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Gender differentiation in higher education: Choice of field of study and labour market outcomes in Spain and Germany

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Abstract

This paper investigates to what extent gender differences in the distribution across fields of study for tertiary graduates affect unemployment and employment in a low-status job. By comparing Germany and Spain we examine how the relationship between gender, field of study, and the selected labour market outcomes is influenced by different institutional contexts. In order to answer our research questions we use two large labour force datasets for both countries from the year 2000. With respect to unemployment and low status jobs, female tertiary graduates are more disadvantaged than male graduates in Germany and Spain. Taking into account field of study, this disadvantage is reduced substantially for the selected labour market outcomes in both countries. Field of study, however, seems to matter more in Spain with respect to unemployment. No clear conclusions can be drawn on specific advantage in either typically male or female fields. Nevertheless, one remarkable finding is that female engineering graduates are significantly more often unemployed and find themselves more often in low-status jobs than their male counterparts.

1. Introduction

During the last decades, two trends can be observed with respect to higher education: On the one side, most European countries experienced an enormous growth of tertiary education and on the other side, women's attainment in higher education has steadily increased and reached parity with men (Müller und Wolbers 1999; OECD 2004). At the same time, almost all European member states were confronted with high rates of unemployment, often followed by the introduction of deregulation and flexibility reforms in the labour market. As a consequence, labour market integration became more fragmented and working careers increasingly involved periods of temporary and part-time employment as well as periods of unemployment (Esping-Anderson und Regini 2000). The achieved parity of women and men with respect to tertiary degrees has been perceived as a positive step toward a more gender-egalitarian society. Nevertheless, women and men continue to choose gender-typical fields of study (Bradley 2000; Charles und Bradley 2002; Jacobs 1995). It is well documented in the literature that these gender typical choices of fields of study are associated with unequal opportunities on the labour market (for example: Roksa 2005).

In order to find out how the differences in choice of field of studies in tertiary education contribute to gender differences on the labour market a comparative research approach is very valuable for two reasons: firstly, earlier research has demonstrated that the connection between education and labour market outcomes varies considerably across countries (Allmendinger 1989; Müller und Gangl 2003; Shavit und Müller 1998). This line of sociological research, however, has focused mainly on how features of secondary education such as the extent and system of vocational training and the degree of standardisation influences the transition from school to work within a country. Differences in the institutional setup of higher education systems and their linkage to the labour market have received only scant attention. Secondly, besides the aforementioned cross-national commonalities in the gender typed pattern of distribution in fields of study there is considerable between-country variation with respect to gender segregation (Charles und Bradley 2002; OECD 1997).

This paper contributes to the understanding of the relationship between gender, field and level of tertiary degree and the labour market by comparing recent graduates of tertiary education in Germany and Spain with respect to unemployment and low status jobs. This analysis, which is mainly descriptive, is valuable as there are only very few publications on cross-national variations in the effects of field of study in combination with gender on labour market outcomes (Charles, et al. 2001; Kim und Kim 2003; Smyth 2002). Furthermore, the literature has been dominated by studies on the contribution of field of study to the gender wage gap (Daymont und Andrisani 1984; Gerhart 1990; Kalmijn und Van der Lippe 1997; Loury 1997; Machin und Puhani 2003) while other labour market outcomes have been neglected. A comparison between Germany and Spain, is pursued because Germany shows

a greater "exclusiveness" of higher education, with a low share of tertiary graduates in the population, while Spain, which has undergone a rapid increase in tertiary education, has a comparatively high share of tertiary graduates in the population. Furthermore, women have surpassed men in the attainment of tertiary degrees in Spain but not in Germany.

The outline of the paper is as follows: The next section provides some background concerning the influence of the three aforementioned factors "fields of study", "gender" and "institutional context" on labour market achievements. We then present some expectations for the analyses as well as the database and methods. We proceed with a description and discussion of the results of the analyses. Finally, we summarize our results and offer some thoughts on further research.

2. Background

Numerous theoretical approaches have been put forward in order to explain gender differences regarding labour market outcomes. Human capital theory is based on the assumption that individual labour market returns depend on personal endowments, i.e. the individual educational level, occupational training, and job experience. Proponents of human capital theory also argue that women invest less in their human capital due to anticipated future family obligations that lower their occupational chances (Becker 1991, Mincer and Polachek 1974). Following this logic, the amount of gender inequality should be reduced when the difference in the human capital endowment of the sexes is reduced. However, considering the fact that women's educational attainment and labour force commitment has increased while their labour market disadvantage[1] has changed little (Jacobs 1996), this neo-classical economic approach seems insufficient for explaining gender differences in educational returns. As a consequence, when focusing on differences in labour market returns between male and female tertiary graduates the different "axes of stratification" within the higher education system need to be considered. It is necessary to relate the human capital investment not only to the vertical differentiation in different degree levels attained but also to the horizontal dimension of tertiary qualifications (different fields), as a further dimension of educational achievement.

The increasing importance of field of study as a selection criterion for graduates and employers seems also plausible in relation to the aforementioned increase in the share of tertiary students. As Kim and Kim (2003, p. 6) argue: *"in a time of 'mass universities' tertiary education is no longer exclusive privilege for a small part of the population so that the signals for employers are not sufficient for selecting students on the labour market."* Several studies are

[1] The mentioned disadvantages are referring to the still existing gender wage gap (Gerhard 1990, Machin und Puhani 2003). Several researchers like Ianelli and Smyth (2004) have demonstrated that other gender specific disadvantages, like the occupational status attainment, have diminished.

supportive of this assumption (Hansen 2001; van de Werfhorst und Kraaykamp 2001; Wolbers 2003) even though they do not investigate trends over time.

It can also be assumed, that specific fields of study determine economic returns on the labour market in different ways. Graduates from fields directly connected to prestigious professions or higher economic demands such as medicine, law, engineering, or business in general attain higher incomes than those from fields of study related to education, art, and humanities. Here also the gender relevance comes to the fore, because the prestigious occupations are connected to typical-male fields of studies whereas the typical female subjects lead to the 'less promising' occupations

When addressing the cross-national variation of labour market careers of school leavers, the institutional structure of education and training systems is at the centre of many explanatory frameworks Gangl (2000). As already mentioned, most research is based on broad classifications of educational systems, focusing particularly on secondary education. The different explanations refer mostly to the variation of countries concerning their "qualificational" and "organisational space" (Maurice, et al. 1986)[2], their level of standardisation (the extent to which the educational system meets the same standards nationwide) (Allmendinger 1989) or the extent and the system of vocational training (Shavit and Müller 1998). Nevertheless, the vocational dimension seems of particularly limited value when attempting to classify systems of higher education. Since educational policy in higher education is predominantly made at the national level, the standardised dimension is less valuable in tertiary education(van de Werfhorst 2004). Following Kim and Kim's approach (2003) countries with a "weak" signalling function of educational level (i.e. the United Kingdom) use additional selection criteria, like fields of study. Consequently, they argue that the higher the share of tertiary graduates in a country is, the higher the importance of a specific field of study as a selection criterion on the labour market will be.

Systems of tertiary education in Germany and Spain

When comparing patterns of tertiary education expansion in Germany and Spain interesting differences are revealed: As figure A1 shows, the share of persons aged 25 to 34 with a tertiary degree changed from 19,6% in 1991 to 22,3% in 2000 in Germany. During the same period, this share more than doubled in Spain (from 16,3% to 34,1%). Moreover, the tremendous increase in tertiary level education has been largely supported by a steady rise in female participation rates. This particularly applies to Spain where up to 40% of tertiary graduates are women, which is 20% higher than in the case of their German counterparts.[3]

[2] Germany, for example, is a typical "qualification space" where skills are learned in a vocationally oriented schooling system and employers select employees based on these assets.

[3] The given percentages are based on data form the OECD for women and men aged 25-34. In the used dataset

-figure A1 about here -

The distribution of men and women across fields of study shows a similar pattern in both countries. As figure A2 illustrates[4], in each country females are underrepresented in engineering and architecture: 21% of all engineering graduates in Germany are female compared to 40% in Spain, while 31% of all German architecture graduates are female compared to 19% in Spain. In respect to the "feminisation" of majors, which means that more than a half of the graduates are women, social sciences, teaching, culture, and art are comparable in both countries.[5] In Spain, however, more women than men studied the prestigious fields medical science[6], law and economics, while women in Germany have marginally surpassed men only in medical science.

- figure A2 about here -

Turning to relevant institutional characteristics of both countries, the connection between education and labour market outcomes is generally considered strong in Germany – at least with respect to educational level (Müller Shavit 1998). In Spain, however, educational credentials – particularly tertiary qualifications – structure the transition to the labour market less clearly (Iannelli und Soro-Bonmatí 2003).

The organisation of tertiary education is slightly different in both countries. Germany can be characterized as a binary tertiary system with "Fachhochschulen" on the one hand and universities on the other. These institutions differ in several aspects, like the length of studies, "qualification" aspects, and practical orientation. In general, "Fachhochschulen" have a shorter duration of study, offer specialisation in a few applied subjects, and provide students with work-oriented training. This is very different in Spain where universities provide almost solely for tertiary education. The Spanish system is organised sequentially and three cycles of tertiary education and four different types of university establishments can be distinguished, leading to a complex degree system. Moreover, the Spanish educational system is oriented towards rather flexible curricula and programmes, which sometimes make it hard for employers to evaluate the skills a graduate has gained (Mora 1996).

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for Spain the percentage of tertiary degree holders aged 20-35 is to some extent higher.

[4] The figure exemplifies the "sex-typing profiles" of Germany and Spain on the level of twelve fields of study for graduates aged 20-35. In this respect we focus on the gender distribution within a specific field of study.

[5] Due to the fact that countries differ in their female representation in tertiary education, another approach to classify a specific field as feminized would be to take the overall participation rate of females in tertiary education in a given country and define the cut offs +/-20% as typical male and typical female subjects.

[6] The percentage of women, who finished a tertiary degree in medicine (in all three cycles) in Spain, was 65% for the year 1999-2000, see INE (http://www.ine.es).

Available research has shown that returns to lower level tertiary degrees ("Fachhochschule") in Germany are lower than those to higher level tertiary degrees (Universities), even though returns to "Fachhochschule" have nearly reached the University level (Müller, et al. 2002). In Spain, short-cycle courses of study, offered at so called "*escuelas"*, similarly lead to lower returns than long-cycle courses (Mora, et al. 2000).

3. Expectations, Data and Methods

Considering the differences between the German and Spanish higher education system, we have certain expectations regarding the effects of our main independent variables: First, drawing from earlier research, we expect a negative association between being female and the selected labour market outcomes (the risk to be unemployed and to have a low status job) in our analyses in both countries. Second, taking into account the influence of field of study, we assume that the expected gender effect is mediated by the unequal distribution of men and women across different subjects resulting from the gender specific choice of fields of study. Furthermore, we expect that with an increased share of tertiary graduates and a lower connection of the tertiary system with the labour market, field of study becomes more important as a selection criterion on the labour market. Consequently, the effect of field of study should be stronger in Spain, with a higher share of tertiary graduates in the population and looser connection of the university system to the labour market, than in Germany. Finally, we are interested in whether the effect of fields of study on the selected labour market outcomes differs between women and men and in how far an atypical choice of field of study leads to higher rewards on the labour market than a gender-typical choice. Here we have no clear-cut expectations because of the ambiguous findings in the literature. On the one side, it has been demonstrated that typical female occupations are connected to lower returns on the labour market than typical male occupations. Moreover, even when men and women work in the same occupation, men are more likely to work in higher and more prestigious positions than women (Hakim 1979, p.19). On the other side, a recent study on the Israeli labour market found some divergent results, showing better returns for both men and women in gender atypical occupations (Katz-Gerro und Yaish 2003)[7].

Data and Methods

For our analyses we use the Spanish Labour Force Survey (Encuesta de Población Activa) and the German Labour Force Survey (Mikrozensus) for the year 2000. These surveys provide detailed information on the social and economic situation as well as educational

[7] Even though these arguments refer to occupations we think that they can be extended to possible effects of typically male or female fields of study.

achievements of the population in each country. In order to test our assumptions we study two labour market outcomes.

First, we examine the effect of fields of study and gender on the risk of being unemployed at the time of the survey. We use the International Labour Organization's (ILO) standard definition of unemployment[8]. Second, we analyse how gender and field of study affect the probability of a person with a tertiary degree holding a job that we classify as a low status job.[9] In order to construct the low status variable we first generated the International Socio-Economic Index of Occupational Status (ISEI), which was developed by Ganzeboom et al. (1992). The ISEI consists of weighted averages of standardized measures concerning the income and education of incumbents of each occupation comprised by the ISCO88 classification. We dichotomized the resulting index: Persons with less than 50 points on the ISEI index were classified as holding a low status job for a person with a tertiary degree whereas persons with 50 points and more on the scale were classified as adequately employed. Another way to think of the low status variable is that tertiary degree holders occupying a low status job are in a "vertical education mismatch". In all multivariate analyses we us the same set of independent variables (table A1).

- table A1 about here-

Apart from our main variables of interest, gender, and field of study, which is coded in 12 categories, we also include in our analyses measures for level of tertiary degree as well as age. For Germany, graduates from traditional universities are assigned to the higher-level tertiary degree group, whereas graduates from universities of applied sciences (Fachhochschulen) comprise the lower tertiary degree. Due to the different structure of tertiary education in Spain the classification into a higher and lower level group is somewhat different. Here only graduates with a higher-level university (long-term courses of five to six years) and doctoral degree are coded to the higher tertiary degree group.

In the following section, the means of the independent variables (see table A2) for both men and women in Germany and Spain are presented in order to give an account of the composition of our analytical sample. We then present some descriptive analyses of the outcome variables, followed by multivariate analysis of our outcome variables with logistic regression models. Logistic regression models estimate the probability of status 1 compared to status 0 as a function of the independent variables. For all of the analyses we restrict our

[8] The ILO definition classifies persons as unemployed when they are not in employment at the time of the survey, are currently available and willing to take up paid work within two weeks, and were actively seeking work in the last four weeks.

[9] We dichotomized the resulting index: Persons with less than 50 points on the ISEI index were classified as holding a low status job, whereas persons with 50 points and more on the scale were classified as adequately employed.

sample to the economically active population and exclude foreigners and students. Furthermore, only tertiary graduates in the age from 20-35 are included in the analyses in order to reduce problems due to unobserved differences between men and women in their labour market careers. More importantly, a restriction to this age group is necessary because labour market entry for this group occurred in time of educational expansion in both countries.

- table A2 about here -

In table A2 we see that even though women have increased their share of graduates with tertiary degrees compared to men women have not reached parity in Germany: Only 42% of all respondents with tertiary degrees in the analytical sample are female in Germany, as opposed to 58% in Spain. Looking at the distribution of the composition of male and female graduates in Germany and Spain it can be seen that German women with tertiary degrees more often attend University (higher level degree) than “Fachhochschule” (lower level). This difference between men and women in Germany is most likely a result of the different curricula offered at higher and lower level tertiary institutions. The more technical orientated “Fachhochschulen” attract fewer women than the traditional university curricula. Of all Spanish women in the sample, 56% have a higher-level tertiary degree compared to 50% Spanish women with a lower tertiary degree. The women in our sample are slightly younger than the men sampled in both Spain and Germany. The table also shows the overall country differences in the distribution of graduates in different fields as well as the distribution of women and men in different fields of study. Looking at overall differences in the output of graduates one can see striking differences. While more than a quarter (27%) of all German graduates in the sample acquired a degree in engineering, natural and life sciences only 7% did so in Spain. In Spain on the other hand, more students graduated in Law, Economics and Social Sciences (40%) compared to 27% in Germany. As previously pointed out by other authors (OECD 1993; Teichler 2000) this variation in the output of higher education graduates certainly deserves more attention in the literature concerned with the linkage between higher education and the world of work.

One can see clear similarities between both countries in the distribution of males of females over different fields.

4. The effects of gender and field of study on selected labour market outcomes in Germany and Spain

4.1. Descriptive Analysis

Unemployment

As a first step in the empirical analysis, figures A3 and A4 provide results of simple cross tabulations between gender and unemployment and between field of study and unemployment. Turning first to unemployment risks of tertiary graduates in Germany and Spain, clear gender-specific variations can be observed in both countries. In general, the highest risk of being unemployed can be found among Spanish tertiary graduates, particularly among women. Women in Germany are also more often unemployed than men – even though the overall level of unemployment is much lower than in Spain and the gender differences less pronounced (figure A3).

- figure A3 about here -

Concerning the risk of unemployment in respect to different fields of study some key findings can be observed in figure A4.

- figure A4 about here -

There is more variation in unemployment by field of study in Spain than in Germany.[10] In Spain the highest proportion of unemployed tertiary graduates are those of life sciences (39%), followed by culture (28%) and teaching (27%), whereas the graduates of architecture have the lowest share (11%). In Germany, the subjects most affected by unemployment are art (7%), medical sciences (5%) and law (5%), while the lowest risk can be found for graduates in engineering (2%). Considering the overrepresentation of women in arts and their underrepresentation in engineering, the disadvantage found in the bivariate analysis could – at least to some extent – be connected to the gender specific choice of field of study.

[10] This finding can be quantified when computing a simple analysis of variance with unemployment as response variable and field of study as factor variable. The variance *between* groups is much larger in Spain (15.982) than in Germany (1.252).

Low status jobs

The second labour market outcome examined is the probability of tertiary graduates to be in a low status job that can be considered as a vertical mismatch. Looking at figure A5 it is obvious that overall Spanish graduates more often hold a low status jobs than graduates in Germany. Moreover, in both countries women more often work in low-status jobs than men.

- figure A5 about here -

A look at the different fields of study reveals that graduates seem to be affected quite similarly by low status jobs in both countries (figure A6). Again, fields with higher shares of female graduates more often seem to be connected to low status jobs than typically male fields: Graduates from economics, social sciences, and teaching are more often in low status jobs than those in architecture and engineering. In addition, the occurrence of a low status job varies considerably across fields in both countries even though the inspection of figure A4 does not necessarily reveal more variation in either country.[11]

- figure A6 about here -

4.2. Multivariate Analyses

In order to follow up on our assumptions concerning gender, field of study, and institutional context more systematically, we estimate a set of nested logistic regression models for both labour market outcomes, separate for both countries. In model A we include gender and the control variable age. In model B we further add the variable for higher tertiary degree in order to see whether gender differences in unemployment can be explained by the differential distribution of men and women over level of tertiary degree. In model C dummy variables for field of study are introduced to see whether the gender specific distribution over field of study explains the female disadvantage. Finally, in model D, interactions between the level of tertiary degree, field of study, and gender are estimated to test the assumptions about gender differences in the probability of being unemployed or occupying a low status job in typically female or male fields.

4.2.1.Unemployment

- table A3 about here -

[11] As in the analysis of unemployment, an analysis of variance was computed to compare variation in lower status jobs across fields of study clusters for Germany and Spain. The difference between groups was almost exactly

Looking at the log-odds coefficients (logits)[12] of "female" in model A both for Germany and Spain (table A3) the bivariate finding that women are significantly more likely to be unemployed than men in both countries is confirmed when controlling for age. Introducing level of tertiary degree (model B) does not alter the gender coefficient substantially, even though in Germany graduates from universities are more likely to be unemployed than graduates from the "Fachhochschule". The introduction of field of study on the other hand leads to a marked reduction of the coefficient for female in both countries even though the gender coefficients in both country models remain significant. The log-odds coefficient for gender is reduced from 0.542 to 0.495 in Germany and, even more noticeably, from 0.426 to 0.306 in Spain. Judging from the model fit statistics, the introduction of field of study leads to a larger increase in model fit in Spain and in Germany: Pseudo R^2 (McFadden) increases from 0.015 to 0.022 in Germany and the more pronounced from 0.064 to 0.084 in Spain; the Likelihood-Ratio Test statistic also increases more markedly in Spain than in Germany.

Compared to respondents in the reference category (teaching), graduates of the arts and "other" fields are significantly more likely to be unemployed in Germany. In Spain, however, graduates from life sciences, architecture, medical sciences, economics as well as other fields are less likely than graduates from teaching to be unemployed. Only graduates from the culture field are more likely than those with a teacher´s education to be unemployed. Again, this result confirms the trend observed in the bivariate analysis that in both countries typically female fields are more often associated with unemployment than typically male fields.

In the last model (D) we let the dummy variable for female interact with higher tertiary degree and field of study to investigate whether there are gender differences with regard to unemployment in specific fields or degree level. Overall, the comparison of the Likelihood Ratio Test statistics from model D and model C reveals that the interaction effects do not improve the overall fit of the model. In both countries, however, female engineering graduates are significantly more likely to be unemployed than male graduates of this field. This effect is even more pronounced in Germany than in Spain. In Spain, female graduates in culture are also more likely to be unemployed than male graduates.

Finally, in order to give a more intuitive interpretation of the results of the logistic regression analysis and to avoid that the effects of different fields are only shown in comparison to the reference category (teaching), we calculate predicted probabilities of being unemployed for women and men in both countries according to model D in table A3 (figure A7). The

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the same (35.69 for Germany and 35.77 for Spain).

[12] Positive coefficients indicate that the probability of unemployment is larger for the group coded to 1 compared to the group coded to 0.

predicted probabilities are computed for men and women with a higher tertiary degree and mean age.

- figure A7 about here -

Again, the figure confirms the bivariate finding that the probability of being unemployed varies substantially more in Spain than in Germany. The high risk of unemployment for life sciences graduates in Spain (over 30%) as well as female graduates of culture fields is startling. There is no clear indication that female graduates of typically male fields are less likely to be unemployed than men in either county.

Overall, most of the previous expectations are confirmed in the analysis of unemployment. Female tertiary graduates are more disadvantaged with regard to unemployment than men in both countries; the different distribution of men and women over fields of study leads to a considerable reduction of the gender disadvantage – as expected, more noticeably in Spain than in Germany. Finally, no clear pattern with respect to the assumptions in the literature regarding female advantages or disadvantage in typically female (or male) fields could be observed when differences between men and women in the 12 fields of study were tested. One important finding is, however, that female engineering graduates seem to face a higher risk of unemployment in Germany and Spain.

4.2.2. Low status jobs

For the multivariate analysis of low status jobs (table A4) we estimated the same set of regression models as we did in the analysis of unemployment.

In model A we see that women are significantly more likely to hold a low status job in both countries but that the female disadvantage is more distinct in Germany. Contrary to the analysis of unemployment, the next model (B) shows that adding the level of tertiary degree variable has a significant impact regarding the status outcome, as the model fit increases considerably in both countries. Graduates with a higher-level tertiary degree are less likely to be in a low status job in both countries. Surprisingly, the main effect for gender somewhat increases when tertiary degree type is added to the model in Germany implying that women would be even more disadvantaged with respect to low status jobs if it was not for their overrepresentation in higher level tertiary degrees[13]. In Spain, however, the gender coefficient is marginally reduced with the introduction of level of tertiary degree.

The introduction of field of study in model C leads to a similar reduction of the gender main effect in Germany (0.660 to 0.530) and Spain (0.152 to 0.042). However, the effect for female loses its statistical significance in the Spanish case. The addition of field of study in

[13] Of all German women in the analysis 62% hold a higher level tertiary degree (see table A2 in Appendix)

both countries leads to an improvement of model fit that is quite similar in both countries: Pseudo R^2 increases from 0.031 to 0.068 in Germany and from 0.034 to 0.69 in Spain; the Likelihood-Ratio Chi^2Test statistic shows a relatively analogous improvement in model fit. Thus the assumption that the reduction of the gender disadvantage due to field of study should be stronger in Spain cannot be verified here.

Inspecting how graduates of different fields fare in comparison to graduates of teaching does not reveal any surprises. When controlling all other variables for Germany, graduates of the typically male fields, natural sciences, engineering, and architecture, as well as of the more gender integrated fields, medical sciences and law, are less likely to hold a low status job than teaching graduates. Graduates from culture fields, however, are more likely to be in a low status job. The disadvantage of economics graduates is somewhat surprising given the supposedly good labour market prospects of graduates of this field. The Spanish case shows that graduates from law, economics, socials sciences and culture are disadvantaged compared to teaching graduates whereas only medical science and architecture are at an advantage with respect to low status jobs. Considering that more women than men in our sample have degrees in law, economics, social sciences, and the culture and art fields in Spain, shows that, if anything, fields chosen more frequently by females (with the exception of medical science in Spain) lead to a higher risk of holding a low status job.

In the next step interactions of gender with field of study and level of tertiary degree are introduced again (model D). Here the model fit increases significantly for both Germany and Spain even though the increase in Spain seems to be solely driven by the residual category "other" since no other interaction coefficient is significant. In Germany, however, 6 out of 12 fields show significant gender differences. Women seem to be more disadvantaged than men in life sciences, engineering, medical sciences, economics, arts and in the "other" field than men, controlling for higher tertiary degree and age. Again, in order to illustrate the effects of model D more intuitively, a plot with predicted probabilities is shown for respondents with higher tertiary degree and mean age (figure A8).

- figure A8 about here –

As in the analysis of unemployment no clear pattern regarding typical female or male fields can be observed. For graduates with a higher tertiary degree and mean age in Germany women's predicted probability of holding a low status job is lower than for men in only one of twelve fields (teaching).[14] The gender specific pattern is much more erratic in Spain. Predicted probabilities of holding a low status job are lower for women in natural sciences, medical sciences, social sciences, teaching, culture, art, and, above all, in the "other" field.

[14] Nevertheless the interaction between female and teaching in model D, Germany, was not significant (ß=-0.127,

Yet, these predictions should be handled with caution because of the lack of statistical significance of the interaction effects (with exception of “other”).

Going back to the expectations regarding the influence of gender, field of study, and institutional context on the outcome variables, it is clear that female graduates in both countries are disadvantaged with respect to holding a low status mismatch job. As assumed, field of study can partly explain this disadvantage. However, no case can be made for a stronger effect of field of study in Spain even though the gender effect becomes insignificant once the field dummies are added to the model. In addition, the level of tertiary degree has a strong impact on chances of occupying a low status job. Graduates of the lower level degree programs are more exposed to the risk of holding a lower status job. However, this effect does not explain the female disadvantage.

Finally, unlike in the analysis of unemployment gender differences within a number of fields can be observed – at least in Germany. Even though no clear pattern with respect to advantages or disadvantages for women in gender-typical field emerged, the analysis still revealed that gross field effects are sometimes restricted to female graduates only. Furthermore, female engineering graduates in Germany seem to be more disadvantaged not only with respect to unemployment but also with regard to holding a low status job.

5. Discussion

The purpose of this paper was to examine how gender specific distribution across fields of study in tertiary education lead to gender differences in unemployment and low status jobs on the labour market. By comparing Germany and Spain, the role of two distinct institutional contexts that mediate the relationship between gender, field of study, and labour market outcomes was examined. Due to the higher share of graduates with tertiary education, we expected that field of study is more important for labour market outcomes in Spain than in Germany. Furthermore, we investigated whether the choice of gender-typical or atypical fields is associated with benefits or penalties on the labour market for women compared to men.

The findings can be summarized as follows. Not surprisingly, female tertiary graduates are more often unemployed than male graduates in both Germany and Spain. This disadvantage for women in both countries is reduced substantially, however, when field of study is taken into account. The female disadvantage is not affected by the level of tertiary degree in either country. Furthermore, typically female fields are more often affected by unemployment than typically male fields. Second, as expected, field of study seems to matter more in Spain, where the gender disadvantage is more reduced than in Germany. Third, considering the

s.e.=0.221)

assumption of a female advantage over men in typically male fields, no clear conclusions can be drawn. The only striking finding is that female graduates in the typical male field engineering are disadvantaged compared to male graduates of the field. This result contradicts the assumption of gender advantages in atypical fields.

With respect to low status jobs the results show interesting similarities and differences compared to the analysis of unemployment. Parallel to the unemployment analysis, the female disadvantage with regard to low status jobs is substantially reduced by field of study. In contrast to the previous analysis, the level of the tertiary degree plays an important role for low-status jobs. Graduates with higher-level tertiary degrees are less affected by low status jobs even though the gender disadvantage is not affected by this variable. Concerning the differences in influence of field of study the impact seems to be the same in both countries. Thus the hypothesis of a stronger influence of field of study in Spain is not supported here. Finally, a conclusive pattern of female advantages in typically male fields or male advantages in typically female fields cannot be found for low status jobs either. No significant gender differences are found within the fields in Spain, with the exception of the residual category "other". In Germany female graduates are disadvantage in both typically female and typically male fields. Engineering is once again a field where women are disadvantaged compared to men. Considering that, policy makers, particularly in Germany, have invested considerable resources to increase female enrollment in engineering fields. These efforts seem questionable considering the relative disadvantage we find for female engineering graduates with respect to unemployment and low status jobs.

In light of these results the following conclusions can be drawn. Above all, field of study matters. In order to get a complete picture why and how female graduates of tertiary education are disadvantaged on the labour market, studies need to take into account the gender specific distribution of graduates over different fields. The assumption that field of study should matter more in Spain than in Germany can only be confirmed for unemployment. It should be pointed out, however, that when taking into account the different structure of the higher education system and the labour market in both countries, the similarities in how level of tertiary degree and field of study mediate gender disadvantages in unemployment and low status jobs is quite remarkable.

Returning to the theories that try to explain gender differences on the labour market it seems that models exclusively focusing on human capital of graduates do not fully capture female lower returns on the labour market. Even after controlling the level (of tertiary degree) and type (field of study) of graduates of tertiary education, women's disadvantage does not disappear.[15] The underlying reasons for why women are more often in unemployment or low status jobs cannot be answered with the analyses here. Nevertheless, as the analysis of

[15] With the exception of the low-status analysis of Spain, where introducing field of study made the gender

gender differences in engineering demonstrated, women seem to be disadvantage even if they choose a typically male field. In order to achieve parity with men in respect to the labour market outcomes, demand side factors must be held accountable.

Finally, a sound theoretical framework that classifies systems of tertiary education and their relationship to the labour market and that accounts for vertical and horizontal differentiation is needed. Moreover, it will be necessary to include more countries in the examination to scrutinise the effects of different institutional contexts more systematically. In order to understand the relationship between educational choices in higher education and labour market outcomes, longitudinal data with more detailed measures is needed for the estimation of causal effects.

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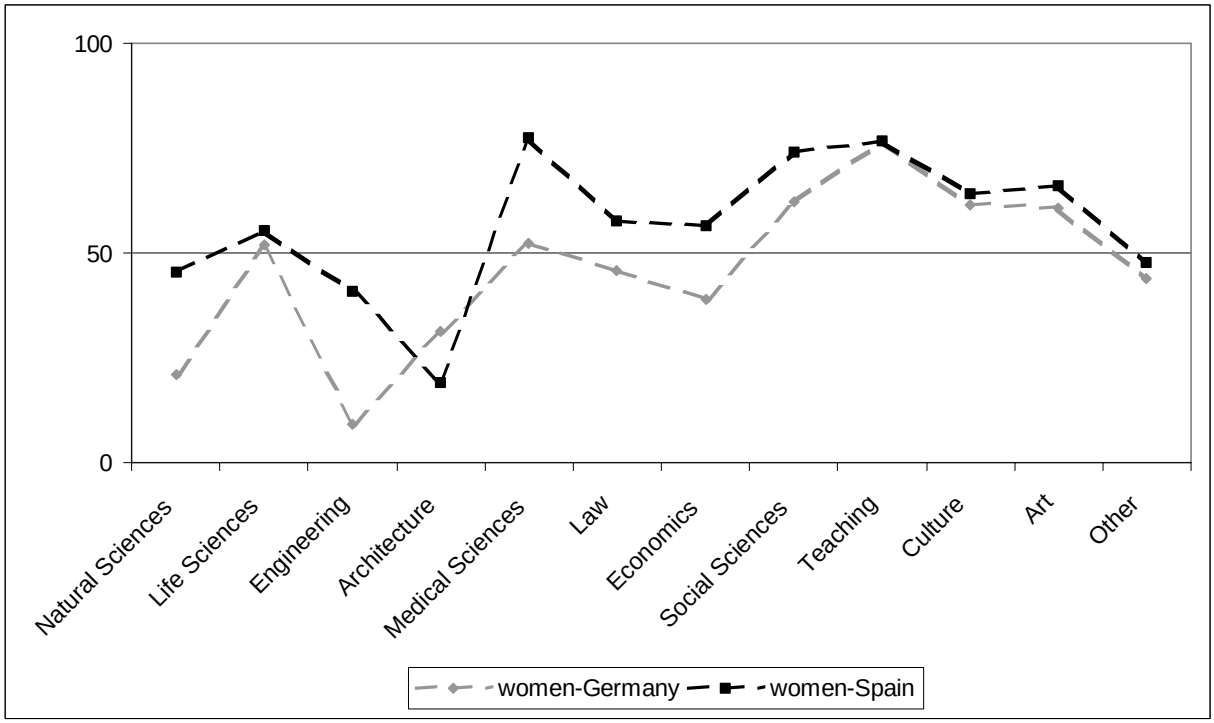
Appendix (Figures and Tables)

Figure A1: Percentage of population (25-34) that has attained tertiary education, 1994-2001

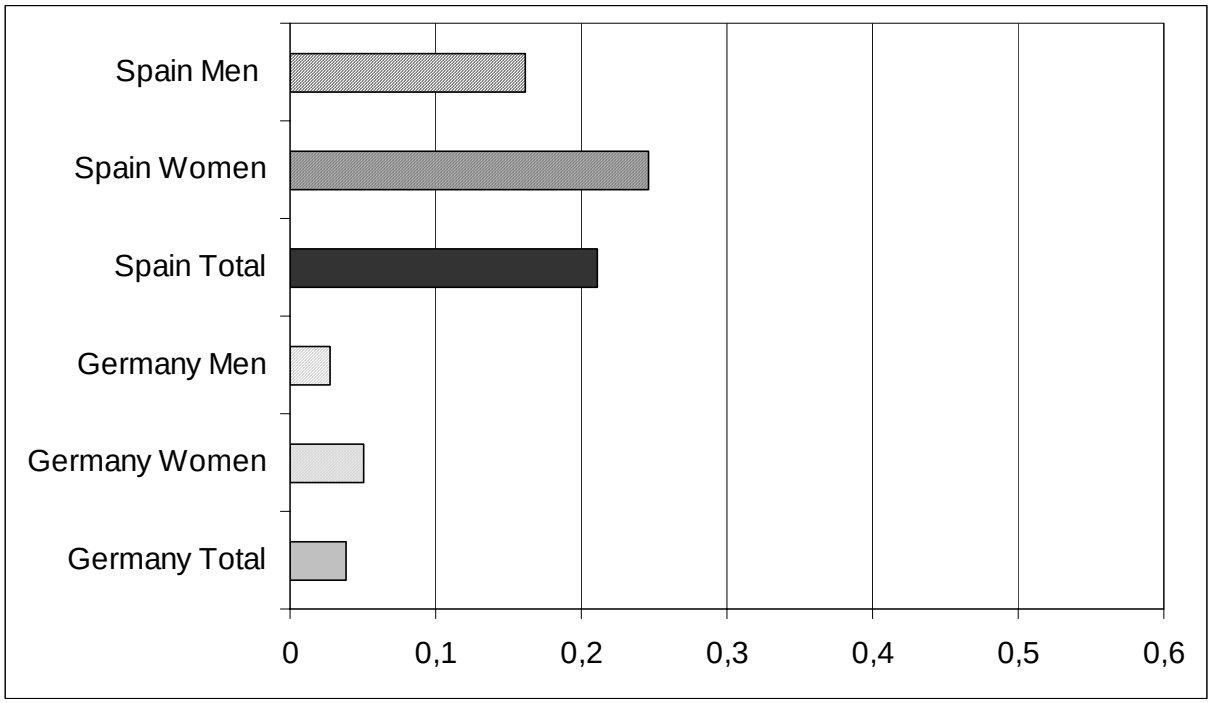
Source: OECD2003

Figure A2: Percentage of female graduates aged 20-35 by fields of study (12) in Germany and Spain, 2000



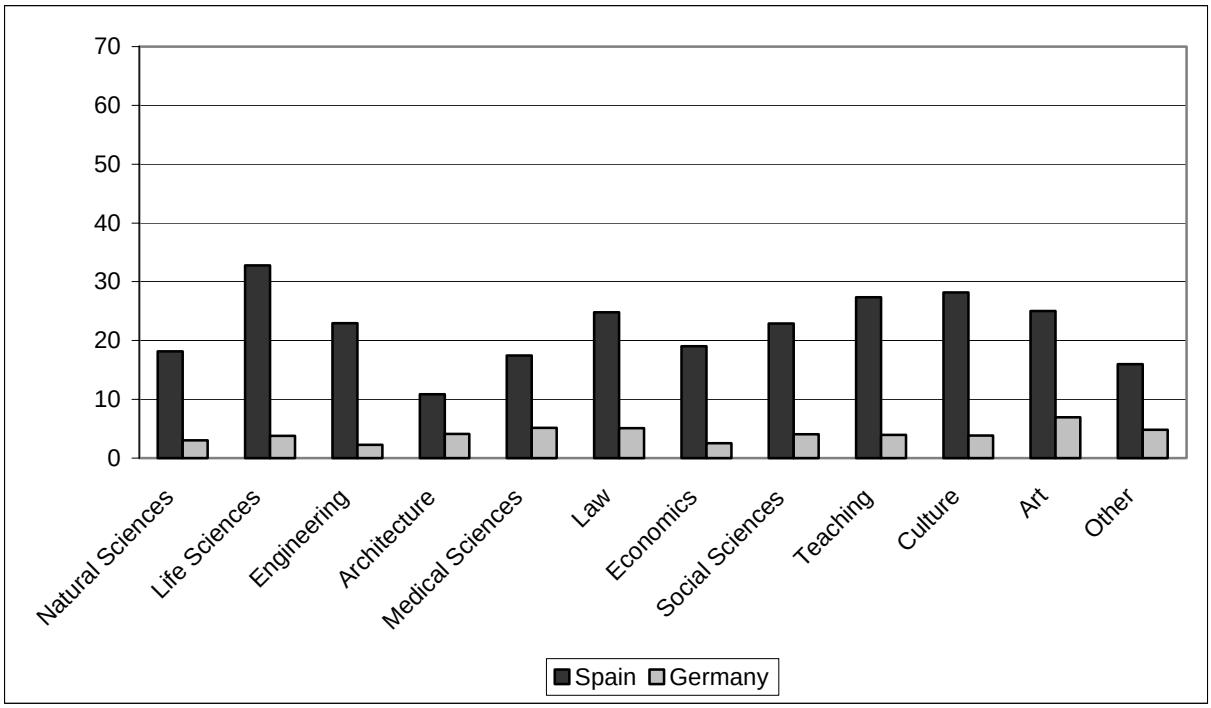
Source: Mikrozensus 2000, EPA 2000, own calculations

Figures A3: Bivariate association between unemployment and gender



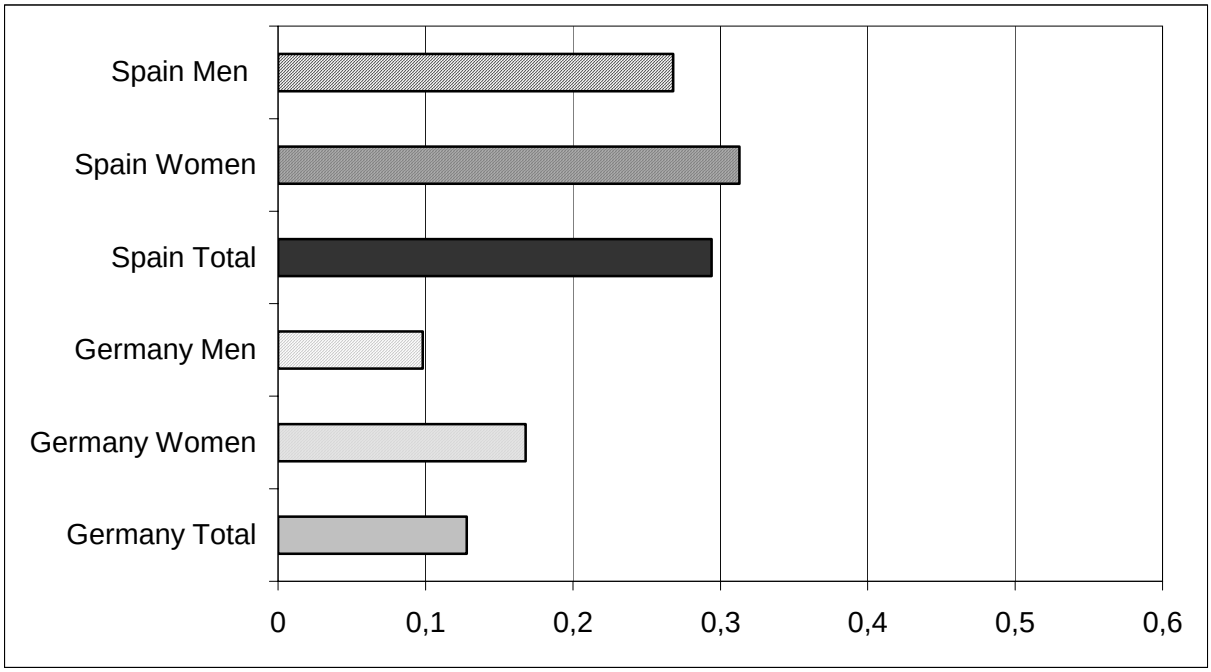
Source: Mikrozensus 2000, EPA 2000, own calculations

Figures A4: Bivariate association between unemployment and field of study



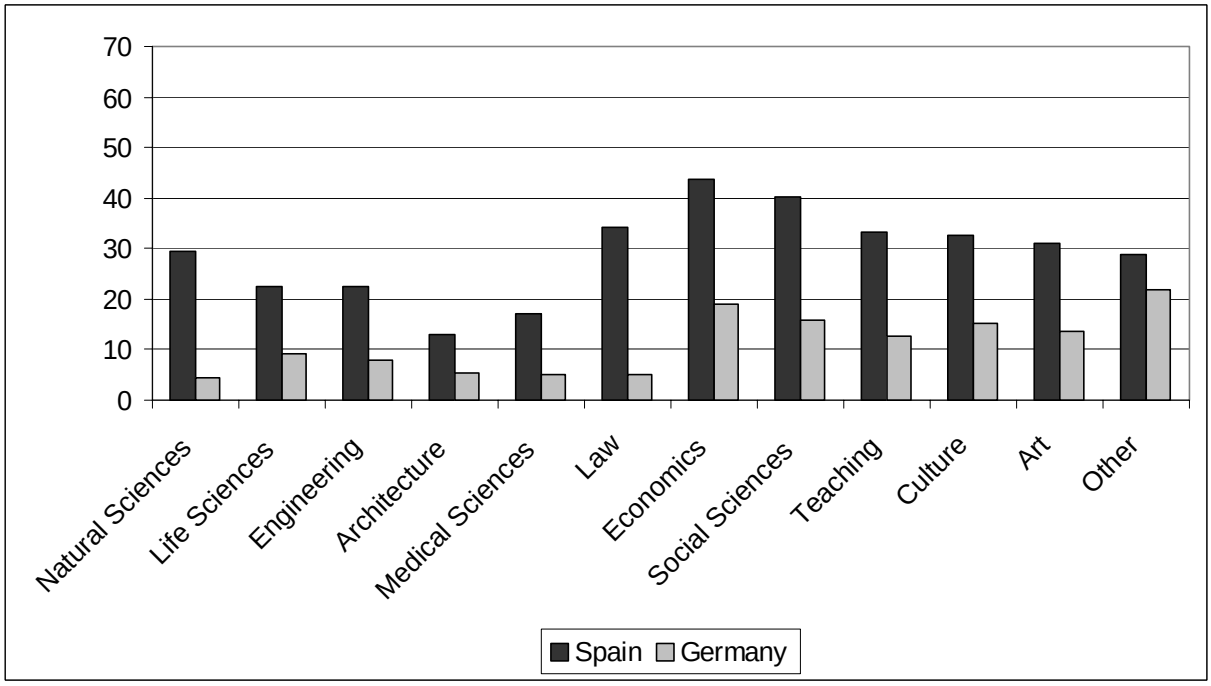
Source: Mikrozensus 2000, EPA 2000, own calculations

Figures A5: Bivariate association between low status and gender



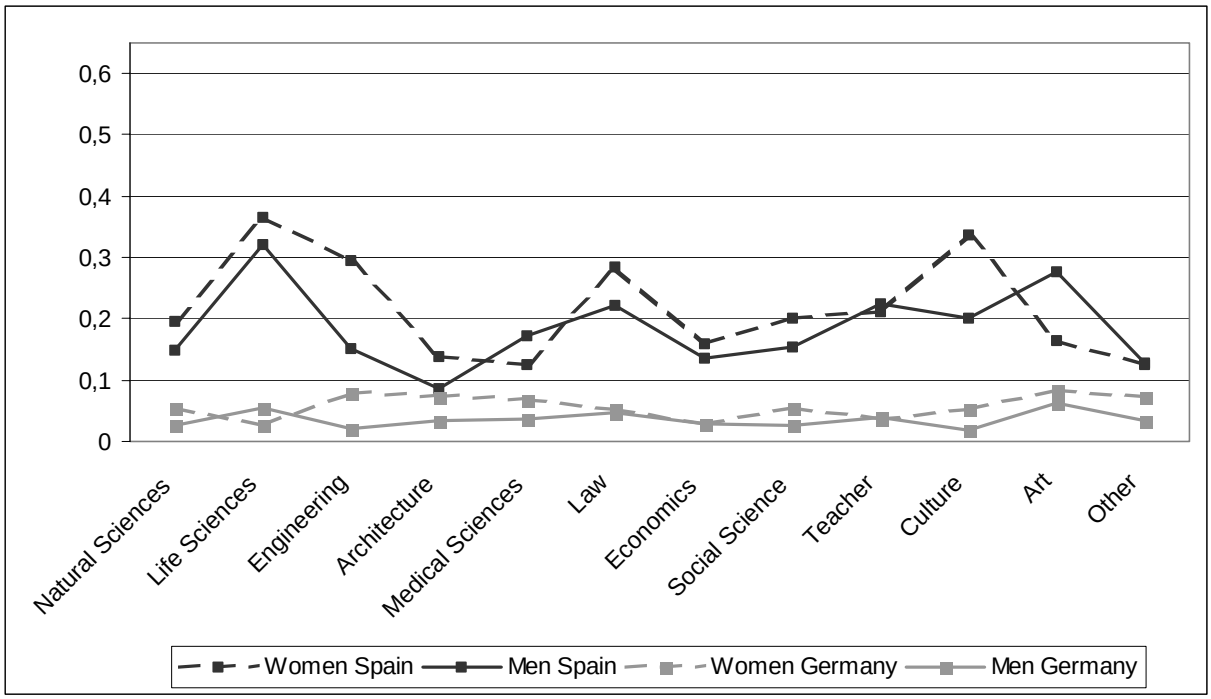
Source: Mikrozensus 2000, EPA 2000, own calculations

Figures A6: Bivariate association between low status and field of study



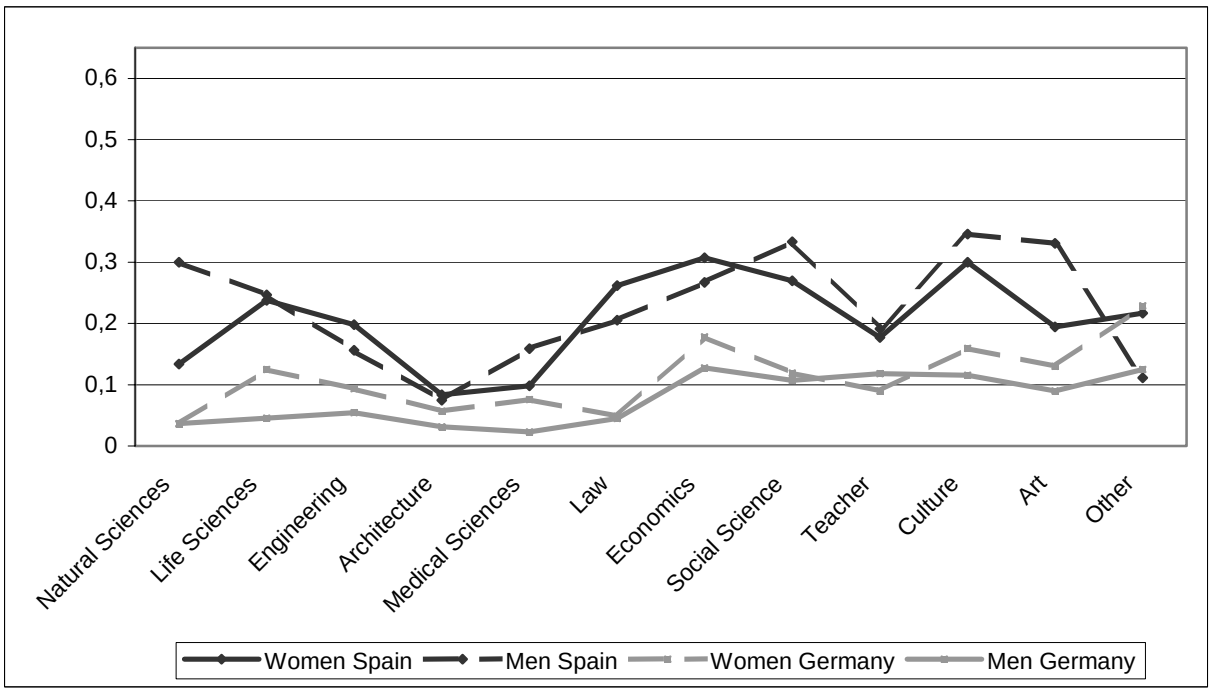
Source: Mikrozensus 2000, EPA 2000, own calculations

Figure A7: Predicted Probabilities for Unemployment =1. For Men and Women from different fields of study in Germany and Spain. Estimated Values from Modell D.



Source: Mikrozensus 2000, EPA 2000, own calculations
Note: Age held constant at mean, Higher Tertiary Degree held constant at =1.

Figure A8: Predicted Probabilities for Low Status =1. For Men and Women from different Fields of Study in Germany and Spain. Estimated Values from Modell D.



Source: Mikrozensus 2000, EPA 2000, own calculations
Note: Age held constant at mean, Higher Tertiary Degree held constant at =1.

Table A1: List of independent variables

Variable name	Variable Description
Female	1= woman, 0=men
Higher Tertiary Degree	1= Higher level tertiary degree (Casmin 3b), 0=Lower level t. degree (Casmin 3a)
Field of Study	12 Dummy Variables - Natural Sciences (including Physics, Mathematics & Computer. Sciences) - Life Sciences (incl. Biology, Chemistry & Pharmacology) - Engineering - Architecture (incl. Construction Sciences) - Medical Sciences (incl. Veterinary and Human Medicine) - Law - Economics (incl. Business Sciences and Economics) - Social Sciences (incl. Psychology, Sociology, Political Science, Social Work) - Teaching (incl. Sports) - Culture (incl. Languages and Humanities) - Art - Other (including Geography, Gardening/Wood Sciences, Domestic and Nutrition Sciences, Clothing and Textile Sciences, Public Security)
Control Variables	
Age	Age at time of Interview

Table A2: Means of Independent Variables in Analysis (N: Spain=5831, Germany=9392)

Variable name	Germany: Women	Germany: Men	Germany: Total	Spain: Women	Spain: Men	Spain: Total
Female	-	-	0.426	-	-	0.592
Higher Tertiary	0.625	0.547	0.580	0.499	0.562	0.525
Field of Study						
Natural Sciences	0.037	0.100	0.073	0.008	0.012	0.009
Life Sciences	0.051	0.035	0.042	0.021	0.023	0.022
Engineering	0.035	0.247	0.156	0.029	0.052	0.038
Architecture	0.047	0.073	0.062	0.025	0.150	0.076
Medical Sciences	0.074	0.049	0.060	0.136	0.072	0.110
Law	0.060	0.053	0.056	0.120	0.121	0.120
Economics	0.148	0.173	0.162	0.196	0.212	0.203
Social Sciences	0.072	0.032	0.049	0.100	0.048	0.079
Teaching	0.216	0.051	0.121	0.157	0.065	0.120
Culture	0.069	0.031	0.047	0.087	0.061	0.076
Art	0.048	0.023	0.034	0.023	0.018	0.021
Other	0.143	0.133	0.137	0.099	0.167	0.126
Control Variables						
Age	30.409	31.161	30.84	28.664	29.419	28.972

Note: Statistics are based on the analytical sample for the analysis of unemployment.

Table A3: Logistic Regression of Gender, Field of Study on Unemployment for Germany and Spain. Logit-coefficients, standard errors in parenthesis, N=9392 for Germany and N=5831 for Spain

	- Germany -				*- Spain -*			
	Model A	Model B	Model C	Model D	Model A	Model B	Model C	Model D
Female	0.563***	0.542***	0.495***	-0.023	0.423***	0.426***	0.306***	0.205
	(0.110)	(0.111)	(0.120)	(0.403)	(0.070)	(0.070)	(0.074)	(0.223)
Higher Tertiary Deg.		0.256*	0.227	0.256		0.086	-0.121	0.047
		(0.114)	(0.123)	(0.187)		(0.067)	(0.077)	(0.129)
Field of Study[a]								
Natural Sciences			0.052	-0.512			-0.248	-0.523
			(0.277)	(0.417)			(0.373)	(0.590)
Life Sciences			0.095	0.266			0.664**	0.475
			(0.306)	(0.448)			(0.224)	(0.385)
Engineer			-0.067	-0.707			0.034	-0.499
			(0.250)	(0.378)			(0.194)	(0.331)
Architecture			0.361	-0.209			-0.876***	-1.063***
			(0.266)	(0.430)			(0.185)	(0.270)
Medical Sciences			0.407	-0.188			-0.551***	-0.348
			(0.247)	(0.460)			(0.141)	(0.290)
Law			0.367	0.126			0.246	-0.022
			(0.253)	(0.414)			(0.139)	(0.266)
Economics			-0.185	-0.443			-0.426***	-0.630**
			(0.228)	(0.375)			(0.121)	(0.242)
Social Sciences			0.170	-0.529			-0.174	-0.480
			(0.282)	(0.594)			(0.149)	(0.331)
Culture			0.070	-0.807			0.396**	-0.150
			(0.292)	(0.659)			(0.153)	(0.312)
Arts			0.764**	0.426			-0.102	0.268
			(0.271)	(0.498)			(0.239)	(0.411)
Other			0.432*	-0.210			-0.612***	-0.689**
			(0.205)	(0.380)			(0.139)	(0.251)
Interactions w. female								
Higher T. Deg*Female				-0.077				-0.287
				(0.248)				(0.161)
Natutal Sci.*Female				0.879				0.427
				(0.581)				(0.766)
Life Sci.*Female				-0.723				0.282
				(0.661)				(0.476)
Engineering*Female				1.460**				0.932*
				(0.534)				(0.416)
Architecture*Female				0.808				0.346
				(0.554)				(0.422)
Medical*Female				0.785				-0.283
				(0.545)				(0.332)
Law*Female				0.161				0.403
				(0.532)				(0.313)
Economics*Female				0.129				0.275
				(0.488)				(0.280)
Social Sci.*Female				0.880				0.408
				(0.676)				(0.370)
Culture*Female				1.114				0.776*
				(0.736)				(0.359)
Arts*Female				0.392				-0.577
				(0.594)				(0.509)
Other*Female				0.873				0.059
				(0.450)				(0.306)
Age	-0.052**	-0.055**	-0.056**	-0.056**	-0.174***	-0.176***	-0.189***	-0.189***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.010)	(0.010)	(0.011)	(0.011)
Constant	-1.931***	-1.988***	-2.092***	-1.641**	3.361***	3.371***	4.100***	4.215***
	(0.531)	(0.536)	(0.557)	(0.629)	(0.294)	(0.295)	(0.314)	(0.357)
Likelihood-Ratio-Test	-1487.784	-1485.203	-1474.244	-1464.356	-2815.654	-2814.834	-2755.387	-2745.803
Comparison of LR-Test[b]	-	5.16(1)*	21.92(11)*	19.78(12).	-	1.64(1)	118.90(11)*	19.17(12)
Pseudo R^2 (McFadden)	0.013	0.015	0.022	0.029	0.064	0.064	0.084	0.087

*[a]Reference Field=Teaching, [b] Comparison of LR Chi² test statistic with previous Model (df in parenth.), p<0.05, ** p<0.01, *** p<0.001*

Table A4: Logistic Regression of Gender and Field of Study on Vertical Education Mismatch for Germany and Spain. Logit-coefficients, standard errors in parenthesis. N=9196 for Germany and N=4808 for Spain

	- Germany -				*- Spain -*			
	Model A	Model B	Model C	Model D	Model A	Model B	Model C	Model D
Female	0.592***	0.660***	0.530***	-0.127	0.175**	0.152*	0.042	-0.225
	(0.063)	(0.064)	(0.070)	(0.221)	(0.065)	(0.066)	(0.071)	(0.217)
Higher Tertiary Degree		-0.675***	-0.581***	-0.487***		-0.667***	-0.914***	-1.005***
		(0.064)	(0.069)	(0.102)		(0.065)	(0.076)	(0.118)
Field of study[a]								
Natural Sciences			-0.932***	-1.415***			0.252	0.585
			(0.211)	(0.276)			(0.349)	(0.475)
Life Sciences			-0.134	-1.186**			0.379	0.317
			(0.192)	(0.384)			(0.270)	(0.426)
Engineer			-0.400**	-1.006***			-0.024	-0.254
			(0.143)	(0.209)			(0.219)	(0.320)
Architecture			-0.931***	-1.533***			-0.921***	-1.123***
			(0.209)	(0.306)			(0.178)	(0.249)
Medical Sciences			-0.725***	-1.890***			-0.570***	-0.233
			(0.212)	(0.449)			(0.145)	(0.282)
Law			-0.796***	-1.208***			0.359*	0.079
			(0.218)	(0.334)			(0.146)	(0.258)
Economics			0.516***	-0.071			0.630***	0.422
			(0.115)	(0.198)			(0.118)	(0.219)
Social Sciences			0.123	-0.268			0.595***	0.741*
			(0.158)	(0.287)			(0.148)	(0.290)
Culture			0.369*	-0.180			0.750***	0.796**
			(0.159)	(0.297)			(0.163)	(0.288)
Arts			0.130	-0.460			0.340	0.729
			(0.185)	(0.344)			(0.255)	(0.436)
Other			0.665***	-0.092			-0.129	-0.645**
			(0.116)	(0.206)			(0.133)	(0.235)
Interactions w. female								
Higher T. Deg.*Female				-0.190				0.124
				(0.138)				(0.155)
Natutal Sci.*Female				0.302				-0.918
				(0.488)				(0.744)
Life Sci.*Female				1.408**				0.051
				(0.445)				(0.554)
Engineering*Female				0.904**				0.388
				(0.343)				(0.455)
Architecture*Female				0.755				0.347
				(0.428)				(0.429)
Medical*Female				1.556**				-0.451
				(0.510)				(0.329)
Law*Female				0.408				0.418
				(0.446)				(0.316)
Economics*Female				0.714**				0.299
				(0.244)				(0.261)
Social Sci.*Female				0.438				-0.203
				(0.344)				(0.337)
Culture*Female				0.689*				-0.111
				(0.351)				(0.352)
Arts*Female				0.728				-0.619
				(0.408)				(0.541)
Other*Female				1.048***				0.894**
				(0.249)				(0.288)
Age	-0.033**	-0.026**	-0.027**	-0.028**	-0.083***	-0.072***	-0.075***	-0.074***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.009)	(0.010)	(0.010)	(0.010)
Constant	-1.192***	-1.083***	-1.075**	-0.509	1.444***	1.474***	1.582***	1.747***
	(0.318)	(0.316)	(0.332)	(0.369)	(0.282)	(0.284)	(0.314)	(0.350)
Likelihood Ratio Test	-3468.049	-3411.475	-3280.997	-3266.226	-2866.693	-2813.600	-2709.439	-2692.740
Comparison of LR-Test[b]		$113.15_{(1)}$***	$260.95_{(11)}$***	$29.54_{(12)}$**		$106.19_{(1)}$***	$208.32_{(11)}$***	$33.40_{(12)}$***
Pseudo R^2 (McFadden)	0.015	0.031	0.068	0.073	0.015	0.034	0.069	0.075

*[a]Reference Field=Teaching, [b] Comparison of LR Chi² test statistic with previous Model (df in parenth.), p<0.05, ** p<0.01, *** p<0.001*