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Gender and Immigration: Double Negative Effects in the Labor Market Outcomes of University Graduates in Germany?

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Survey data for a large sample of recent graduates from 37 German universities are used to study labor market outcomes of highly skilled young women and immigrants. Our results indicate a systemic wage gap for women, but not for male immigrants. We find no evidence that female immigrants suffer from a "double-negative effect" of being disadvantaged twofold (in terms of gender and immigration status). Similar patterns are obtained for job satisfaction and the match quality of competences and job requirements.

Keywords: Labor market discrimination, university graduates, immigration, gender, double-negative effect.

JEL-Classification: J71, J61, I23

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1. Introduction

Experts and policy makers often contend that, due to technological developments (Autor et al., 1998, 2008) and demographic trends (Bonin et al., 2007), the German economy is increasingly challenged by a gap between demand and availability of skilled labor. No panacea has yet been found to solve this problem. However, in addition to postponed retirement, two "reservoirs" of highly skilled individuals are often pointed to: women and immigrants[1] (see, e.g., von der Leyen, 2011). In spite of women's considerable educational attainments, labor market participation rates of women have traditionally been low, particularly in Western Germany. Increasing the labor market participation of highly skilled women is therefore seen as a quick and relatively inexpensive way to increase the supply of human capital. As regards immigrants, two processes may help enlarge the pool of skilled labor. On the one hand, new immigration by highly skilled individuals is often advocated (e.g., Zimmermann, 2012). On the other hand, increasing the average educational attainments of individuals with migration backgrounds is identified as a key challenge, as students from immigrant families are under-represented in the German higher education system (Dustmann et al., 2010; DAAD, 2011).

Somewhat paradoxically, in spite of the widely recognized need to better integrate highly skilled (or highly talented) women and immigrants in the German labor market, there is a widespread perception that both groups are discriminated against. This view finds *prima facie* support in wage gaps (e.g., Destatis, 2012a) as well as observable under-representation in high-income and high-status jobs. However, relatively poor labor market outcomes of women and immigrants are not necessarily caused by discrimination. They may (at least partially) reflect

[1] As regards immigration, the German situation defies conventional English terminology. Decades of immigration have left Germany with sizeable ethnic minorities (quantitatively most important is the Turkish minority). Many but far from all members of these minorities are German citizens. More recently, Germany has experienced a sizeable influx of individuals from Eastern Europe and the former Soviet Union. Many of the Eastern immigrants are of German descent and can therefore not be considered an ethnic minority. While we try to differentiate among different groups of immigrants below, we use the term "immigration" as a blanket expression for all labor market participants in Germany whose parents are foreign-born. In line with common usage in Germany, we synonymously refer to "individuals with migration background".

heterogeneity in individual characteristics, job choices and career objectives, different search and negotiation behaviors of different groups, structural reasons such as unequal burdens of bringing up children, or even biased location choices of couples.

The ongoing public debate notwithstanding, our knowledge about labor market chances of highly skilled women and immigrants in Germany, and the potential problem of additive disadvantages faced by female immigrants, is limited. In this paper, we draw on survey data from a large-scale graduate tracer study conducted by the University of Kassel International Centre for Higher Education Research (INCHER-Kassel). Alumni across all disciplines from 37 German universities (with a raw sample size of more than 15,000 individuals) were surveyed about their employment situation roughly nine to 18 months after graduation. Controlling for individual differences in employability, we analyze three different indicators of labor market outcomes for this sample: wage differentials, job satisfaction, as well as the perceived match of competences and job requirements. For our sample of recent German university graduates, gender differences in labor market outcomes generally appear to be more substantial than those related to immigration status. Our results indicate a systemic wage gap for women, but not for male immigrants. In contrast to earlier work for the U.S. (Le and Miller, 2010) we find no evidence that female immigrants suffer from a "double-negative effect" of being disadvantaged twofold (in terms of gender and immigration status). Similar patterns are obtained for job satisfaction and the match quality of competences and job requirements.

The present paper makes three contributions. First, we provide new empirical findings on labor market outcomes for women and immigrants in the high-skill segment of the German labor market. Some factors (such as language skills) that might plausibly underlie observable differences in labor market outcomes should be less pronounced in this segment than in a less selective sample, facilitating the interpretation of results. Second, we investigate how results vary for alternative outcome measures while being able to control for individual differences in

program choice, study performance and demographic factors. Third, to our knowledge, with the joint analysis of how gender and immigration status are related to labor market outcomes, we conduct the first analysis of a potential "double-negative effect" (Beach and Worswick, 1993) for Germany.

The remainder of the paper is structured as follows. Prior evidence on differential labor market outcomes (section 2) and potential underlying causes (section 3) is surveyed first. Section 4 focuses on data and methods. Results of the empirical analysis are presented in section 5. Section 6 has a concluding discussion.

2. Prior evidence on differential labor market outcomes

A sizeable empirical literature investigates the labor market prospects of women and immigrants in various countries in comparison to, respectively, male and native employees. A first strand of literature focuses on relative labor market outcomes of female employees. Descriptive evidence from numerous policy reports and scholarly studies indicates that fewer women are employed and female workers earn lower wages than their male counterparts (see, e.g., Oaxaca, 1973, for the U.S.; Miller, 1987, for the U.K.; Hunt, 2002, for East Germany; Joliffe, 2002, for Bulgaria; Voon and Miller, 2005, for Australia; Jurajda, 2005 for the Czech and Slovak Republics; or OECD, 2009, for various European countries). Recent studies based on survey data have also documented a gender wage gap in the context of German university graduates (Bredtmann and Otten, 2010; Görlitz and Grave, 2012; Braakman, 2013).[2]

[2] While most studies analyze wage differentials as the indicator of labor market disadvantages faced by women, there are notable instances of ingenious alternative approaches. A well-known study by Goldin and Rouse (2000) is based on the adoption of anonymous (or "blind") auditions by U.S. symphony orchestras in the 1970s and 1980s. The authors find that after the change (which however may not have been exogenous to the discrimination issue), female musicians were more likely to advance to later rounds of the hiring process, and also to be hired eventually. The authors estimate that about one-third of the observable increase in the share of females among newly hired musicians may be attributable to anonymous auditions.

Numerous studies have likewise found immigrants and ethnic minorities to have a lower probability of being employed (see, e.g., Burnstein, 1998; Bailey, 2004) while obtaining significantly lower wages than their native peers (Borjas, 1987; Weinberger, 1998; Scherer, 2000). In both the U.S. and Europe, wages are found to be lower for individuals with African (-American) or Hispanic descent (Reimers, 1983; Bailey, 2004, Aeberhardt et al., 2010). Blackaby et al. (2005) provide evidence that ethnic minorities in Britain fare somewhat better than their parents, but are still subject to labor market disadvantages with respect to earnings. Moreover, Hersch (2008) provides evidence that darker complexion adversely affects immigrant wages; this finding even holds within the subpopulation of immigrants. Some authors have argued that estimates of wage differentials may be biased upward as lower levels of schooling and education among immigrants explain a large portion of the different levels of earnings (Loury, 1998, Carneiro et al. 2005). In this vein, Rodgers (2008) provides evidence that racial dynamics do matter in labor market discrimination while "ripple effects" exist in the sense that wage differentials decrease with qualification (see also Black et al., 2006).

Similar to the work on gender wage gaps, audit studies have addressed the effect of names – foreign-sounding versus typical native names – to identify biased hiring decisions (e.g. Bertrand and Mullainathan, 2004; Carlsson and Rooth, 2007). Based on a large sample of manipulated resumes, recent work by Oreopoulos (2011) finds that candidates with foreign backgrounds or Asian (or Greek) names were discriminated against across a wide spectrum of professions in Canada. Other clues such as graduation from highly reputed schools or self-reported language skills were not adequately taken into account by recruiters, which is consistent with (implicit or explicit) discrimination against immigrants.

Mixed evidence has been obtained regarding the labor market outcomes of immigrants in Germany. Drawing upon data reflecting recruitment experience of 850 firms in Germany, France, the UK and the Netherlands, Mavromaras (2004) provides evidence that foreign workers in

Germany earn more than comparable Germans. He also finds that most of the recruited workers with foreign citizenship have been working in the respective domestic countries prior to hiring, which limits the degree to which his findings generalize to other groups of immigrants.

Labor market outcomes of university graduates with migration background have only recently been addressed by scholarly analyses. Qualitative findings by Hakak et al. (2010) show that Latin American Graduates of Canadian MBA programs perceive several challenges to their success in the Canadian labor market including lack of personal networks, discrimination and – despite being highly skilled – language barriers. Dustmann et al. (2010) find that hazard rates of leaving employment in economic downturns are typically higher for male immigrants than for natives in both Germany and the U.K. This difference is reproduced throughout various skill groups including individuals with university education.

Gender and immigration status have rarely been studied jointly in prior work. This is required, though, to find out whether female immigrants suffer from a "double-negative effect" (Beach and Worswick, 1993). Addressing this issue, Le and Miller (2010) use quantile regression to estimate gender wage gaps in U.S. Census data. They distinguish between native employees, immigrants from English-speaking countries, and immigrants from non-English-speaking countries, and find evidence consistent with double disadvantages only for the latter. Within the group of immigrants from non-English-speaking countries, it is particularly the highly skilled that suffer twofold.

3. How can dissimilar labor market outcomes be explained?

Relatively poor labor market outcomes of female employees and immigrants are frequently attributed to discrimination. In many countries (often controversial) policy measures such as anti-discrimination laws or racial and gender quotas in the public sector have been introduced to

redress employment discrimination based on race, citizenship or gender (e.g. the Civil Rights Act of 1964 in the U.S.; the Racial Relations Amendment Act of the U.K. in 2000, the General Equal Treatment Act of 2006 in Germany or similar approaches in other European countries following the Anti-Discrimination Directive of the European Union – Council Directive 2000/43/EC). More recently, a debate on anonymous applications has arisen in Germany, and policy proposals aiming at a higher participation rate of women in leading private- and public-sector positions abound.

However, it is far from obvious that differential labor market outcomes are indeed caused by discrimination. On the one hand, discriminatory employment practices are costly to employers. They should therefore be hard to sustain in competitive markets, unless they are induced by search costs or imperfect information. A sizeable economic literature has developed to explore these possibilities. On the other hand, dissimilar labor market outcomes may reflect differences in individual characteristics and behavior rather than discriminatory practice by employers. Potential employment discrimination has therefore been the subject of an ongoing scholarly debate (see e.g. Oaxaca and Ransom, 1994; Eckstein and Wolpin, 1999; Carneiro et al., 2005).

In standard economic models with frictionless labor markets, wage differentials stemming from discriminatory hiring by some employers should be equalized as long as there are enough non-discriminating competitors (Becker, 1957).[3] Employees' exit option of migrating to other regions or countries further constrains discriminatory employers (Arrow, 1998). Since employee mobility increases with the level of qualification (Arntz, 2010), this should be particularly relevant for high-skilled workers. However, the possibility of persistent differences in labor market outcomes has been demonstrated in search models, where discrimination may lead to lower

[3] Lang and Lehmann (2012) provide a review of theoretical models as well as empirical evidence in the context of racial discrimination in the U.S. labor market.

reservation wages or required match quality by members of disadvantaged groups (Black, 1995; Rosen, 1997; Lang et al., 2005). The same holds when employers infer employee quality from observables such as ethnicity (Altonij and Pierret, 2001), or if disadvantaged workers condition their human capital investments on expected labor market outcomes (Coate and Loury, 1993).[4]

Besides discrimination, various alternative explanations have been proposed for poorer labor market outcomes by women. One strand in the literature on gender discrimination attributes wage differentials to differences in personal characteristics (Oaxaca and Ransom, 1994). Other studies highlight the possibility that women search differently for jobs. A recent paper by Dahl and Sorenson (2011) is a case in point. Using linked employer-employee data for blue-collar and lower-level white-collar employees in Denmark, they show that women's expected incomes are essentially neglected in interregional mobility decisions of double-income couples. The authors attribute more than a third of the existing gender wage gap in Denmark to this process. They moreover show that women's expected income differentials are underweighted most strongly when the female partner's father earned much more than her mother. In contrast, the wage differential between the male partner's parents is not predictive. This is interpreted as suggesting that women inherit gender roles from their parents.

Some experimental studies suggest that women prefer less competitive environments and compete less fiercely than men do (Gneezy et al., 2003; Gneezy and Rustichini, 2004; Niederle and Vesterlund, 2007, but see Guenther et al., 2010). This phenomenon may have repercussions on employment choices if women put less emphasis on wages in job negotiations, but value job satisfaction and predictable working hours more strongly (Farrell, 2005). Saygin (2011) shows for Turkey that women make less ambitious choices of college programs. Babcock and Laschever (2003) provide evidence that women negotiate differently from men, which may

[4] It has also been shown that in the presence of search costs or asymmetric information, identical workers may be paid different wages in equilibrium, or that relative wages do not reflect productivity differentials in a systematic way (e.g., Shi, 2006). Differences in fringe benefits further help explain wage differentials (Schiller and Weiss, 1980).

help explain the gender wage gap. Further adding to the complexity of the issue, empirical work by Booth et al. (2003) for Britain indicates that – controlling for individual heterogeneity – men and women have about the same chances of being promoted, but women are paid lower post-promotion wages than men.

There is no agreement in the literature as to what extent differences in personal characteristics and behavior account for the gender wage gap. While some studies conclude that gender discrimination hardly exists when all sorts of individual heterogeneity are properly taken into account (Farrell, 2005), other studies argue that individual differences do not suffice to explain the observable differences in pay (Weinberger, 1998; OECD, 2009). Most scholars agree, however, that adding controls for education, occupation and individual background decreases the estimated gender wage gap (Groshen, 1991; Oaxaca and Radsom, 1994; Hunt, 2002). In the empirical context of our study, prior work on German university graduates suggests that self-selection into different academic programs and specialization can only partially explain the observable wage gaps. When investigating social sciences, natural sciences and humanities (including arts) separately, Görlitz and Grave (2012) detect gender differences in monthly wages in all three fields of study. According to Braakman (2013), the raw gender wage gap of about one-third of monthly salaries reduces to 14 to 15 % when differences in individual characteristics and fields of study are controlled.

As regards immigrants, it is often argued that both human capital differentials and discrimination affect wages (e.g. Weinberger, 1998; Scherer, 2000). Since individuals with migration background are often found to possess (on average) lower education levels, the influence of unobserved productivity differences on wage differentials is difficult to disentangle from discrimination. Studies by Bowlus and Eckstein (2002) as well as Carneiro et al. (2005) argue that differences in schooling and productivity explain a large portion of wage gaps between Whites and Blacks in the United States. Chiswick and Miller (2002) find that English

language skills are an important determinant of earnings for foreign-born men in the U.S. labor market. A recent OECD study of several countries finds that second generation immigrants face severe disadvantages in the labor market, which, however is especially pronounced among individuals with lower levels of educational attainment (OECD, 2009).

4. Data and Empirical Approach

4.1 Data Source

In the subsequent empirical analysis, we study labor market outcomes of recent graduates of German research universities. While not representative of the general labor force, this choice of context mitigates several problems of empirically identifying labor market discrimination. University graduates are a rather homogeneous sample in terms of labor market experience, and relatively rich information is available with regard to individual characteristics and prior experience. Differences in the quality of (tertiary) schooling should not bias results for graduates of the same university, while university effects can be controlled in the empirical analysis. Of course, findings from analyzing data on university graduates need to be interpreted cautiously, keeping in mind that the underlying sample of individuals is highly selective.

Our empirical analysis uses a large-scale dataset of German university graduates who were surveyed roughly nine to 18 months after entering the labor market. The dataset pools surveys of alumni years 2007 and 2008 that were conducted as part of the KOAB (*Kooperationsprojekt Absolventenstudien*) graduate tracer study, a joint research project of the University of Kassel International Center for Higher Education Research (INCHER-Kassel) and numerous German universities. INCHER-Kassel was responsible for survey design and coordination. The participating universities conducted the survey with their own graduates. In doing so, a common core questionnaire was used at all universities. However, some optional questions were not used by all universities. Most importantly for our purposes, some universities

did not ask whether graduates have children. They are excluded from empirical the analysis, which therefore relies on information from 37 universities.

The KOAB survey has an annual target population of 75.000 graduates, representing approximately 30% of all graduates in Germany. From this annual population around 15,000 students answer all parts of the survey. We excluded all graduates subsequently enrolled in further study programs. Joint with some other restrictions (see below for details) as well as missing answers our pooled sample for the 2007 and 2008 surveys includes about 19,000 graduates.

The survey was conducted both online and by mail. Prior to survey implementation graduates were contacted by e-mail (or by mail if the e-mail address was unknown). Up to three reminders were sent. The time frame was chosen such that graduates were likely to have entered the labor market when the survey was implemented. We restrict the sample to respondents who report that they acquired their high school degree or equivalent (*Hochschulzugangsberechtigung*) within Germany. This restriction excludes foreign students who may not want to enter employment in Germany. We also exclude individuals who take up employment outside of Germany. Our delineation of immigrants is primarily based on the birthplace of parents – immigrants are defined as students whose parents were both born outside Germany. Note that this definition is broader than that of *Bildungsinländer* ("educational natives") adopted by the German Academic Exchange Service (DAAD, 2011), which only includes individuals with non-German citizenship but German high school degrees (or equivalent). Our broader definition seems appropriate because many members of Germany's ethnic minorities have assumed German citizenship, but it also picks up individuals from countries other than those accounting for the majority of past immigration into Germany. We control for citizenship in the empirical analysis.

Women account for 46.8 % of our sample, which is slightly below their share of 51.1 % among all graduates from German universities including universities of applied sciences (*Fachhochschulen*; see Destatis, 2012b). A total of 1,470 employed graduates have two parents born outside Germany, denoting a share of 7.8 %. Non-German citizenship is reported by 1.9 % of graduates analyzed which almost equals the 2.0 % share of *Bildungsinländer* among all 2010 graduates in Germany reported by the German Academic Exchange Service (DAAD, 2011).

An important limitation of the dataset is that, due to the decentralized character of the KOAB survey, we cannot analyze non-response bias for the full sample. However, an exemplary non-response analysis has been conducted for alumni year 2008 at the level of one participating university (KOAB consortium, unpublished). It shows that 94 % of all alumni could be traced, of whom 54 % provided useable responses (but not necessarily completed the full survey). Shares of female graduates do not differ significantly between the survey population and the respondents ($p > 0.26$), whereas foreign graduates are slightly but significantly under-represented among the respondents (85 % versus 87 %; $p < 0.01$). Note, however, that problems of identifying the whereabouts of foreign graduates should be most relevant for the group of foreigners without German high school degree, which is excluded from our analysis. More important, the smaller share of immigrants would only bias our results if natives and immigrants systematically differed as to how the likelihood of responding is associated with graduate characteristics. We see no plausible scenario in which this would be the case.

4.2 Variables of interest

Dependent Variables

- *Wage*: Graduates were asked to report their gross monthly income in fourteen categories (in steps of 500 €). We recoded this information into five categories. Our wage variable takes a value of 1 for gross monthly incomes below 1500 €, a value of 2 indicates an income

between 1501 € and 2000 €, a value of 3 denotes that gross monthly income is above 2000 € but no higher than 3000 €, a value of 4 indicates an income between 3001 and 3500 € while a value of 5 indicates a gross income of above 3500 €.

- *Job Satisfaction:* Employed graduates were asked how satisfied they are with their current job, using a five-point Likert-type scale ranging from a value of 1, indicating "highly satisfied" to a value of 5, indicating "not satisfied at all". We recoded the variable such that higher values represent higher levels of job satisfaction. Thus, our measure of job satisfaction is an ordinal variable taking an integer value between 1 and 5 with a value of 5 denoting very high job satisfaction.
- *Match of competences*: Similar to the job satisfaction measure respondents were asked to what extent the skills acquired during studying match the skills demanded in the current job. Again, a five point Likert-type scale was provided ranging from 1 indicating a very good match of competences to 5 denoting that competences demanded in the current job are substantially different from the skills acquired during studying. Again, we recoded the variable such that a higher value indicates a better match of skills.

Explanatory variables In order to examine the impact of gender and immigration status on labor outcome we classified graduates into four groups:

- *Female immigrant*: This binary variable reflects that a graduate is female with both parents coming from outside Germany.
- *Female native*: A binary variable indicates by a value of 1 that an individual is female and at least one parent is born in Germany.
- *Male immigrant*: This binary variable reflects that a graduate is male with both parents coming from outside Germany.

- *Male native*: A binary variable indicates by a value of 1 that an individual is male and at least one parent is born in Germany. (This will be our reference group in most analyses.)

Furthermore, we utilize the following individual-level variables:

- *Diploma or master degree:* This binary variable indicates by a value of 1 graduates finishing a program leading to a *Diplom,* Master or *Staatsexamen* degree, with graduates from Bachelor programs being the reference group. (As noted above, Bachelor graduates who directly pursue another degree rather than entering the labor market are eliminated from the sample.)
- *Grade university:* In the German education system grades range from 1.0 ('excellent') to 5.0 ('insufficient') with grades between 1.0 and 4.0 ('still sufficient') denoting that a candidate passed. Thus, final degrees of graduates are associated with a grade ranging from 1.0 to 4.0.
- *Grade school:* Similarly, German high school grades range from 1.0 ('excellent') to to 6.0 ('insufficient'). To obtain a high school diploma, which is generally required to enroll in an university program, a final grade of at least 4.0 ('still sufficient') is required. Accordingly, high school grades in our sample can range from 1.0 to 4.0.
- *Finished within regular study period:* This dummy variable takes a value of 1 if a graduate finished her studies within the designated number of semesters (*Regelstudienzeit*) for the respective program.
- *Having children*: This binary variable denotes whether a graduate has children in her or his household (value of 1) or not (value of 0).
- *Age*: This variable indicates graduates' age at the time of the survey (end of 2008 for graduates having finished in 2007, end of 2009 for graduates who finished their studies in 2008).

- *Citizenship dummies:* Our measure of immigration status is based on where parents were born. This measure does not distinguish between regions of origin. We therefore also include citizenship dummies in our analysis. Specifically, we contrast between six regional groups of citizenships in the sample of employed graduates (N=18,811): (i) the United States, Canada and Australia (26 individuals), (ii) all Western European countries including Southern Europe and the United Kingdom (172), (iii) Eastern European and former Soviet countries (129), (iv) Turkey (37) and Middle Eastern countries (9), and (vi) all remaining non-German citizenships (37). The reference category is German citizenship. In other models, we alternatively employ a dummy variable denoting all graduates who reported German citizenship.[5]
- *Fields of study:* We distinguish between six different groups of graduates by fields of study. Six binary variables indicate by a value of 1 that graduates finished their studies in the respective field. The first group finished their studies in the humanities and social sciences, including language studies. The second group of graduates finished studies in the fields of engineering, computer science, or mathematics, whereas the third group comprises graduates who finished their studies in the sciences. Graduates of the medical sciences, including pharmaceutical science, are comprised in group 4 *while graduates o*f economics, management or law[6] are comprised in group 5 (which we take as our reference group throughout). Remaining graduates who finished in other fields of study such as sports, arts or architecture are merged into group 6.
- *Self-employed*: This dummy variable takes value 1 for graduates who are self-employed at the time of the survey.

[5] As noted in Section 4.1 above, the seemingly small share of non-German citizens is consistent with official numbers (DAAD, 2011). In the survey, graduates were first asked whether they are German citizens. Those giving negative answers were then asked for their citizenship.

[6] Due to the specificities of the education of lawyers and teachers in Germany, most law graduates do not enter the regular labor market after being surveyed but go on to mandatory practical training (the *Referendariat*). These individuals are excluded from the empirical analysis. For the same reason, the field of education is not taken into account.

- *Year of graduation: 2007:* Another dummy variable denoting graduates from the 2007 alumni cohort (2008 is the reference cohort).

A descriptive overview of variables is given in Table 1. This table denotes an overview of variables on all employed graduates who reported to all relevant questions regarding independent variables and at least one of the labor outcomes of interest, namely wage, job satisfaction and job match. This sample comprises 18,881 graduates.

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Insert Table 1 about here

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In the empirical analysis we analyze graduates' wage, job satisfaction as well as perceived match of competences and job requirements. The respective samples are slightly lower than the overall sample of 18,811 graduates as not all graduates reported all three labor market outcomes. Thus, the analysis is restricted to 16,230 graduates when analyzing wage, 18,571 graduates when analyzing job satisfaction and 17,809 graduates when analyzing the match of competences. Relative shares of graduates with foreign citizenship and parents born outside are reported in Table 2.

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Insert Table 2 about here

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A descriptive analysis on differences in wage, job satisfaction and match of competences is given in Table 3. It indicates that female graduates face lower wages, lower job satisfaction and an inferior match of competences compared to male graduates. Graduates with migration background report higher wages but lower scores the two alternative outcome measures. For all

outcome measures, differences between the male and female subsamples are larger than those between the subsamples of graduates with and without migration background.

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Insert Table 3 about here

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Table 4 provides a correlation matrix for all variables, indicating that collinearity is not a major concern for this dataset.

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Insert Table 4about here

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4.3 Empirical approach

We analyze the influence of gender and immigration status on the labor market outcomes wage, job satisfaction and match of competences, controlling for individual characteristics, field of study, as well as citizenship. Measures on all three labor outcomes are self-reported and ordinal as they were provided in five-point Likert type scales (see section 4.2). We therefore analyze labor market outcomes using ordered logistic models, which have come to be widely used as a framework for analyzing such responses. This model type is built around a latent regression such that we assume a linear relationship between the unobserved latent variable indicating *job satisfaction* y_i^* and the vector of explanatory variables $x_i'\beta$:

$$y_i^* = x_i'\beta + \epsilon_i \tag{5}$$

where y_i^* is unobserved. Instead, we observe:

$$y_i = 1 \; if \; y_i^* \leq \mu_1$$

$$y_i = 2 \; if \; \mu_1 < \; y_i^* \leq \mu_2$$

$$y_i = 3 \; if \; \mu_2 < \; y_i^* \leq \mu_3 \tag{6}$$

$$y_i = 4 \; if \; \mu_3 < \; y_i^* \leq \mu_4$$

$$y_i = 5 \; if \; \mu_4 < \; y_i^*$$

where μ_j are unknown parameters (cut-points) to be estimated with β. The error terms ϵ_i in equation (5) reflect stochastic differences in job satisfaction and are assumed to be normally distributed. In the ordered logit the cumulative predicted probabilities for each case are computed by

$$P\,(y_i = j) = 1/(1 + \exp\{-\mu_j + x_i{}'\beta\,\})$$

For these probabilities of each category to be positive, we must have $\mu_1 < \mu_2 < \cdots < \mu_5$. As in the binomial logit the estimated coefficient of a variable reflects how the *log odd ratio* of two categories changes if an explanatory variable increases by one unit. The descriptive evidence in Table 3 denotes that the more pronounced differences are found between male and female graduates.

Even though a rich set of controls is employed in the analyses utilizing ordered logits, estimated differences in labor market outcomes for different groups might still be partially due to differences in personal characteristics of graduates or to differences in the coefficient estimates for the alternative groups. To disentangle these two factors, the decomposition technique developed by Blinder (1973) and Oaxaca (1973) is often adopted in empirical work in labor economics. However, while the Oaxaca-Blinder decomposition technique would be applicable to the issues of our analysis, it cannot be applied to nonlinear models such as the ordered logit we utilize. Bauer and Sinning et al. (2008) have developed an extension for nonlinear models. This extension is based on comparing conditional expectations for outcomes of the different groups

given alternative covariate vectors and estimated coefficients for the groups. In the context of the ordered logit, the precision of this decomposition is sensitive to the quality of predicting outcomes based on the alternative group coefficient vectors. We therefore prefer to use propensity score matching as an alternative approach to investigate the extent to which differences in group outcomes may be due to differences in characteristics between the groups.

Propensity score matching is widely used in the program evaluation literature where under the assumption of conditional independence (also known as selection on observables, i.e. all determinants of selection into treatment are observed), difference in outcomes between a treatment and a control group can be attributed to causal effects of the treatment (Caliendo and Kopeinig, 2008). Propensity score matching is useful in our context because it allows us to construct a "pseudo population" in which differences in observable characteristics between members of the alternative groups (e.g., men and women) are minimized. Remaining outcome differences between the groups within this pseudo population are then interpretable as differences in "rewards" that members of the alternative groups having the same characteristics can realize in the labor market.

To assess the importance of different characteristics for the gender wage gap, we first estimate a logit model to calculate the propensity score, i.e. the probability that a given observation belongs to a female graduate given its observable characteristics. The propensity score then provides the basis of matching each observation belonging to a female graduate with a weighted average of all observations belonging to male graduates. We employ Gaussian kernel matching where the weights for the individual observations belonging to male graduates follow a normal distribution around the propensity score of the respective female graduate. The outcome of interest from the matching procedure is known as "average effect of treatment on the treated" or ATT in the program evaluation literature. It is given by

$$ATT = \frac{1}{N_1}\sum_{i \in I_1}\left[Y_i^1 - \sum_{j \in I_0} W_{N_0}(i,j)\, Y_j^0 \right]$$

where the outcome for female graduate i is given by Y_i^1, the outcome for male graduate j is given by Y_j^0, N_1 represents the number of female graduates (treatment group I_1), and N_0 represents the number of male graduates (control group I_0). $W_{N_0}(i,j)$ reflects the weight placed on the j-th male individual in constructing the counterfactual for the i-th female individual.

5. Results

As noted above, we constructed four indicator variables denoting (i) male natives; (ii) female natives, (iii) males with migration background (both parents born outside Germany) and (iv) females with migration background to jointly analyze gender- and immigration-related differences in labor market outcomes. We use the latter three of these indicator variables in a set of ordered logit models – leaving male natives as the reference group. Moreover, we apply models using alternative outcome variables and model specifications.

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Insert Table 5 about here
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Results of ordered logits with wage as dependent variable are reported in Table 5. The baseline specification Model 1 indicates that both groups of women have significantly lower incomes than male natives. Interestingly, the coefficient estimated for female immigrants is smaller (in absolute terms) than that obtained for native female graduates. Among male graduates, higher wages are found for immigrants, even though the difference to male natives is only marginally significant. Taken together, these results do not suggest that immigrant

graduates – as identified by the birthplace of their parents – face systematically lower wages than their native peers.

In Model 2, the variable denoting German citizenship is replaced by six dummies for different regions of citizenship. A significant difference is observed for graduates with Eastern European citizenship, who earn significantly lower wages. In contrast, wages of graduates with Turkish or Middle Eastern citizenship do not differ systematically from those with German citizenship. Model 3 replicates Model 2 without the indicator denoting graduates with children. Eliminating this variable does little to change the coefficient for female natives or immigrants, suggesting that gender differences in wages are not primarily driven by gender-specific effects of having children.

Models 4 and 5 denote separate regressions for the subsample of female and male graduates, respectively. Both models support the primary finding of a substantial gender wage gap among non-immigrant graduates whereas, if anything, graduates with migration background tend to earn *more* than their native peers. Finally, in Model 6 a full set of university dummies is added to the specification. Results of this model indicate that prior results are robust to the control for university (and thus also regional) differences.

As regards the role of individual characteristics, graduates who report having children on average earn less well, with Models 4 and 5 showing that this result is driven by the female subsample. We also find that lower wages reported by those graduates who are self-employed. Having graduated within the regular study period is not significantly related to higher income, nor are final grades. In contrast, better (i.e., lower) high school grades are associated with higher post-graduation wages. Field of study dummies show that incomes differ strongly (and expectedly) across the various educational profiles.

The main finding from this initial set of models, then, is that among graduates of German universities, women tend to have lower wages early in their career. The differences implied by the estimated coefficients are economically relevant. Adjusting all other variables at their median, a female immigrant is predicted to have a 9.5% lower probability to reach the highest two income categories compared to a native male graduate (utilizing model 2 of the analysis presented in Table 5). In contrast, the evidence does not suggest systematic disadvantages of immigrants in terms of income. Nor does it suggest a "double-negative effect" of being a female immigrant. We next explore alternative indicators of labor market outcomes to learn more about the differences across the four groups of graduates.

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Insert Table 6 about here

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Table 6 contains results regarding job satisfaction. Consistent with the above results, we find significantly lower reported values for female natives and female immigrants compared to male natives. For median values of all other variables, a female immigrant has a 6.0 % lower likelihood of reporting one of the two highest levels of job satisfaction than a male native (Model 2 in Table 6). A native female has a 5.2 % lower likelihood to report the two highest job satisfaction categories. Among both men and women, individuals with foreign-born parents report lower satisfaction levels, but the differences to German natives of the same gender are insignificant (Models 4 and 5 in Table 6). Moreover, with respect to the duration of study variable we find that slower students have to settle for less attractive jobs. Surprisingly, (female) graduates with children on average report higher job satisfaction. This result may reflect different aspiration levels of parenting graduates.

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Insert Table 7 about here

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The third set of results relates to the (self-assessed) matching of individual skills and job requirements (Table 7). The general patterns are similar to those obtained for job satisfaction. Reported levels of match quality are significantly lower for female graduates. The differences in implied probabilities of reporting the highest level of match quality are larger than those found above for job satisfaction. For median values of all other variables, a female immigrant has a 9.7 % lower likelihood of reporting one of the two highest levels of match of competences than a male native. A female native has a 7.6 % lower likelihood to report one of the two highest levels of match of competences than a male native (Model 2 in Table 7).

As the differences are most pronounced with respect to wages we apply propensity score matching to the gender wage gap. As outlined in section 4 above, we first estimate a logit model to obtain propensity scores and then match observations for female graduates with a weighted average of male counterparts, where the weights are highest for those males whose observable characteristics are most similar to those of the respective female graduate. Mean values after matching are reported in Table 8. While there are still significant gender differences for severaly of the characteristics used in the matching, the percentage bias is below 5%, a threshold value deemed acceptable in the program evaluation literature (Caliendo and Kopeinig, 2008) for all variables other than age. The relatively large difference in age, in turn, is explicable by the fact that male German citizens were subject to mandatory military service at the time of our analysis.[7]

As can be seen from Table 9 the raw (unmatched) difference in wage categories between male and female graduates is about -0.779. When comparing female graduates with

[7] The ATT is only defined in the region of common support, i.e. for values of the propensity score that are attained by both groups (cf. Caliendo and Kopeinig, 2008, for a detailed discussion). This condition is satisfied for all observations.

counterparts matched to minimize differences in observable characteristics, the difference reduces to about -0.456. This suggests that slightly more that 40% of the gender wage gap in our sample are explicable in terms of different observable characteristics. Nonetheless, even after controlling for differences in specialization, performance and demographics, a statistically as well as economically significant difference remains.

6. Discussion and Conclusion

In this paper, a graduate tracer survey for 37 German universities was utilized to analyze differential labor market outcomes for men and women, as well as for natives versus immigrants (where immigrants were defined as individuals whose parents were both born outside Germany). Controlling for employability, we found that women, but not immigrants, are disadvantaged in terms of wages obtained nine to 18 months after graduations. The same pattern emerged when job satisfaction or the quality of matching between skills and job requirements were used as alternative indicators of labor market outcomes. In contrast to findings by Le and Miller (2010) for the U.S. labor market, no systematic evidence of female immigrants being subject to a double-negative effect was obtained. Nor did our estimates suggest that they make systematically different trade-offs between the different aspects of labor market outcomes.[8]

Is it plausible that highly skilled women face stronger obstacles in the labor market than immigrants do? Some arguments come to mind that would suggest an affirmative answer. First, we have analyzed a highly selective group of labor market participants, particularly as regards immigrants who are strongly underrepresented in secondary schools preparing for university studies (DAAD, 2011). Successful graduation from a German university may be sufficient as a

[8] While the relative sizes of coefficient estimates for female natives and female immigrants differ for the alternative outcome measures, the differences are relatively small and statistically insignificant.

quality signal to disperse worries that potential employers possibly have vis-à-vis immigrants. Second, as regards women, traditional patterns of intra-familiar division of labor coupled with legal instruments protecting parents' jobs mean that employers hiring female graduates face a higher hazard (from their perspective) of future pregnancies and periods of child leave. Anecdotal evidence suggests that this does translate into disadvantages for women in the German labor market. Moreover, note that as it relates to the possibility of future children, this potential account is not inconsistent with the above finding that the presence of *already born* children is of limited relevance to explain the lower wages (or other outcomes) of women. Third, it seems conceivable that women are perceived as more threatening than immigrants to male comradeship in the workplace, even (or particularly) in the higher-level white collar jobs that university graduates typically aspire to.

We hasten to acknowledge the limitations of our study. First, our empirical measure does not pick up third-generation Turkish immigrants whose parents were both born in Germany.[9] Second, by focusing on recent university graduates, we cannot fully study the "glass ceiling effect", which has been suggested to imply both that disadvantages are more pronounced at higher income (or other outcome) levels *and* that they get stronger over the course of a career (Cotter et al., 2001). While our results indicate that highly skilled women are indeed disadvantaged in the German labor market, by the very nature of our data we cannot assess the dynamic part of this characterization. Finally, our analysis relied on self-reported data reported in ordinal scales. A possible account of the gender wage gap that we cannot exclude is that men are generally more likely to bias their reported wages upward. While this would be consistent with some gender stereotypes, the findings for the alternative outcome variables increase our

[9] We would expect, however, that the Turkish graduates in our analysis, who were mostly born around 1980, tend to have parents born in Turkey. Substantial immigration from Turkey began in 1960, but initially the total number of Turkish immigrants in Germany was still small. It exceeded 100,000 only in 1965 and 500,000 only in 1971 (Herbert, 2001). Accordingly, only the German-born children of relatively early immigrants could be parents of the graduates in our sample.

confidence that there is more to the observed differences than just male bragging. Moreover, we see no obvious reason why males should be motivated to exaggerate reported wages in an anonymous survey that they receive from their former university.

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Table 1: Overview Variables: Employed graduates

	Obs	Mean	St.Dev.	Min	Max
Both parents non-German	18811	0.07814	0.26408	0	1
Female immigrant	18811	0.039498	0.194782	0	1
Female native	18811	0.428632	0.494894	0	1
Male Immigrant	18811	0.038648	0.192759	0	1
Male native	18811	0.4932221	0.4999673		
Diploma or master degree	18811	0.938812	0.239681	0	1
Grade university	18811	1.648284	0.630398	1	4
Having children	18811	0.086439	0.28102	0	1
Studied within regular study period	18811	0.354952	0.478512	0	1
age	18811	28.78433	3.132889	21	45
citizenship: Turkey	18811	0.001967	0.044308	0	1
citizenship: North America or Australia	18811	0.001382	0.037153	0	1
citizenship: Western Europe (including UK)	18811	0.009144	0.095187	0	1
citizenship: Eastern Europe	18811	0.006858	0.082529	0	1
citizenship: Middle East (excluding Turkey)	18811	0.000478	0.021869	0	1
Remaining non-German citizenships	18811	0.001967	0.044308	0	1
Citizenship German	18811	0.9812875	0.1355112	0	1
Linguistics and Social Sciences	18811	0.197119	0.397833	0	1
Math. / Computer Science / Engineering	18811	0.228909	0.420142	0	1
Natural Sciences	18811	0.087768	0.282964	0	1
Medicine	18811	0.109564	0.312353	0	1
Economics / Law / Management	18811	0.247727	0.431704	0	1
Remaining subjects	18811	0.128914	0.335114	0	1
Self-employed	18811	0.038648	0.192759	0	1
Year of graduation 2007	18811	0.557918	0.496647	0	1

Table 2: Descriptive Statistics of Migrant Status and Citizenship Background in Sample of employed graduates

	OVERALL			WAGE			MATCH			SATISFACTION		
Citizenship	Obs	Mean	St. Dev.	Obs	Mean	St. Dev.	Obs	Mean	St. Dev.	Obs	Mean	St. Dev.
Citizenship Turkey	18811	0.0019669	0.0443077	16230	0.0017868	0.0422342	17809	0.0019653	0.0442893	18571	0.0019924	0.0445925
Citizenship North America & Australia	18811	0.0013822	0.0371528	16230	0.0014171	0.0376192	17809	0.0013476	0.0366864	18571	0.0013462	0.0366667
Western Europe and UK	18811	0.0091436	0.0951865	16230	0.0086876	0.0928045	17809	0.0091527	0.0952335	18571	0.0091002	0.0949625
Eastern Europe	18811	0.0068577	0.0825289	16230	0.0069624	0.0831527	17809	0.0068505	0.0824859	18571	0.0068925	0.0827365
Middle East	18811	0.0004784	0.0218687	16230	0.0003081	0.0175498	17809	0.0004492	0.0211904	18571	0.0004846	0.0220095
Remaining citizenships	18811	0.0019669	0.0443077	16230	0.0017252	0.041501	17809	0.0017968	0.0423523	18571	0.0019385	0.043987
Citizenship German	18811	0.9812875	0.1355112	16230	0.9813309	0.1353578	17809	0.98147	0.1348615	18571	0.9812611	0.1356051
Both parents non-German	18811	0.0781458	0.268408	16230	0.0778189	0.2678946	17809	0.0783873	0.2687877	18571	0.077971	0.2681332
Female immigrant	18811	0.0394982	0.1947821	16230	0.0399877	0.1959363	17809	0.0400359	0.196049	18571	0.0394163	0.1945885
Female native	18811	0.4286322	0.4948936	16230	0.4311768	0.495256	17809	0.4307373	0.4951933	18571	0.4298099	0.4950622
Male Immigrant	18811	0.0386476	0.1927588	16230	0.0378312	0.1907937	17809	0.0383514	0.1920485	18571	0.0385547	0.1925364
Male native	18811	0.4932221	0.4999673	16230	0.4910043	0.4999345	17809	0.4908754	0.4999308	18571	0.4922191	0.4999529

Table 3: Descriptive Statistics – Differences in labor outcome according to gender and immigration status

Labor outcome – Gender differences	**Mean Value: Female**	**Mean Value: Male**	**t-test**	**Wilcoxon-Mann-Whitney test**
Wage	2.516542	3.295934	***	***
Job Satisfaction	3.714712	3.864462	***	***
Match of competences	3.51324	3.678939	***	***

Labor outcome – Immigrant Differences	**Mean Value: Immigrants**	**Mean Value: Natives**	**t-test**	**Wilcoxon-Mann-Whitney test**
Wage	3.09422	2.914746	***	***
Job Satisfaction	3.739641	3.798809	**	**
Match of competences	3.523639	3.607506	***	***

Table 4: Correlation Matrix

		V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12
V1	wage	1											
V2	Job Satisfaction	0.1183	1										
V3	Job: Match of Competences	0.018	0.286	1									
V4	female immigrant	-0.0259	-0.0264	-0.0352	1								
V5	female native	-0.2617	-0.0737	-0.0732	-0.1756	1							
V6	male immigrant	0.0734	0.002	0.0029	-0.0407	-0.1737	1						
V7	male native	0.2414	0.0825	0.0852	-0.2001	-0.8545	-0.1978	1					
V8	diploma or master degree	0.1188	0.0069	0.0665	-0.0166	-0.063	0.0121	0.0642	1				
V9	grade university	-0.0005	-0.0323	-0.1147	0.0549	-0.0171	0.0583	-0.0269	-0.0592	1			
V10	Finished within regular study period	-0.023	0.0371	0.0357	-0.0044	0.0909	-0.0167	-0.0818	-0.1152	-0.1082	1		
V11	Having children	-0.0159	-0.0087	-0.0109	0.0056	-0.0627	0.0404	0.0443	0.0146	0.0416	-0.0309	1	
V12	age	0.0524	-0.0849	-0.0455	-0.0054	-0.1268	0.0403	0.1121	0.0834	0.0783	-0.1395	0.3352	1
V13	citizenship_Turkey	0.0122	-0.0059	-0.012	0.0526	-0.036	0.1467	-0.0414	-0.0137	0.0179	-0.0104	0.012	-0.0073
V14	citizenship_Northamerica_Australia	0.003	-0.0014	-0.0055	0.0145	-0.0004	-0.0075	-0.0024	-0.0084	-0.0008	0.0023	-0.0064	-0.0038
V15	Western Europe and UK	-0.0073	0.0049	0.0043	0.0465	-0.0358	0.0995	-0.021	-0.0058	-0.0106	0.0069	-0.0156	-0.0062
V16	Eastern Europe	-0.0154	-0.0092	0.0005	0.2113	-0.0655	0.1638	-0.0807	-0.003	0.0222	-0.0145	0.0042	-0.0015
V17	Middle East	0.0057	0.0051	-0.0161	0.0205	-0.014	0.0713	-0.0216	0.0056	0.0026	0.0041	0.0019	0.0062
V18	Remaining non-German citizenships	0.0093	-0.0049	0.0052	0.0588	-0.036	0.1218	-0.0342	-0.0087	-0.0082	0.0097	-0.0051	0.0046
V19	Linguistics and Social Sciences	-0.3319	-0.0736	-0.1021	0.034	0.2283	-0.0508	-0.2197	-0.1528	-0.0692	-0.0026	0.0212	0.0542
V20	Math. / Computer Science / Engineering	0.2351	0.1098	0.0551	-0.0579	-0.283	0.0746	0.2739	0.042	-0.0483	-0.098	0.0035	-0.0368
V21	Natural Sciences	-0.2105	0.0052	0.0862	-0.0118	0.0574	-0.0339	-0.0392	0.0298	-0.0837	0.0542	-0.0439	-0.1131
V22	Medicine	0.2278	-0.0377	0.0566	0.0267	0.0865	-0.0085	-0.0928	0.0484	-0.0761	0.1303	0.0229	0.0762
V23	Remaining subjects	-0.1771	-0.0422	-0.0185	-0.0145	0.0492	-0.0335	-0.0302	-0.0143	0.0096	-0.0559	0.0188	0.0113
V24	Economics / Law / Management	0.1876	0.0176	-0.0421	0.0246	-0.0735	0.0287	0.0521	0.0566	0.2133	0.0113	-0.0253	-0.0038
V25	self-employed	-0.1123	-0.0465	-0.0256	0.0188	-0.0026	0.0056	-0.0069	-0.0547	-0.03	-0.026	0.0394	0.0881
V26	year of graduation:2007	0.0049	0.0093	-0.0057	-0.0091	0.0142	-0.0209	-0.0024	0.005	-0.2373	-0.0175	-0.0176	-0.0061

Table 4 continued

	V13	V14	V15	V16	V17	V18	V19	V20	V21	V22	V23	V24	V25
Citizenship Turkey	1												
Citizenship North America Australia	-0.0017	1											
Western Europe and UK	-0.0043	0.0115	1										
Eastern Europe	-0.0037	-0.0031	-0.008	1									
Middle East	-0.001	-0.0008	-0.0021	-0.0018	1								
Remaining non-German citizenships	-0.002	-0.0017	-0.0043	-0.0037	-0.001	1							
Linguistics and Social Sciences	-0.0099	0.0103	0.0029	0.009	-0.0108	-0.0069	1						
Math. / Computer Science / Engineering	0.0044	-0.0032	-0.0151	-0.0054	-0.0061	0.0244	-0.27	1					
Natural Sciences	-0.0053	-0.0014	0.0038	-0.0144	0.0018	-0.0095	-0.1537	-0.169	1				
Medicine	-0.0156	-0.0085	0.0128	-0.0106	-0.0077	-0.0156	-0.1738	-0.1911	-0.1088	1			
Remaining subjects	-0.0135	-0.0015	-0.012	-0.0012	0.0061	-0.0063	-0.1906	-0.2096	-0.1193	-0.1349	1		
Economics / Law / Management	0.0301	0.0019	0.0096	0.015	0.0156	0.0051	-0.2843	-0.3127	-0.178	-0.2013	-0.2208	1	
self-employed	0.0035	0	0.0155	0.0067	0.0208	0.0035	0.1031	-0.0574	-0.0446	-0.0518	0.0834	-0.0371	1
year of graduation:2007	-0.0088	-0.0159	0.0045	-0.0116	0.0146	0.0323	0.045	-0.0154	-0.0069	-0.0102	-0.0227	0.003	0.1785

Table 5: Ordered logistic regressions on wage category

	(1)	(2)	(3)	(4)	(5)	(6)
Female immigrant	-0.512***	-0.470***	-0.474***	0.283***		-0.484***
	(0.0787)	(0.0890)	(0.0870)	(0.0940)		(0.0877)
Female native	-0.706***	-0.707***	-0.701***	ref.		-0.654***
	(0.0674)	(0.0673)	(0.0670)			(0.0489)
Male immigrant	0.180*	0.217**	0.201**		0.186*	0.200**
	(0.0987)	(0.101)	(0.0998)		(0.0991)	(0.0975)
Male native	ref	ref	ref		ref	ref
diploma or master degree	0.446**	0.446**	0.448**	0.336	0.537***	0.359*
	(0.181)	(0.180)	(0.180)	(0.255)	(0.146)	(0.192)
grade university	-0.0978	-0.0993	-0.102	-0.0833	-0.111*	-0.0662
	(0.0693)	(0.0689)	(0.0693)	(0.0887)	(0.0602)	(0.0659)
Grade school	-0.189***	-0.190***	-0.185***	-0.224***	-0.172***	-0.0964***
	(0.0437)	(0.0434)	(0.0439)	(0.0571)	(0.0526)	(0.0338)
finished in regular study period	-0.0195	-0.0200	-0.0237	-0.105	0.0507	0.0483
	(0.0613)	(0.0614)	(0.0615)	(0.0845)	(0.0709)	(0.0505)
having children	-0.309***	-0.313***		-0.830***	-0.0724	-0.272***
	(0.0638)	(0.0633)		(0.106)	(0.0945)	(0.0608)
age	0.0392***	0.0393***	0.0298***	0.0591***	0.0280**	0.0415***
	(0.00868)	(0.00870)	(0.00892)	(0.0121)	(0.0117)	(0.00831)
citizenship: Turkey		0.129	0.0789	-0.264	0.156	0.146
		(0.332)	(0.331)	(0.587)	(0.355)	(0.299)
citizenship: Northamerica or Australia		0.413	0.426	0.255	0.572*	0.307
		(0.288)	(0.285)	(0.551)	(0.305)	(0.284)
citizenship: Western Europe (including UK)		-0.263	-0.245	-0.220	-0.308	-0.318*
		(0.185)	(0.186)	(0.288)	(0.260)	(0.188)
citizenship: Eastern Europe		-0.529**	-0.516**	-0.555**	-0.476*	-0.450**
		(0.222)	(0.221)	(0.257)	(0.269)	(0.225)
citizenship: Middle East (excluding Turkey)		0.407	0.454	0.544***	0.377	0.556
		(0.560)	(0.561)	(0.188)	(0.700)	(0.537)
Remaining non-German citizenships		-0.0243	-0.00283	-0.0188	0.0162	-0.144
		(0.279)	(0.284)	(0.554)	(0.308)	(0.287)
citizenship German	0.0404	ref	ref	ref	ref	ref
	(0.125)					
Linguistics and Social Sciences	-1.931***	-1.932***	-1.937***	-1.781***	-2.160***	-1.918***
	(0.114)	(0.113)	(0.114)	(0.0940)	(0.162)	(0.104)
Math. / Computer Science / Engineering	-0.0801	-0.0819	-0.0914	-0.182	-0.124	-0.256**
	(0.110)	(0.108)	(0.109)	(0.217)	(0.107)	(0.123)
Natural Sciences	-2.213***	-2.214***	-2.217***	-1.922***	-2.504***	-2.276***
	(0.231)	(0.230)	(0.231)	(0.288)	(0.192)	(0.246)
Medicine	0.652***	0.652***	0.648***	0.808***	0.542**	0.684***
	(0.175)	(0.175)	(0.176)	(0.206)	(0.212)	(0.209)
Remaining subjects	-1.495***	-1.495***	-1.505***	-1.361***	-1.628***	-1.581***
	(0.131)	(0.131)	(0.131)	(0.139)	(0.143)	(0.150)
Economics / Law / Management	ref	ref	ref	ref	ref	ref
selfemployed	-0.931***	-0.928***	-0.926***	-1.141***	-0.750***	-0.924***
	(0.0807)	(0.0815)	(0.0804)	(0.122)	(0.115)	(0.0822)
jahr2007	0.0242	0.0242	0.0248	0.0330	0.000785	0.0757
	(0.0716)	(0.0712)	(0.0718)	(0.0918)	(0.0655)	(0.0565)
DUMMIES FOR UNIVERSITIES						YES
Observations	16,230	16,230	16,230	7,647	8,583	16,230
R-squared	0.1135	0.1138	0.1131	0.1033	0.0867	0.1248
Log Lik	-22467	-22461	-22477	-10266	-12136	-22182

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 6: Ordered logistic regressions on Job Satisfaction

	(1)	(2)	(3)	(4)	(5)	(6)
Female immigrant	-0.298***	-0.274***	-0.272***	-0.0272		-0.272***
	(0.0633)	(0.0688)	(0.0689)	(0.0753)		(0.0701)
Female native	-0.249***	-0.248***	-0.249***	ref.		-0.231***
	(0.0307)	(0.0306)	(0.0305)			(0.0299)
Male immigrant	-0.123	-0.0956	-0.0886		-0.0874	-0.0970
	(0.0814)	(0.0825)	(0.0819)		(0.0818)	(0.0821)
Male native	ref.	ref.	ref.		ref.	ref.
diploma or master degree	-0.0295	-0.0311	-0.0318	0.0653	-0.180	-0.107
	(0.0715)	(0.0712)	(0.0709)	(0.0618)	(0.120)	(0.0661)
grade university	-0.0397	-0.0397	-0.0383	0.0234	-0.102***	-0.0477*
	(0.0246)	(0.0246)	(0.0244)	(0.0365)	(0.0354)	(0.0249)
Grade school	-0.172***	-0.171***	-0.173***	-0.191***	-0.157***	-0.128***
	(0.0230)	(0.0231)	(0.0228)	(0.0354)	(0.0319)	(0.0245)
finished in regular study period	0.154***	0.153***	0.155***	0.138***	0.169***	0.181***
	(0.0295)	(0.0296)	(0.0295)	(0.0362)	(0.0438)	(0.0327)
having children	0.143**	0.143**		0.309***	0.0446	0.164***
	(0.0594)	(0.0592)		(0.0755)	(0.0755)	(0.0577)
age	-0.0432***	-0.0433***	-0.0389***	-0.0403***	-0.0498***	-0.0404***
	(0.00390)	(0.00386)	(0.00388)	(0.00562)	(0.00821)	(0.00407)
citizenship: Turkey		-0.292	-0.284	-0.461	-0.242	-0.305
		(0.286)	(0.287)	(0.538)	(0.305)	(0.289)
citizenship: Northamerica or Australia		0.176	0.175	1.237*	-1.080	0.183
		(0.569)	(0.568)	(0.639)	(0.935)	(0.559)
citizenship: Western Europe (including UK)		0.138	0.130	0.343	0.00322	0.132
		(0.145)	(0.145)	(0.289)	(0.172)	(0.148)
citizenship: Eastern Europe		-0.129	-0.131	-0.291	0.0857	-0.109
		(0.168)	(0.168)	(0.206)	(0.207)	(0.165)
citizenship: Middle East (excluding Turkey)		0.624	0.620	2.312**	-0.267	0.632
		(0.682)	(0.685)	(1.022)	(0.771)	(0.658)
Remaining non-German citizenships		-0.396	-0.408	0.236	-0.706***	-0.415
		(0.273)	(0.278)	(0.562)	(0.271)	(0.271)
Citizenship German	-0.0262					
	(0.134)					
Linguistics and Social Sciences	-0.267***	-0.267***	-0.263***	-0.149***	-0.390***	-0.306***
	(0.0457)	(0.0459)	(0.0454)	(0.0503)	(0.0599)	(0.0354)
Math. / Computer Science / Engineering	0.256***	0.257***	0.261***	0.311***	0.194***	0.196***
	(0.0413)	(0.0416)	(0.0409)	(0.0903)	(0.0415)	(0.0432)
Natural Sciences	-0.140**	-0.141**	-0.139**	0.0158	-0.307***	-0.191***
	(0.0585)	(0.0586)	(0.0577)	(0.0674)	(0.0797)	(0.0578)
Medicine	-0.354***	-0.356***	-0.354***	-0.213***	-0.524***	-0.439***
	(0.0608)	(0.0606)	(0.0597)	(0.0561)	(0.0788)	(0.0614)
Remaining subjects	-0.204***	-0.205***	-0.201***	-0.0919	-0.295***	-0.246***
	(0.0634)	(0.0639)	(0.0632)	(0.0683)	(0.0798)	(0.0549)
Economics / Law / Management	ref	ref	ref	ref	ref	ref
selfemployed	-0.280***	-0.282***	-0.280***	-0.459***	-0.109	-0.277***
	(0.0729)	(0.0733)	(0.0734)	(0.129)	(0.123)	(0.0714)
year_2007	0.0375	0.0381	0.0373	0.0827*	-0.0114	0.0403
	(0.0393)	(0.0395)	(0.0395)	(0.0485)	(0.0534)	(0.0439)
Dummies per university						YES
Observations	18,571	18,571	18,571	8,714	9,857	18,571
R-squared	0.0134	0.0135	0.0133	0.0090	0.0142	0.0155
Log Lik	-22943	-22941	-22945	-11000	-11912	-22895
Robust standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1					

Table 7: Ordered logistic regression on Job Match

	(1)	(2)	(3)	(4)	(5)	(6)
Female immigrant	-0.400***	-0.391***	-0.391***	-0.0899		-0.375***
	(0.0745)	(0.0685)	(0.0685)	(0.0632)		(0.0692)
Female native	-0.311***	-0.311***	-0.312***	ref.		-0.306***
	(0.0359)	(0.0358)	(0.0359)			(0.0377)
Male immigrant	-0.0606	-0.0348	-0.0338		-0.0304	-0.0203
	(0.0745)	(0.0778)	(0.0769)		(0.0893)	(0.0770)
Male native	ref.	ref.	ref.		ref.	ref.
diploma or master degree	0.301***	0.302***	0.302***	0.322***	0.247*	0.276***
	(0.101)	(0.101)	(0.101)	(0.106)	(0.147)	(0.0995)
grade university	-0.238***	-0.238***	-0.237***	-0.237***	-0.234***	-0.264***
	(0.0298)	(0.0298)	(0.0298)	(0.0419)	(0.0290)	(0.0323)
Grade school	-0.286***	-0.286***	-0.287***	-0.330***	-0.245***	-0.258***
	(0.0303)	(0.0305)	(0.0303)	(0.0360)	(0.0397)	(0.0320)
finished in regular study period	0.0923***	0.0930***	0.0933***	0.00697	0.186***	0.107***
	(0.0327)	(0.0327)	(0.0329)	(0.0369)	(0.0567)	(0.0301)
having children	0.0239	0.0242		0.000984	0.0390	0.0325
	(0.0540)	(0.0544)		(0.0925)	(0.0616)	(0.0551)
age	-0.0137	-0.0137	-0.0129	-0.00186	-0.0263**	-0.0132
	(0.00905)	(0.00908)	(0.00889)	(0.0106)	(0.0122)	(0.00892)
citizenship: Turkey		-0.301	-0.301	0.614	-0.763	-0.295
		(0.391)	(0.391)	(0.549)	(0.477)	(0.379)
citizenship: North America or Australia		-0.134	-0.135	0.343	-0.676	-0.127
		(0.332)	(0.331)	(0.426)	(0.464)	(0.342)
citizenship: Western Europe (including UK)		0.00227	0.00117	-0.202	0.106	-0.0105
		(0.136)	(0.136)	(0.261)	(0.154)	(0.140)
citizenship: Eastern Europe		0.254	0.254	0.192	0.336	0.281
		(0.190)	(0.190)	(0.179)	(0.370)	(0.191)
citizenship: Middle East (excluding Turkey)		-1.326**	-1.327**	-1.992***	-0.857	-1.363***
		(0.531)	(0.532)	(0.503)	(0.815)	(0.518)
Remaining non-German citizenships		0.306	0.304	1.320**	-0.131	0.329
		(0.338)	(0.337)	(0.662)	(0.297)	(0.341)
Citizenship German	-0.142					
	(0.123)					
Linguistics and Social Sciences	-0.217***	-0.218***	-0.217***	-0.204**	-0.242**	-0.212***
	(0.0802)	(0.0800)	(0.0804)	(0.0837)	(0.103)	(0.0784)
Math. / Computer Science / Engineering	0.151**	0.150**	0.150**	0.0682	0.172***	0.179***
	(0.0606)	(0.0605)	(0.0605)	(0.0905)	(0.0635)	(0.0621)
Natural Sciences	0.546***	0.547***	0.547***	0.478***	0.665***	0.518***
	(0.0851)	(0.0847)	(0.0847)	(0.0963)	(0.110)	(0.0927)
Medicine	0.241***	0.239***	0.240***	0.331***	0.0958	0.240***
	(0.0839)	(0.0838)	(0.0837)	(0.0846)	(0.119)	(0.0925)
Remaining subjects	0.0616	0.0615	0.0623	0.112	0.0194	0.0561
	(0.0741)	(0.0741)	(0.0743)	(0.0776)	(0.0950)	(0.0751)
Economics / Law / Management						
selfemployed	-0.0169	-0.0140	-0.0137	0.0553	-0.0747	-0.0176
	(0.0665)	(0.0670)	(0.0668)	(0.0845)	(0.120)	(0.0707)
year_2007	-0.0961**	-0.0958**	-0.0959**	-0.0510	-0.136**	-0.0971*
	(0.0487)	(0.0488)	(0.0488)	(0.0622)	(0.0545)	(0.0544)
Dummies per university						YES
Observations	17,809	17,809	17,809	8,384	9,425	17,809
R-squared	0.0186	0.0188	0.0188	0.0175	0.0169	0.0217
Log Lik	-23536	-23533	-23533	-11273	-12229	-23464
Robust standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1					

Table 8: Propensity score matching

	Mean			t-test	
Variable	Female	Male	%bias		p>|t|
female	1	0	.	.	.
Diploma or master degree	0.93069	0.93753	-3	5.93	0
Grade university	16.643	1.662	0.4	0.11	0.91
Grade school	21.668	2.181	-2.3	6.86	0
Finished in regular study period	0.39911	0.38823	2.3	-10.5	0
Having children	0.06591	0.07506	-3.3	4.64	0
Age	28.323	28.603	-9.4	8.63	0
Citizenship German	0.97986	0.98192	-1.5	-0.13	0.898
Linguistics	0.29724	0.27878	4.7	-26.23	0
Math and computer science	0.09232	0.10231	-2.5	35.44	0
Natural science	0.10514	0.10863	-1.2	-6.7	0
Medicine	0.14934	0.15411	-1.5	-10.58	0
Remaining subjects	0.14934	0.1482	0.3	-4.24	0
Selfemployed	0.03439	0.03275	0.9	-0.43	0.666
Graduation year 2007: (yes – no)	0.53341	0.53028	0.6	-1.26	0.209

Table 9: Difference in wages in matched sample

Variable	Sample	Female	Male	Difference	S.E.	T-stat
wage	Unmatched	2.51654243	3.29593382	-0.779391388	0.021837654	-35.69
	ATT	2.51654243	2.97214859	-0.455606153	0.025262929	-18.03