Searching on Campus? Marriage Market Effects of the Student Gender Composition

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Abstract

This paper studies how changing student gender compositions during education affect marriage market outcomes for university graduates. Using German Microcensus data combined with aggregate information on the field-specific student sex ratio for more than 40 detailed fields of study from 1977 to 2011 the results for outcomes of marital status and couple composition reveal distinct gender differences. Women who experience a higher own-gender share during university education have lower marriage market opportunities than women in rather male-dominated fields. However, men are more likely to be married when the field-specific male share of students increases. When students of the own gender are relatively abundant, women's probability of having a university-educated partner from a different field of study increases, while men are more likely to marry down with respect to educational status.

JEL Classification: D10, I23, I24, J12
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1 Introduction

How does the gender composition among university students during education affect marriage market outcomes of university-educated individuals? In many Western societies, women's attainment in higher education has significantly increased over the past decades, considerably shifting the male-to-female ratio of university students.[1] In modern societies, educational attainment plays a crucial role in determining individuals' relative position by paying off returns on both the labor market and the marriage market more generally (Goldin, 1997; Lafortune, 2013). Given that individuals typically prefer spouses of similar age and education, the educational system represents a crucial marriage market for the highly educated (Mare, 1991; Kalmijn, 1991). Being enrolled in university education typically implies being faced with a homogeneous peer group with respect to age and ability right before marrying age (Blossfeld and Timm, 2003).[2] Thus, in addition to having significantly improved labor market opportunities for women (Goldin et al., 2006), the secular trend of more women enrolling in higher education may have shifted marriage market prospects for both male and female university graduates. Imbalanced sex ratios have strong implications for marriage market outcomes in various settings. Typically the scarcer gender is favored because of reduced partner search costs and increased bargaining power. However, little is known about the exact mechanisms through which gender imbalances by educational attainment affect individual marriage market prospects.

This paper explicitly addresses the role of higher education as a marriage market for university students and investigates effects of the gender composition among students by detailed fields of study on marriage market outcomes of university graduates using rich micro data from Germany. Different from the U.S., university teaching as well as students' social environment in Germany are tradi-

[1] For Germany, Figure A.1 shows that in 2003 among older cohorts of women the share of university-educated individuals was below 15% and well below the share of university-educated men, while the gender gap in higher education has almost closed for younger cohorts in 2011 with more than 25% of men and women aged 30–34 holding a university degree.

[2] In Germany, individuals holding a university degree typically marry shortly after having completed education. Average age at graduation is 28.1 for men and 27.2 for women, while average age at marriage is 30.0 and 28.8 respectively (Figure A.2). On average, individuals with lower levels of education finish much earlier (men: 22.2, women: 21.3) but the average time gap between education and marriage is much larger (men: 27.7, women: 25.9). Figure A.3 shows that university graduates are also significantly more likely to meet their partner in education or at work.

tionally strongly segmented by fields of study. Almost 90% of German university students do not reside on campus where they would frequently meet students from other fields of study.[3] In addition, German universities are typically scattered across university cities instead of being concentrated at a single campus. Hence, faculties of different disciplines, including teaching facilities, are usually located rather separately within cities. That is why in this setting the *field-specific* gender composition of enrolled students is most relevant for the frequency of meeting potential partners of the opposite sex.

To analyze the effect of the field-specific gender composition on marriage market outcomes of university graduates, I use administrative information on the sex ratio of students enrolled in (West) German universities broken down by 41 detailed fields of study over the period from 1977 to 2011. The aggregate field-by-year data is merged with data from the German Microcensus waves 2003 to 2011 containing individual information on the year of graduation as well as the exact field of study for more than 30 cohorts of university graduates. Based on this combined dataset, the regression analysis relies on substantial over-time and within-field variation in student sex ratios experienced at the time of education to estimate the effect on individual marriage market outcomes such as the marital status and the composition of couples with regard to spouses' educational attainment, field of study as well as occupation and industry.

The main identification strategy employs field of study fixed effects capturing any unobserved field-specific and time-invariant characteristics of students enrolled in a given field of study. Thus, variation in the gender composition is *within fields over time*. The comparison implicitly underlying the regression analysis can be illustrated as follows. For example, a female university student enrolled in a field characterized by a predominantly male student body (e.g. a field in Engineering) in the 1970s, when the female share of students is particularly low, encounters male students very frequently during her university education, implying that the probability of meeting a potential opposite-sex partner is very high. Consequently,

[3] Figure A.4 shows that over the past decades the share of university students in Germany living in student dorms has been around 12% while about two thirds of students live in (shared) apartments or stay with their parents (more than 20%).

the opposite is true for male students enrolled in Engineering fields and they are more likely to meet a potential partner outside their field of study or even outside the university environment. While the female share of students in Engineering may still be rather low in the 2000s, a relative increase since the 1970s implies that for female Engineering students the frequency of meeting male students is nowadays relatively lower compared to older cohorts of female Engineers holding any specific characteristics of women choosing Engineering constant.

However, the identification of causal effects of the student gender composition by field of study on marriage market outcomes may still raise concerns of endogenous self-selection into fields driven by marriage market considerations. Students who are mainly interested in finding a university-educated spouse may deliberately choose fields where the own gender is relatively scarce. In that case, the resulting gender composition would result from preferences for specific marriage market outcomes and reverse causality would be an issue.[4] In addition, the student gender composition may be correlated with a field's as well as its graduates' average unobserved characteristics which could be related to marriage market outcomes. These concerns are addressed by the field fixed effects strategy when unobserved characteristics are time-invariant. In addition, I include time-varying controls for a field's average income and average scores of occupational prestige. This addresses the concern of omitted variable bias since fields that are highly male may also be fields that pay high salaries while more female fields may be associated with lower average salaries. Further, I exploit information on the extent to which admission to university education in particular fields is restricted. Enrolling in a restricted field is costly from a student's point of view since this may imply "waiting semesters" before actual admission and because the choice of specific university is beyond the control of the individual applicant. This makes it much more likely that the motivation for choosing a restricted field is primarily driven by labor market considerations. Hence, by restricting the estimation samples to admission-restricted fields I am able to reduce

[4] However, individuals predominantly choosing fields of study where their own gender is scarce would imply that in the longer run the gender composition by field of study should become more balanced. In Section 2, I show that this is true for some fields, but is at odds with the observation that the female share increased in virtually all fields, i.e., also in those that had already been predominantly female. In addition, a number of fields are still predominantly male.

the concern of selection into fields driven by marriage market motives.

The results of this paper show that the gender composition of fellow students within the field of study during education has significant impacts on marriage market outcomes for university graduates with distinct gender differences. First, a higher female share of students negatively affects marriage market opportunities for women. Female graduates more often remain single and are less often in a (married) couple when women represent a larger share of students in the respective field of study. For men, I find the exact opposite result. A higher share of males in the field is associated with a higher probability of being married, while it is less likely to be single for men. Second, the student sex ratio significantly affects the composition of couples with respect to educational levels and field of study. For women, a higher share of the own gender among fellow students increases the probability of having a partner holding a degree from a different field of study than their own. At the same time, when men are more abundant in their field of study, male graduates are more likely to "marry down" with respect to educational status. This indicates that the pool of potential partners is larger for university-educated men than for women since marrying a partner from outside the university environment with a lower level of education and earnings potential is more likely for men than for women when the own gender is relatively abundant. Indeed, additional results are consistent with the interpretation that the educational environment is a relevant marriage market for university graduates. I show that when the own gender is relatively scarce with the field of study it is more likely that a university-educated spouse's graduation year is about the same. This is particularly true for female graduates. For men, a higher field-specific share of male students is associated with a higher probability of having a partner working in the same industry but at a lower probability in the same occupation. This result supports the interpretation that an unbalanced student gender composition enhances couple initiation at university for the scarcer gender, while work environments may be of additional relevance for "partner search on the job" (McKinnish, 2007).

This paper contributes to the literature in several ways. First, I exploit variation in the gender composition of university students, which is specific to detailed

fields of study, in order to study the role of the system of higher education as a marriage market for high-skilled individuals. Previous studies on the effects of imbalanced sex ratios on marriage and labor market outcomes have used segmentations of marriage markets by region, ethnicity or socio-economic status, among others *levels* of education.[5] Negrusa and Oreffice (2010) find that more favorable sex ratios by metropolitan area and educational attainment for women reduce wives' labor supply but increases that of husbands. Mansour and McKinnish (2018) study whether disproportionate rates of within-occupation matching of couples are due to preferences for a spouse with the same occupation or due to lower search costs within the workplace environment and find that their results are more in line with a search cost explanation. Bitler and Schmidt (2012) exploit variation across states and over time in men drafted for the Vietnam War and find that higher rates of inducted men led to significantly lower birth rates. Similarly Abramitzky et al. (2011) use regional variation in male scarcity in France caused by World War I and find consistent evidence that men improved their position in the marriage market as they became scarcer. Edlund (1999) studies the implications of unbalanced sex ratios due to widespread son preferences in Asian countries on marriage market outcomes across social classes. Chiappori et al. (2002) show that the sex ratio and divorce laws deemed favorable to women affect bargaining power and labor supply behavior. Angrist (2002) uses variation in immigrant flows as a natural experiment to study the effect of sex ratios on the children and grandchildren of immigrants. and consistently finds that higher sex ratios increase female bargaining power in the marriage market. Second, the findings of this paper are consistent with social norms regarding the composition of couples with respect to socio-economic status. For example, Bertrand et al. (2015) study the share of income earned by male and female spouses within the household and show that the likelihood of deviating from *gender identity norms*, stipulating that the husband should be the main earner in the household, affects various socio-economic outcomes. This norm is in line with the observation that women (men) typically tend to "marry up (down)" with re-

[5] One recent exception is Bičáková and Jurajda (2016) who use European labor force survey data and document a strong tendency of matching partners within eight broadly defined fields of study.

spect to the spouse's socio-economic status, which is consistent with findings based on speed-dating experiments. For instance Fisman et al. (2006) find that men prefer women whose "intelligence does not exceed their own", which would suggest that men may have a preference for partners with a lower education than themselves. Similarly, studies of online dating, e.g. Skopek et al. (2011), find that although men are willing to contact potential partners with lower educational qualifications, highly educated women tend to be averse to lower-qualified partners. In the context of this study, an increase in the female share of students enrolled in a given field reduces women's frequency of meeting men with similar levels of education. Consequently, the chances of finding a partner with at least the same (high) earnings potential are more limited, making couple formation in line with social norms more difficult and, hence, less likely. Finally, the main finding of this paper that the gender composition of university students affects couple formation among high-skilled individuals is relevant from a policy perspective given that assortative mating of couples has important implications for labor supply (Bredemeier and Juessen, 2013), inequality (Hyslop, 2001; Greenwood et al., 2014; Pestel, 2017; Fiorio and Verzillo, 2018) and intergenerational mobility (Ermisch et al., 2006).

The remainder of the paper is organized as follows: Section 2 describes the data. The empirical strategy and the results are presented in section 3. Section 4 concludes.

2 Data and Descriptives

Data sources. The aim of this paper is to study whether over-time changes in the sex ratio of students within fields of study drive observed differences in marriage market outcomes for university graduates. The data comes from two sources. The German Microcensus (2011) is an annual cross-sectional survey of private households in Germany covering one per cent of the population and contains micro data on core socio-demographic variables on the individual and household level, in particular marital status and household composition as well as detailed information on education, occupation and industry. Since wave 2003 the Microcensus provides

information on the field of study and the year of graduation for individuals holding a university degree. This allows me to merge aggregate information on the student gender composition by field of study with Microcensus waves 2003–2011. This administrative data was is retrieved from various volumes of the German Statistical Yearbook (Destatis, 1992, 2012), which report the annual total and gender-specific number of students enrolled in university education by field of study.

Marriage market outcomes by university education. Marriage market outcomes, in particular marital status of individuals as well as the composition of couple households, differ by university education. Figure 1 shows aggregate time-series of indicators of marital status over the period 2003–2011. Overall, there is a secular trend towards more singles and fewer individuals living in a (married) couple household. However, there are sizable level differences between individuals with and without university education. While for both males and females, among the group of university-educated individuals the share of single (couple) households is higher (lower), this difference is particularly pronounced for women. The educational gap for being single is more than ten percentage points over the period under investigation, while the gap for having ever been married is even between 15 and 20 percentage points. This underlines that the marriage market behavior of university-educated individuals on average differs from individuals with a lower level of education.

Focusing on couple households, the left-hand side panel of Figure 2 shows the share of couples where either one or both spouses hold a university degree for the full population. The share of households with one university-educated spouse has increased from about 15% in 2003 to almost 19% in 2011. The share of dual-educated couple households increased by more than half from below 10% to 15% over the same period, among which the share of university-educated couples from the very same field of study quadrupled from 1.1% to 4.4%. This means that the share of couples with at least one educated spouse increased from one fourth to about one third over the period 2003–2011. The increase in the importance of dual-educated couple households is even more pronounced when focusing on couples in the top decile of the income distribution. The share of couples where one spouse holds a university degree while the other spouse has a lower level of education has

remained constant at around 30% among the richest couples. At the same time, the share of dual-educated couples increased substantially from 30% in 2003 to 45% in 2011, again an increase by one half. Among those, the share of same-field couples increased by more than ten percentage points from 3.6% to 14.6%. Overall, almost three quarters of couple households within the top income decile comprise at least one spouse with a university degree, with a significantly growing importance of dual-educated couples. This means that couple formation among highly-educated individuals plays an increasingly important role for household composition in society, in particular at the upper end of the income distribution.

Gender composition of students by field of study. In the empirical analysis, I will test whether marriage market outcomes of individuals holding a university degree are affected by variation in the gender composition of students enrolled in the field of study at the time of university education. Figure 3 shows how the total number of university students enrolled in (West) Germany as well as the overall gender composition, indicated by the share of females, has evolved since the late-1970s.[6] Over this period, the number of students in Germany more than doubled from about 850,000 to more than two million individuals enrolled in university education, while the gender composition of students has considerably changed. In 1977, about one third of students were women and their share has been continuously increasing to 48% in 2011.[7]

While an increasing share of female university students is observed for virtually all fields of study, the overall change in the gender composition is not uniformly distributed across fields. Figure 4 shows the change in the share of female students by 41 fields of study between 1977 and 2011. The substantial variation indicates

[6] Each data year in the Statistical Yearbooks refers to the latter calender year of winter terms (typically from October to March). Harmonized data are available since 1977. East Germany is included from 1993 onwards.

[7] The observed growth in both the total number as well as the female share of university students is due to several factors. First, the system of tertiary education in Germany expanded rapidly during the 1970s responding to the demand from large birth cohorts in the 1950s and 1960s. The state invested in additional capacities by expanding existing universities and by founding new ones. Second, the women's movement in the 1960s promoted an increase in female participation in university education. This was, third, accompanied by the introduction of a financial support scheme targeted at students from low-income backgrounds, which turned out to be particularly beneficial for women.

that the social environment during university education in terms of the gender composition among fellow students has considerably shifted for older cohorts compared to younger cohorts of university students. A number of fields have actually switched from being predominantly male to predominantly female, for example in Architecture, Law and virtually all fields in Medical Sciences. Despite considerable increases in the share of enrolled women, fields in Engineering are still predominantly male, while fields in Humanities have become even more female. Other fields, like Economics and Business Administration or Agriculture, used to have a low female share and are nowadays rather balanced in terms of the gender composition. Only three fields have experienced very small decreases in the female share of students (Computer Sciences, Sports and Ecotrophology).

Estimation sample of university graduates. The estimation sample retrieved from the Microcensus waves 2003–2011 comprises men and women holding a university degree and have non-missing information on the year of graduation and field of study. The sample is further restricted to individuals aged 30–45 (birth cohorts 1958–1981).[8] Individuals from East Germany are excluded since the information from the Statistical Yearbooks is limited to West Germany until 1992 and only comprises students at East German universities thereafter. In addition, individuals with a non-German nationality are dropped since the data do not allow to disentangle whether foreigners have received their degree at a university in Germany or in the country of origin. Individuals who graduated from university at age 35 or later are dropped, since their period of education may arguably not overlap as much with the age of partner search. Finally, I only use individual observations who either live in a single or couple household (both married and cohabiting).

Summary statistics are presented in Table 1. Overall, the full sample comprises 34,302 men and 28,165 women. The main outcome variables of interest are marital status and for those individuals living in a couple household the characteristics

[8] As the timing of graduation as well as marriage among German university graduates is concentrated at ages just below 30 years (see Figure A.2), the lower-bound age restricts the sample to individuals who have mainly completed both education and marital search. Given that the Microcensus does not provide information on marital history and only comprises data on current marital status, the upper-bound age is chosen to restrict the sample to individuals who are most likely in their first marriage.

of the partner with respect to university education and field of study. The share of individuals living in single households compared to couple households is very similar among the samples of men and women respectively. The share of singles is on average 28% and the share living in couple households is 67%–70%. More than 60% of individuals have ever been married. Most of them are currently married at the time of the survey interview (83%–87% among the subsample of individuals living in couple households), while about 4% are either divorced or widowed.

While marital status outcomes are very similar between the samples of men and women there are substantial differences regarding the partner's characteristics among those who live in a couple household. The partners of male university graduates is in most cases a wive without a university degree (53%) while about 47% live with a partner who has obtained the same level of education. At the same time, female graduates are much more likely to live with a university-educated man (69%) while only 31% live with a lower-educated partner. Among those individuals living with a university-educated partner the fraction of partners having graduated in the very same field of study is about one third (16% for men and 24% for women).

The distinct gender patterns of selection into fields of study as shown on the aggregate level in Figure 4 are reflected in the sample of university graduates from the Microcensus data shown in Appendix Table A.1. Overall, there are 41 fields under consideration in the empirical analysis. About one third of both male and female university graduates have graduated in a field within Social Sciences (32% and 36% respectively). At the same time, men are substantially more likely to have a degree in an Engineering field (37%) or Natural Sciences (15%) than women (both 10%). About 33% of women have graduated in a field within Human Sciences with the number for men standing at 9%. Moreover, women are somewhat more likely to graduate in a medical field than men (8% vs. 5%). Only 2% of men and 4% of women graduate from Arts.

The observed differences in the choice of field of study are related to the percentage of the own gender among fellow students at the time of university education. Given that the German Microcensus contains individual information on the field and year of graduation, I am able to match the aggregate information on the male and

female percentages of students from the Statistical Yearbooks with the micro data. On average, men experience a 69% male share among students within the field of study while women experience a female share of 52%. This variation in the gender composition across fields and within fields over time will be exploited in the regression analysis.[9]

3 Estimation of Marriage Market Effects

3.1 Empirical Strategy

The empirical strategy exploits variation in the gender composition of university students over time and within field of study to estimate its impact on marriage market outcomes of university graduates. The empirical model reads:

$$y_{itcfg} = \alpha + \beta \times percent\ own\ gender_{fg} + X'_{it}\gamma + W'_{fg}\delta + Z'_{ft}\theta + \mu_f + \mu_c + \varepsilon_{itcfg}, \quad (1)$$

where y_{itcfg} denotes a marriage market outcome of an individual i who was surveyed in year t, is of birth cohort c and graduated in field of study f in year g. The outcomes are binary indicators of the marital status (single, in couple and ever married) or the composition of the couple regarding the spouse's level of education and field of study (partner without university degree, partner with degree in same field, partner with degree in other field) as described in the previous section. The main variable of interest is $percent\ own\ gender_{fg}$, i.e., the percentage of students of the *own gender* enrolled in field of study f in graduation year g indicating the gender composition experienced by individual i during university education.[10]

Field fixed effects μ_f control for any unobserved time-invariant field of study characteristics that are related to the frequency of meeting opposite-sex individuals. Importantly, this takes into account that some fields have been traditionally male- or female-dominated (e.g. fields in Engineering vs. fields in Humanities). Hence, I

[9] Figure A.5 shows the distribution of the field-specific female share of students by six field groups for both men and women separately.

[10] In a robustness check, I assign the percentage of the own gender in up to ten years prior the year of graduation.

only exploit variation in the gender composition *within* fields over time. Moreover, field fixed effects take into account any unobserved characteristics (e.g. personality traits, cognitive differences, differences in tastes and preferences, etc.) of individuals selecting into particular fields which may related to marriage market behavior and outcomes. In addition, the vector Z_{ft} controls for time-varying average full-time net income and average occupational prestige scores of graduates of field f surveyed in year t. This should reduce the concern of omitted variable bias since the gender composition of students may be correlated with salaries and prestige, which may affect marriage market outcomes. Birth cohort fixed effects μ_c control for any impact common to birth cohorts that may influence marriage market outcomes (e.g. the gender composition of students across all fields of study or changing social norms over time).

The set of individual controls X_{it} includes age, age squared, a binary indicator for living in an urban area at the time of the survey and state fixed effects, while W_{fg} controls for the log total number of students enrolled in field f in graduation year g. Equation (1) is estimated separately for men and women using a linear probability model with standard errors ε_{itcfg} clustered on the field by graduation year level.

3.2 Main Results: Effects of Student Gender Composition

Effects on marital status. The analysis of marriage market effects of the gender composition among university students begins by examining the impact of the own-gender share on outcomes related to marital status, i.e., whether a university-educated individual is single, in a couple or has ever been married at the time of the survey interview.

The estimation results are displayed in Table 2. Panel A shows the results for the full sample of university-educated men. Overall, I find that a higher own-gender (i.e. male) share of students significantly *improves* marriage market prospects of men. Having experienced a higher male share among fellow students during university education reduces the probability of being single (columns (1)–(3)) and increases the probability of being in a couple relationship and of having been ever married (columns (4)–(9)). The results indicate that a one percentage point higher

share of male students reduces the probability of being single by about 0.6 percentage points when including the full set of controls and fixed effects, corresponding to a 2.1% decrease at the mean value. At the same time, the probability of being in a couple is increased by 0.6 percentage points (0.1% at the mean), the effect on having been ever married is about one percentage point (about 1.5% at the mean). At first sight this pattern of results on the marital status of university-educated men may be surprising since a relative abundance of the own gender within the social environment is expected to be associated with higher competition as well as higher search costs on the marriage market. Note, however, that the marital status outcomes are not specific to the level or even field of the partner's education. The result that a higher male share within the educational peer group improves educated men's marriage market prospects implies that their partner search expands to the overall marriage market beyond the own field of study.

The results for the full sample of university-educated women are presented in Panel B of Table 2 and show the exact opposite pattern compared to men. Women who experienced a higher share of female peers during university education within their field of study are significantly more likely to remain single, while the prospects of being in a (married) couple is significantly reduced. For women, a one percentage point increase in the own-gender share increases the probability of remaining single by one percentage point (3.6% at the mean) and reduces the probability of having been married by 1.5 percentage points (2.5% at the mean).

The regression results presented in Table 2 are based on a linear specification of equation (1). However, non-linear relationships between the gender composition in the field of study and the marriage market outcomes may be plausible as well. For example, the linear estimates may be driven by individuals who experienced extremely unbalanced gender compositions. For this purpose, I run specifications of equation (1) where the continuous own-gender share is replaced by a series of indicators for specific levels of the gender share. The results for marital status outcomes are shown in Figure 5 and reveal a fairly linear pattern, in particular for the outcomes of remaining single and having ever been married.

Overall, the results for marital status outcomes imply that for university-

educated women a relative scarcity of male students within the field of study hampers couple formation, in particular regarding entering marriage. At the same time, a high male share does not impair men's marriage market prospects.

Effects on composition of couples. The results discussed in the previous paragraph show that the own-gender share among university students within the field of study affects couple formation in general. I now turn to outcomes related to the composition of couples with respect to the level of education, i.e., whether a university graduate's partner has attained university education as well, and whether university-educated partners are from the same or from a different field of study. Hence, the analysis is restricted to the sub-samples of university-educated men and women who live in a couple household at the time of the Microcensus survey.

The results are displayed in Table 3. The estimates in Panel A for university-educated men show that a higher own-gender share affects the margin of having a partner with completed university education (columns (1)–(3)). After including all controls and fixed effects a one percentage point higher male share on average significantly reduces the probability of having a partner holding a tertiary degree by one percentage point (2.1% at the mean). This finding is consistent with the interpretation that a higher percentage of the own gender among fellow students reduces the chances of meeting an opposite-gender partner within the university environment. Taking into account the partner's field of study, the results in columns (4)–(9) show that this result affects both margins of finding a university-educated wife from the same or from a different field of study.

The results for non-linear specifications shown in Figure 6 show that the impact on having a same-field spouse is mainly driven by men who experienced a rather low male share (less than 50% of male students) during university education having a significantly higher probability of a within-field match compared to a men who experienced a more balanced or predominantly male student gender composition. Given that a higher share of male students improves male students' overall success on the marriage market (see Table 2), the results on couple composition indicate that when men are more abundant within their field of study, they are apparently

more likely to expand their search for a potential spouse outside the university environment. This implies that male graduates are also willing to "marry down" with respect to the *level* of education.

The results for the sub-sample of women in couple households holding a university degree are shown in Panel B of Table 3. A higher female share of students during education significantly increases the probability of women having a partner holding a university degree (columns (1)–(3)), in particular from a different field of study (columns (7)–(9)). A one percentage point higher female share of students reduces the probability of a university-educated spouse (from another field) by one percentage point (corresponding to 1.6%–2.2% at the mean). At the same time the probability of having a partner with a degree from the very same field of study is not significantly affected when including the full set of controls (columns (4)–(6)). However, the non-linear specification presented in Figure 6 shows that women exposed to a very low own-gender share (below 25%) are more likely to have a same-field partner than women who have experienced a more balanced gender composition.

This means that university educated women's partner search seems to be strongly affected by the gender composition of fellow students during university education. This is consistent with the notion that partner search costs on the marriage market are lower when being outnumbered by the opposite gender (Mansour and McKinnish, 2018). An increasing own-gender share implying reduced relative scarcity increases search costs and makes within-field mating less likely. In addition, these findings indicate that there are gender-specific preferences for marrying up or down the educational ladder. When the female share among fellow students is higher, making within-field partner search more costly and more difficult, an important alternative search pool seems to be the university environment more generally, including different fields of study. Hence, educated women seem to prefer to marry a spouse from the same educational level or remaining single over "marrying down" the educational ladder.[11] At the same time, men are more likely to search for partners outside the university environment.

[11] Another mechanism behind these results could be the fact that the overall female share of students has always been below 50% for the entire sample though increasing over time (see Figure 3). Hence, female students may be overrepresented in some fields, but are always outnumbered on aggregate, making the wider university environment more attractive for partner search.

3.3 Additional Results and Robustness Checks

Choice of field of study driven by marriage market considerations? In order to address potential concerns regarding selection into fields of study being mainly driven by marriage market rather than labor market considerations, I present estimation results exploiting field-specific information on admission restriction rules. In Germany, admission to university education in specific fields can either be restricted at the central (federal) level or at the local (university) level. Central restriction of admission implies that only applicants whose overall score in their secondary school leaving examination (*Abitur*) passes a minimum threshold, which differs across fields and over time.[12] The main purpose is to allocate applicants for a place at university in fields where demand exceeds available capacities which mainly, but not exclusively, applies to fields in Medical Sciences. In addition, individual universities may also define their own admission restriction rules for specific fields. For this purpose, I compile administrative information on annual field-specific admission restrictions from the German Rector's Conference (*Hochschulrektorenkonferenz*), an umbrella organization of German universities. The dataset is based on annual publications listing the situation of admission restriction (free admission, local restriction or central restriction) for each field at each university in Germany. This allows me to compute an index of admission restriction ranging from zero (free admission) and 100% (admission fully restricted). Values in between give the percentage of German universities where admission to the respective field is restricted in a given year. Over the period under consideration between 1977 and 2011, the extent of admission restriction varies substantially both across fields and within fields over time, see Figures A.6 and A.7. Enrolling in university education in a field where admission is restricted may not fully rule out the possibility that the motivation for choosing the respective field is driven by marriage market considerations. However, I argue that this much less likely since enrolling in a restricted field is costly from an individual's point of view. First, some applicants may have to wait one or more semesters before they are actually admitted. Second, particularly the central level restriction

[12] In addition, waiting time as well certain quotas for disadvantaged groups are also used as auxiliary criteria.

typically implies that the choice of specific university is beyond the control of the individual applicant. Both aspects substantially increase the opportunity costs of choosing a restricted field of study, making it much more likely that the motivation is primarily (if not only) driven by labor market considerations. For this reason, I run regressions where the sample is restricted to individuals who graduated from a field of study where admission was restricted to large extent, indicated by the percentage of admission-restricted universities, five years prior to graduation. The results are shown in Figures 7 and 8 and indicate that the effects of gender composition in restricted fields are very much in line with the baseline results.

Meeting of spouses at university or at work? The interpretation of the results of the field-specific gender composition among university students so far relies on the idea that couples meet and match whilst at university, which is however not directly testable based on the available data. An alternative explanation could be forwarded with respect to work environments after graduation. Given that graduating from a specific field of study typically prepares for careers in related occupations. Students of engineering will usually start careers as engineers while students of medicine will be working as doctors after having completed their university education. This means that work environments in specific occupations can be expected to be similarly gender-differentiated as the student gender composition of closely related fields of study. Hence, in addition to affecting the probability of encountering potential opposite-gender spouses at university the student gender composition may also have an effect on the frequency of meeting opposite-gender colleagues and co-workers. Lacking information on whether observed partnerships of university graduates have actually been initiated during university, I exploit the information on spouses' year of graduation.

If the interpretation that the university environment represents an important marriage market is relevant this implies that the graduation year among university-educated spouses is the same or very close. On average, 44% of couples where both partners hold a university degree have graduated at about the same time, i.e., within at most one year (see Table 1). Indeed, the results in columns (1)–(3) of Table 4 show that a higher percentage of the own gender among students in the field

significantly reduces the probability that the partner's year of graduation is similar. This holds for both genders, while the effect is more pronounced and of a higher statistical significance for women (Panel B). A one percentage point higher female share reduces the probability of the spouses' similarity in the year of graduation by 0.9 percentage points, corresponding to an effect of about 2% at the mean.[13]

While this result supports the interpretation that an unbalanced student gender composition enhances couple initiation at university for the scarcer gender, the related gender composition of work environments may be of additional relevance for "partner search on the job" (McKinnish, 2007). This mechanism would imply that spouses are similar with respect to the industry and occupation. The share of spouses working in the same industry or occupation is between 15% and 22%.[14] Columns (4)–(6) of Table 4 show that indeed a higher percentage of the own gender significantly increases the probability of having a partner working in the same industry sector for men while the estimate is negative and insignificant for women. This supports the notion that men graduating from male-dominated fields are more likely to meet their spouse at work. However, as shown in columns (7)–(9), at the same time the outcome of having a spouse working in the same occupation is significantly and negatively affected by a higher share of male students. This result indicates that men are likely to meet their partner within their work environment but among women performing different tasks, arguably not requiring a university education given that the results on marital status and couple composition have shown that men are more more likely to live with a partner with a lower level of education (see Tables 2 and 3).

Placebo gender composition by randomly assigning the field of study. In order to further corroborate the validity of the baseline estimation results, I run regressions with placebo treatments by randomly assigning the gender composition

[13] Note that the number of observations in columns (1)–(3) of Table 4 is below the sample size of the male and female couple samples since the graduation year of the spouse is only observed for couples where both partners are university graduates. This the case for 47% of men and 69% of women living in couple households (see Table 1).

[14] Summary statistics are presented in Table 1. For this analysis, I employ 2-digit categories according the Statistical Office's classification of industries and classification of occupations respectively.

of artificially assigned fields of study to individual observations while keeping the year of graduation fixed. This exercise is repeated 500 times for each outcome as well as for the samples of men and women separately and yields distributions of the coefficient estimates (β in equation (1)). The results are shown in Figures 9 and 10. The vertical dashed lines indicate the point estimates from the baseline regression results presented in Tables 2 and 3. In almost all cases, the baseline point estimate is significantly different and more pronounced than the distribution of placebo treatment effects except for those outcomes where the baseline effect is anyway not significantly different from zero. For most outcomes the distribution of placebo effects is not centered around zero indicating statistically significant effects of the placebo treatments. This could be due to the fact that the placebo gender composition of university students for a given graduation year represents the "average" gender composition for a given graduation year which is positively correlated with the true gender composition within the actual field of study. What is reassuring for the analysis, is the fact that the baseline estimate is usually significantly outside the distribution of placebo effects. This indicates that the actually experienced gender composition during university education has more pronounced impacts on marriage market outcomes of university graduates.

Lagged gender composition with respect to graduation year. In the baseline specification, the gender composition assigned to each individual is based on the exact field of study and the year of graduation in that field. However, a university graduate's field-specific gender composition reflecting marital search conditions may not be the one that prevailed in the year of graduation, i.e., at the end of education, but rather the one at the beginning of or during the course of study. Unfortunately, the year of starting university education is not available in the Microcensus data. That is why I present regression results assigning the gender composition of students between one and ten years before the year of graduation.[15] The results are presented in Figures 11 and 12 and are very similar to the baseline specifications (equal to zero years before graduation). This is not surprising given the fact that, while the

[15] For example, in the baseline specification an individual who graduated in 2000 is assigned the respective field-specific gender share in that year. In the alternative specifications the individual is assigned the gender share that prevailed in 1999, 1998, and so on.

gender composition has changed substantially in some fields of study over several decades, the year by year levels are highly correlated. However, it turns out that those results assigning the gender composition between zero and five years before graduation are more pronounced than those assigning the gender composition more than five years prior to graduation. This is consistent with a typical duration of university education of about five years.

4 Conclusions

This paper studies how the gender composition among university students by field of study affects marriage market outcomes of university graduates in Germany. Using rich data from the German Microcensus combined with aggregate information for more than 40 fields of study over the period 1977–2011, I exploit over-time variation in the gender composition within fields of study.

The main findings of the paper show that the gender composition of fellow students within the field of study experienced during education has significant impacts on marriage market outcomes for university graduates with distinct gender differences. First, a higher own-gender share of students negatively affects marriage market opportunities for women by increasing the probability of remaining single and reducing marriage rates, while the opposite is true for men. Second, an imbalanced student sex ratio significantly affects the composition of couples in terms of education and the field of study. A higher share of the own gender increases the probability of having an opposite-sex partner from a different field of study for women. At the same time, men are more likely to marry down with respect to educational status, while women rather have a partner with the same level of education.

Overall, the results of this study are in line with gender identity norms with respect to couple formation, implying that women typically prefer to "marry up" the socio-economic ladder (Bertrand et al., 2015). These findings imply that changes in the gender composition of students may have implications for the socio-demographic composition of societies since we may expect increases in assortative mating of cou-

ples when the formation of same-field relationships is enhanced in male-dominated fields. This may have longer-run impacts on income inequality and intergenerational mobility. At the same time, further increases in the female share of students in fields already dominated by women may increase the number of university-educated women remaining single (longer), which may in turn have negative implications for fertility among high-skilled women.

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Figures and Tables

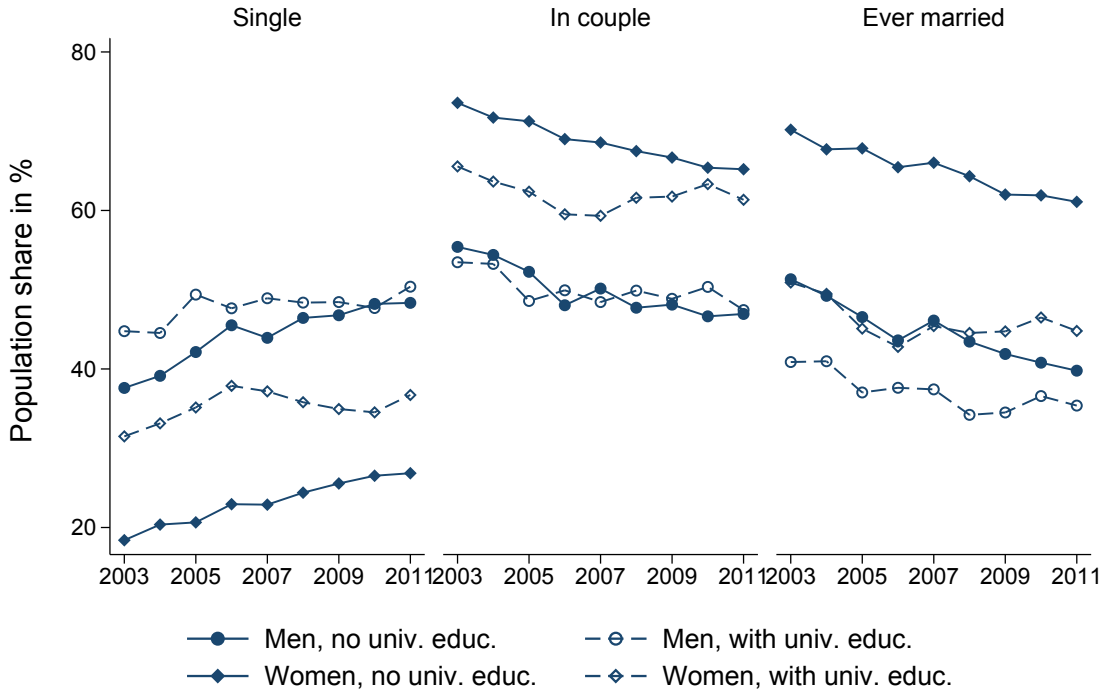

Figure 1: Marital status by gender and university education

Note: This graph shows the marital status among individuals aged 30–34 in Germany. Ever married includes currently married, divorced and widowed. *Source*: Microcensus 2003–2011, own calculations.

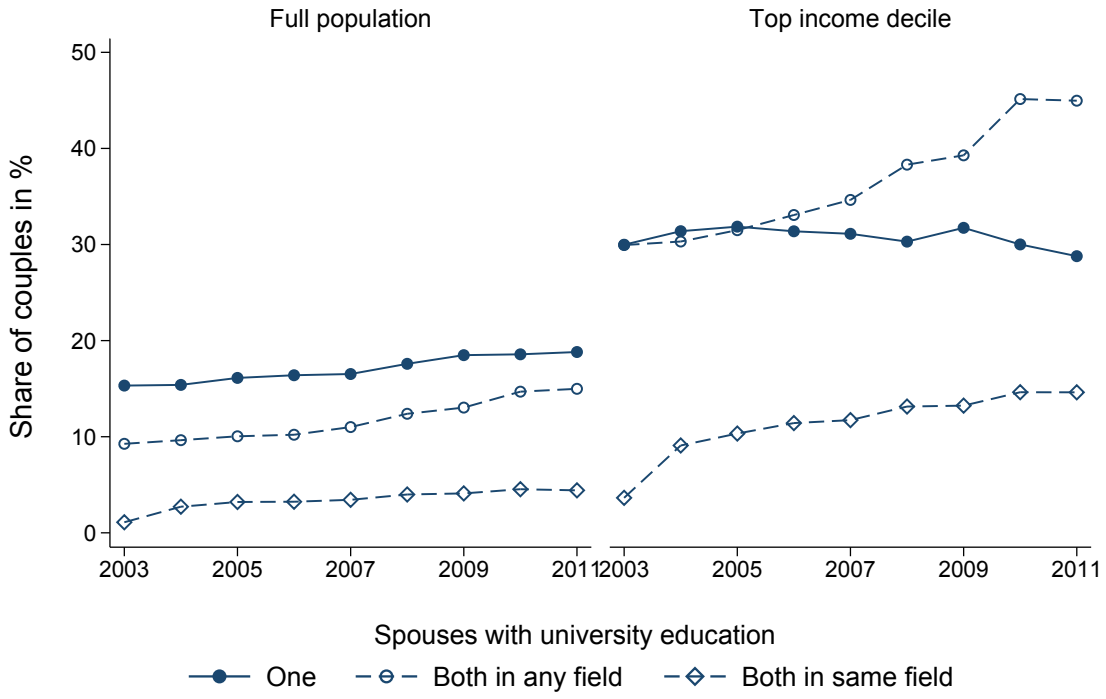

Figure 2: Composition of couples by university education

Note: This graph shows the share of couple households with either one or both spouses hold a university degree. The share of couples where both spouses hold a degree from the same field of study is a subgroup of the share where both spouses hold a university degree in any field of study. The sample is restricted to couple households where the household head is aged between 30 and 45. The left panel shows the composition of couples for the full population while the panel on the right-hand side is restricted to couple households within the top decile of the household income distribution. *Source*: Microcensus 2003–2011, own calculations.

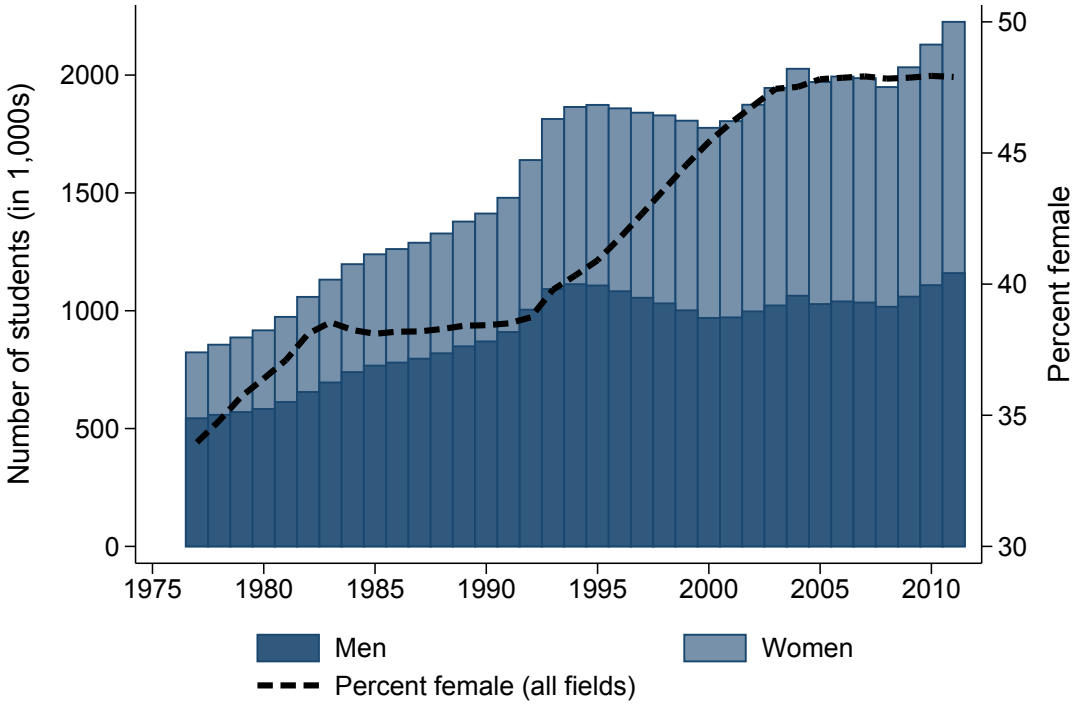

Figure 3: University students in Germany by gender

Note: This bar chart shows the total number of university students in Germany by gender and over time (left axis) as well as the corresponding percentage of female students (right axis). *Source*: Statistical Yearbooks, own calculations.

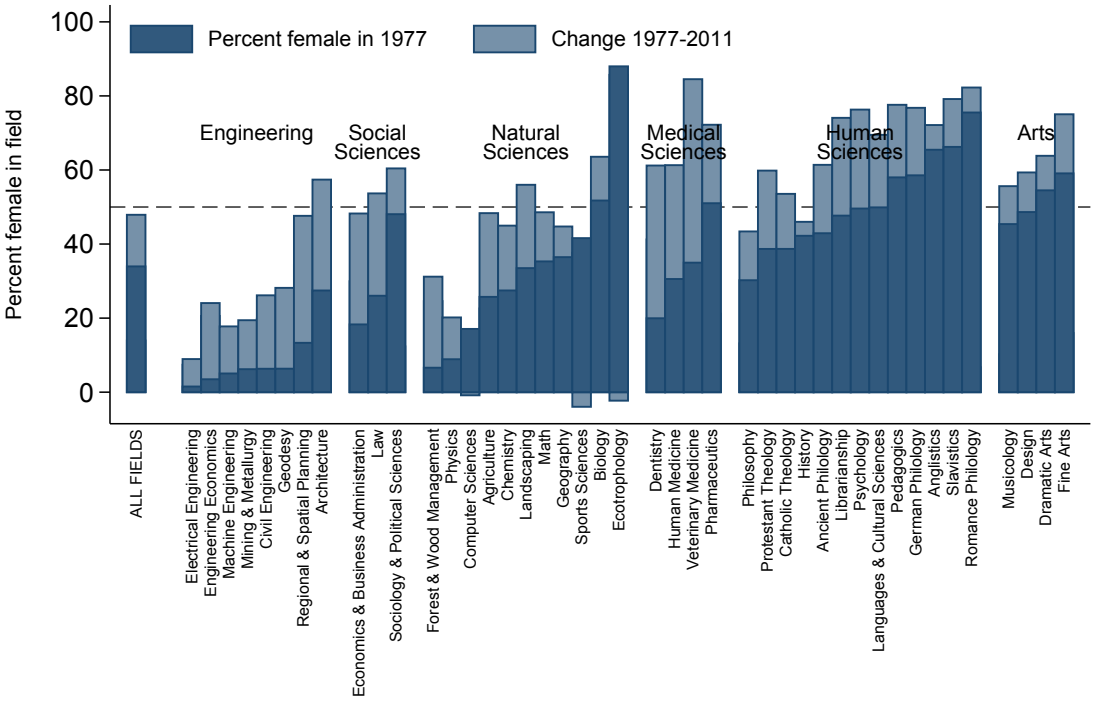

Figure 4: Gender composition of university students by field of study

Note: This bar chart shows the percentage of female students by field of study in 1977 (darker bars) and its change between 1977 and 2011 (lighter bars). Adding the height of the two bars gives the percentage of female students in 2011. The horizontal line indicates a female share of 50%, where the gender composition is perfectly balanced. *Source*: Statistical Yearbooks, own calculations.

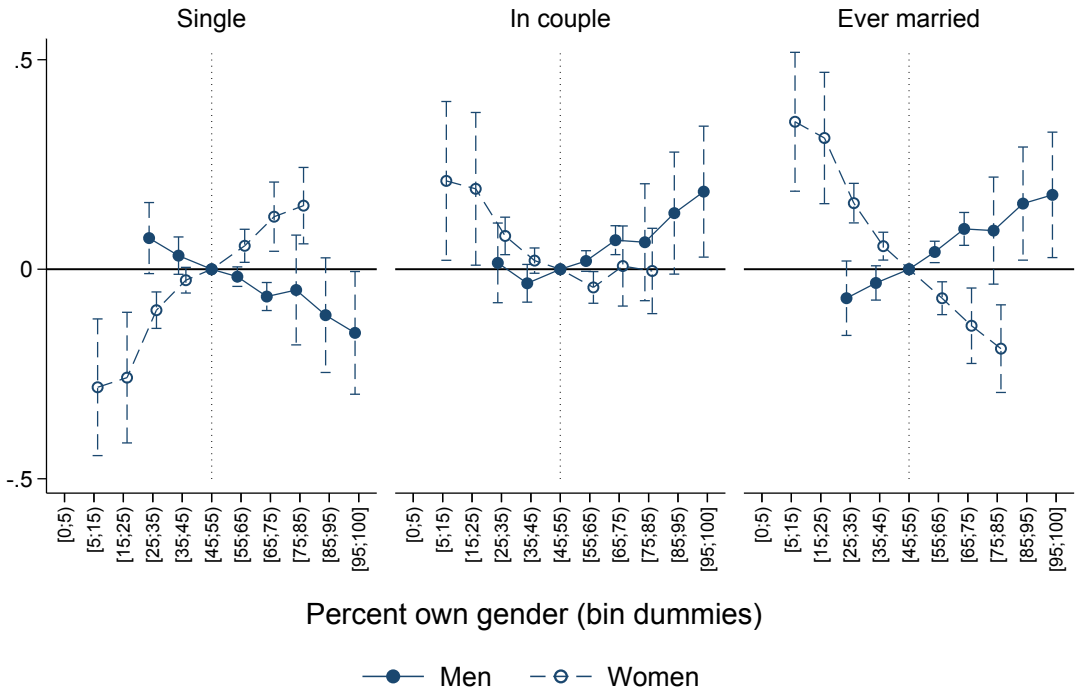

Figure 5: Non-linear effects of percent own gender on marital status

Note: This graph shows estimation results for the coefficient β from six separate regressions of equation (1) replacing the linear effect of percent of own gender with a series of eleven dummies. Each scatter point indicates the point estimate for the respective bin dummy. The omitted category is percent own gender between 45 and 55. The vertical whiskers indicate 95% confidence intervals. *Source*: Statistical Yearbooks & Microcensus 2003–2011, own calculations.

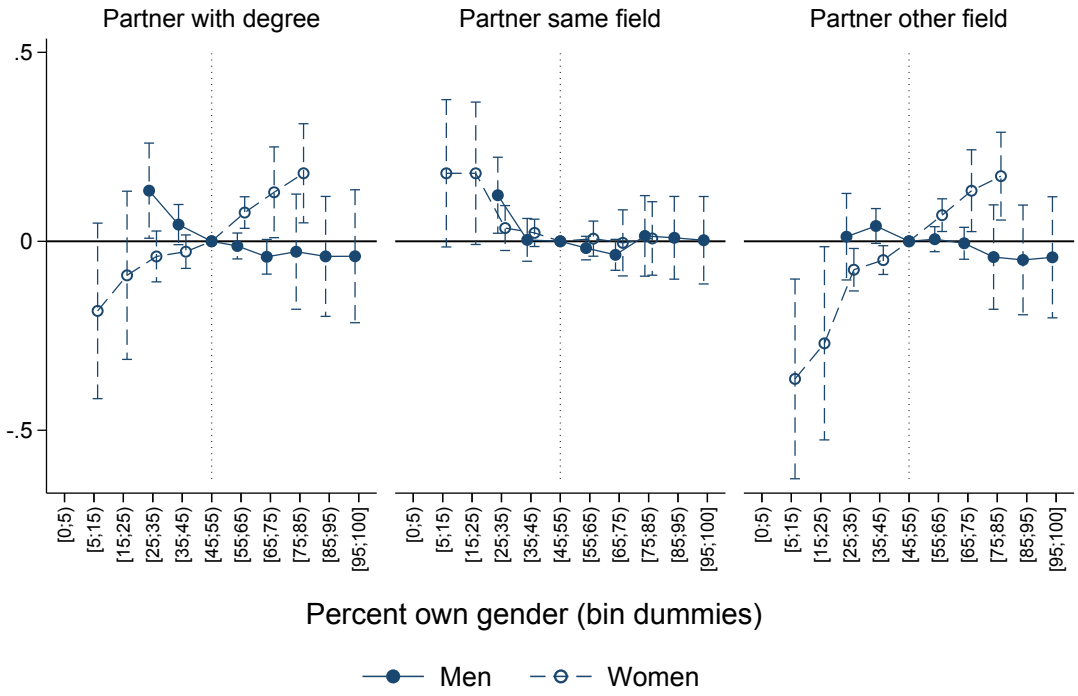

Figure 6: Non-linear effects of percent own gender on couple composition

Note: This graph shows estimation results for the coefficient β from six separate regressions of equation (1) replacing the linear effect of percent of own gender with a series of eleven dummies. Each scatter point indicates the point estimate for the respective bin dummy. The omitted category is percent own gender between 45 and 55. The vertical whiskers indicate 95% confidence intervals. *Source*: Statistical Yearbooks & Microcensus 2003–2011, own calculations.

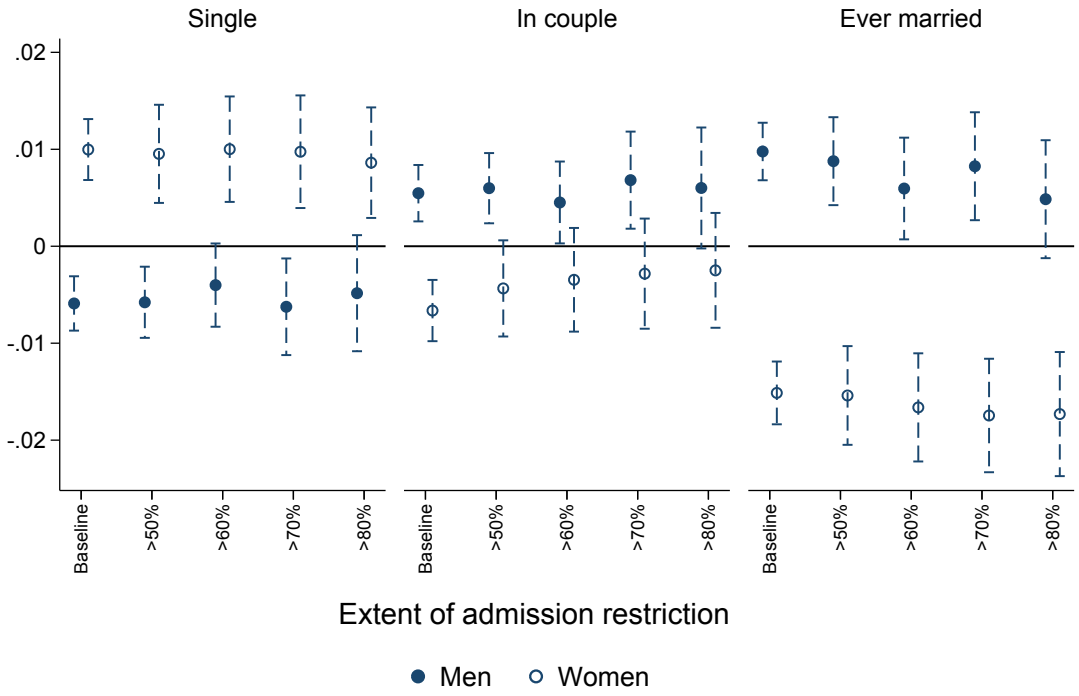

Figure 7: Effects of percent own gender on marital status for admission-restricted fields

Note: This graph shows estimation results for the coefficient β from 30 separate regressions of equation (1) for alternative sub-samples with respect to the extent of field-specific admission restrictions five years prior to individual graduation. The baseline estimates shows the respective results from Table 2 and can be compared to the estimates for samples of individuals whose field was characterized by a level of admission restriction of more than 50%, 60%, 70% or 80%. Each scatter point indicates the respective point estimate for percent of own gender in the field. The vertical whiskers indicate 95% confidence intervals. *Source*: Statistical Yearbooks & Microcensus 2003–2011, own calculations.

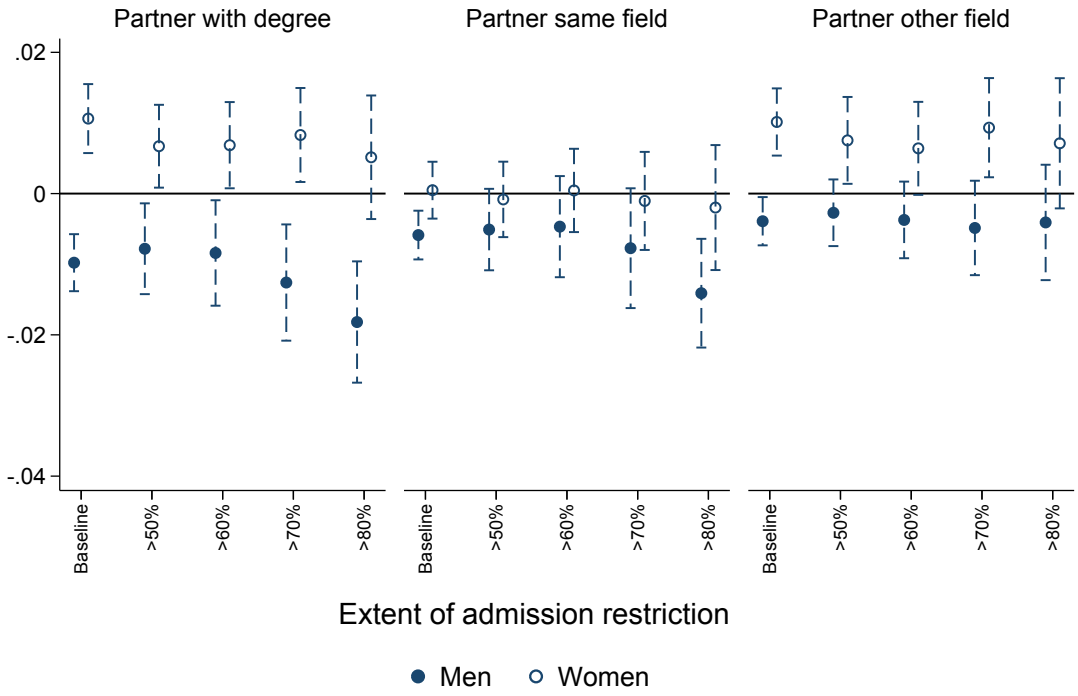

Figure 8: Effects of percent own gender on couple composition for admission-restricted fields

Note: This graph shows estimation results for the coefficient β from 30 separate regressions of equation (1) for alternative sub-samples with respect to the extent of field-specific admission restrictions five years prior to individual graduation. The baseline estimates shows the respective results from Table 3 and can be compared to the estimates for samples of individuals whose field was characterized by a level of admission restriction of more than 50%, 60%, 70% or 80%. Each scatter point indicates the respective point estimate for percent of own gender in the field. The vertical whiskers indicate 95% confidence intervals. *Source*: Statistical Yearbooks & Microcensus 2003–2011, own calculations.

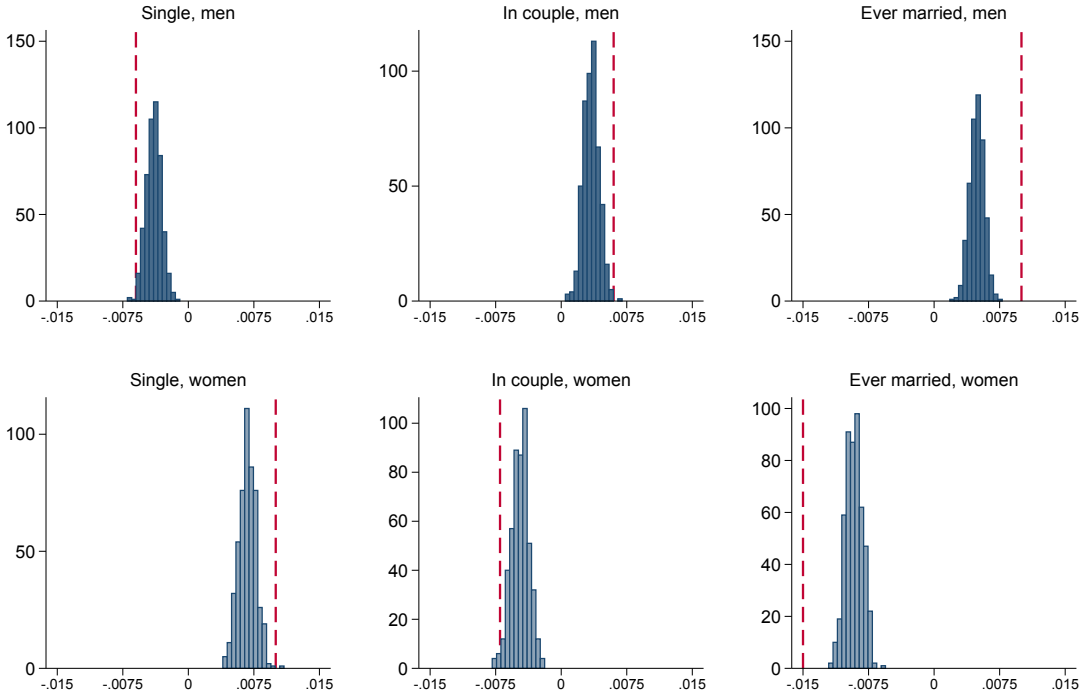

Figure 9: Effects of percent own gender on marital status for randomly assigned field

Note: This graph shows the frequency distribution of estimation results for the coefficient β in equation (1) from 500 replications (per outcome and sample) when randomly assigning the field of study to individual observations and holding the year of graduation fixed. The dashed vertical line indicates the estimate of the baseline estimates as shown in Table 2. *Source*: Statistical Yearbooks & Microcensus 2003–2011, own calculations.

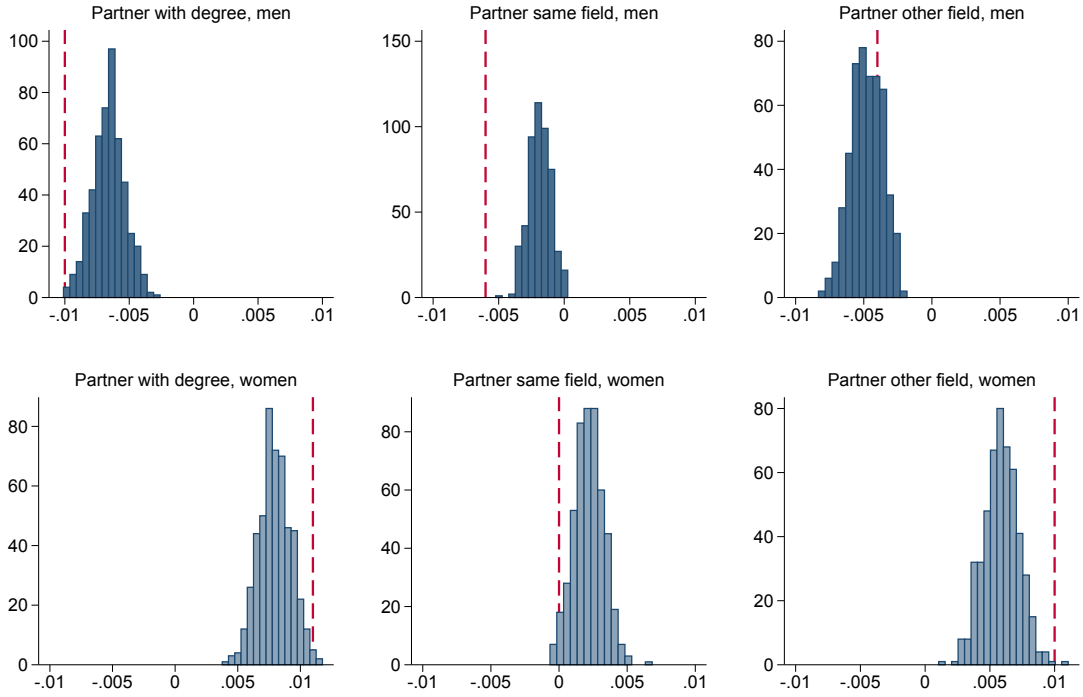

Figure 10: Effects of percent own gender on couple composition for randomly assigned field

Note: This graph shows the frequency distribution of estimation results for the coefficient β in equation (1) from 500 replications (per outcome and sample) when randomly assigning the field of study to individual observations and holding the year of graduation fixed. The dashed vertical line indicates the estimate of the baseline estimates as shown in Table 3. *Source*: Statistical Yearbooks & Microcensus 2003–2011, own calculations.

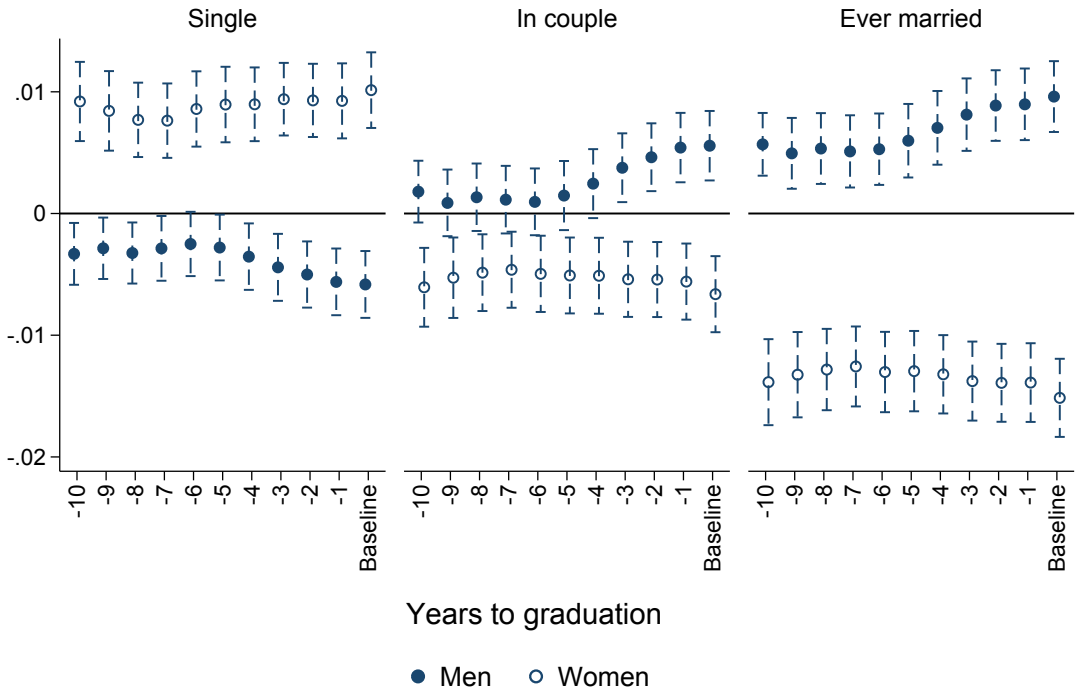

Figure 11: Effects of percent own gender on marital status for different lags of graduation year

Note: This graph shows estimation results for the coefficient β from 88 separate regressions of equation (1) for alternative definitions of the field-specific gender composition's timing, employing lags $l \in \{0, ..., 10\}$ with respect to an individual's year of graduation g. Zero years before graduation is the baseline specification shown in Panel A of Table 2. Each scatter point indicates the respective point estimate for percent own gender. The vertical whiskers indicate 95% confidence intervals. *Source*: Statistical Yearbooks & Microcensus 2003–2011, own calculations.

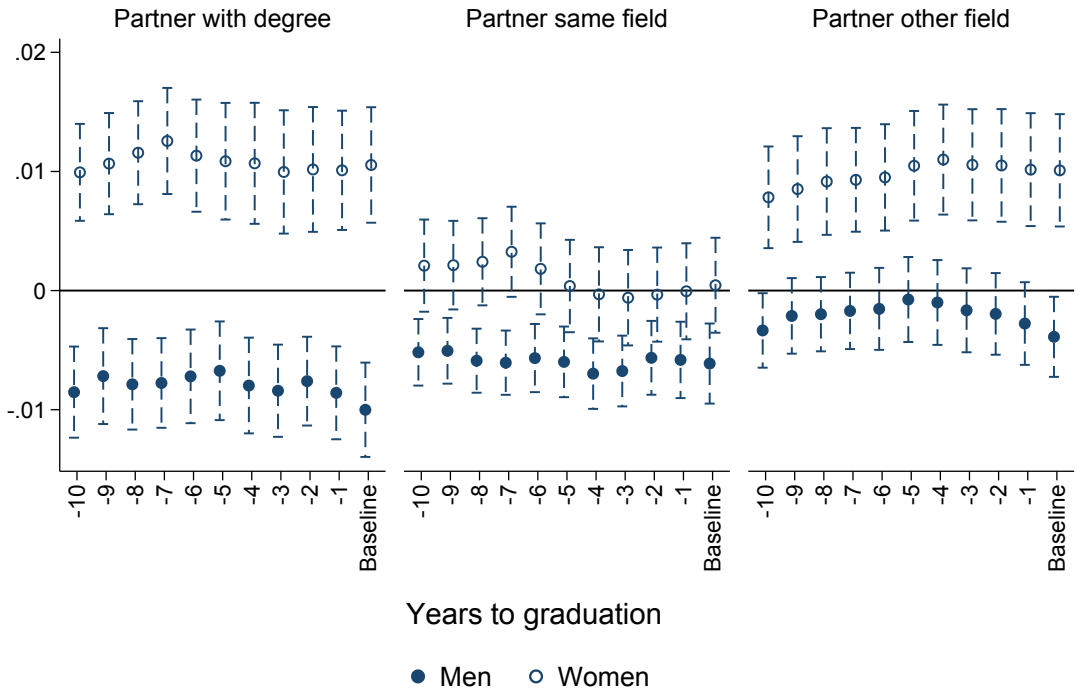

Figure 12: Effects of percent own gender on couple composition for different lags of graduation year

Note: This graph shows estimation results for the coefficient β from 66 separate regressions of equation (1) for alternative definitions of the field-specific gender composition's timing, employing lags $l \in \{0, ..., 10\}$ with respect to an individual's year of graduation g. Zero years before graduation is the baseline specification shown in Panel A of Table 3. Each scatter point indicates the respective point estimate for percent own gender. The vertical whiskers indicate 95% confidence intervals. *Source*: Statistical Yearbooks & Microcensus 2003–2011, own calculations.

Table 1: Summary statistics

Sample	Men		Women	
Subsample	Full sample	Couple sample	Full sample	Couple sample
Student gender composition				
Percent own gender in field	68.7	69.8	51.6	51.5
	(20.5)	(20.3)	(18.6)	(18.9)
Marital status				
Single (0/1)	.28	0	.28	0
	(.45)	(0)	(.45)	(0)
In couple (0/1)	.7	1	.67	1
	(.46)	(0)	(.47)	(0)
Ever married (0/1)	.64	.87	.61	.83
	(.48)	(.33)	(.49)	(.37)
Currently married (0/1)	.61	.87	.56	.83
	(.49)	(.33)	(.5)	(.37)
Divorced (0/1)	.03	0	.04	0
	(.16)	(0)	(.2)	(0)
Widowed (0/1)	.001	0	.003	0
	(.038)	(0)	(.059)	(0)
Couple composition				
Partner with university degree (0/1)	–	.47	–	.69
		(.5)		(.46)
in same field (0/1)	–	.16	–	.24
		(.37)		(.43)
in other field (0/1)	–	.31	–	.45
		(.46)		(.5)
Partner similar year of graduation (0/1)	–	.44	–	.44
		(.5)		(.5)
Partner in same industry (0/1)	–	.19	–	.22
		(.39)		(.41)
Partner in same occupation (0/1)	–	.15	–	.21
		(.36)		(.41)
Field of study controls				
Log number of students in field	11.3	11.3	11.2	11.2
	(1)	(1)	(.9)	(.9)
Full-time net income in field (2010 euros)	3225	3241	2930	2934
	(514)	(503)	(612)	(608)
Occupational prestige of field (ISEI score)	65.6	65.7	65	65.1
	(6.2)	(6.2)	(7.1)	(7)
Individual controls				
Age (years)	38.3	39	36.8	36.8
	(4.4)	(4)	(4.4)	(4.2)
Living in urban area (0/1)	.24	.19	.29	.23
	(.43)	(.39)	(.45)	(.42)
Observations	34302	23947	28165	18990

Note: This table shows summary statistics on marital status and field of study for a sample of university-educated individuals aged 30–45 in Germany. The *percentage of the own gender* in the field of study refers to the year of an individual's graduation. The binary indicator for ever married comprises currently married individuals as well as widows/widowers and divorced individuals. The binary variable for having a partner with *a similar year of graduation* indicates whether an individual's partner has graduated from university education in the very same year or at most one year before or after among couples where both spouses hold a university degree. The binary variables for having a partner in the *same industry* and the *same occupation* indicate that the individual's spouse is currently employed in the same 2-digit category for the Statistical Office's classification of industries (*Wirtschaftszweigklassifikation, WZ2003/2008*) or classification of occupation (*Klassifikation der Berufe, KldB92*). *Full-time net income* of the field is the mean net income of graduates from the same field surveyed in the same year. Occupational prestige is the mean ISEI prestige score among graduates from the same field interviewed in the same year. *Urban area* indicates whether the individual lives in a city with more than 500,000 inhabitants. *Source*: Statistical Yearbooks & Microcensus 2003–2011, own calculations.

Table 2: Effects of percent own gender in field on marital status

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Single			In couple			Ever married		
A. Men: Full Sample									
Percent own gender	-0.002***	-0.006***	-0.006***	0.002***	0.006***	0.006***	0.003***	0.010***	0.010***
	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
Observations	34302	34302	34302	34302	34302	34302	34302	34302	34302
Adjusted R^2	0.007	0.091	0.133	0.007	0.072	0.111	0.013	0.121	0.174
B. Women: Full Sample									
Percent own gender	0.001*	0.011***	0.010***	-0.000	-0.008***	-0.007***	-0.001**	-0.016***	-0.015***
	(0.000)	(0.002)	(0.002)	(0.000)	(0.002)	(0.002)	(0.000)	(0.002)	(0.002)
Observations	28165	28165	28165	28165	28165	28165	28165	28165	28165
Adjusted R^2	0.001	0.028	0.066	0.000	0.022	0.059	0.002	0.063	0.116
Field FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Birth cohort FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Field controls	No	No	Yes	No	No	Yes	No	No	Yes
Individual controls	No	No	Yes	No	No	Yes	No	No	Yes

Note: Field controls are the log number of students enrolled in an individual's field of study in the year of graduation, the average monthly full-time net income as well as the average occupational prestige (ISEI) score of graduates of the field of study in the year of the Microcensus survey interview. Individual controls are age, age squared, a binary indicator for living in an urban area as well as a set of dummies for the federal state of residence at the time of the Microcensus survey interview. Standard errors are clustered on the field by graduation year level. *** = significant at the 1 percent level, ** = significant at the 5 percent level, * = significant at the 1 percent level. *Source*: Statistical Yearbooks & Microcensus 2003–2011, own calculations.

Table 3: Effects of percent own gender in field on couple composition: education and field

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Partner with degree			Partner with degree in same field			Partner with degree in other field		
A. Men: Couple Sample									
Percent own gender	-0.004***	-0.011***	-0.010***	-0.005***	-0.007***	-0.006***	0.001***	-0.005***	-0.004**
	(0.000)	(0.002)	(0.002)	(0.000)	(0.002)	(0.002)	(0.000)	(0.002)	(0.002)
Observations	23947	23947	23947	23947	23947	23947	23947	23947	23947
Adjusted R^2	0.031	0.059	0.077	0.088	0.112	0.116	0.002	0.035	0.045
B. Women: Couple Sample									
Percent own gender	-0.001***	0.012***	0.011***	-0.004***	0.001	0.000	0.003***	0.011***	0.010***
	(0.000)	(0.003)	(0.002)	(0.000)	(0.002)	(0.002)	(0.000)	(0.002)	(0.002)
Observations	18990	18990	18990	18990	18990	18990	18990	18990	18990
Adjusted R^2	0.003	0.029	0.045	0.035	0.059	0.063	0.012	0.035	0.040
Field FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Birth cohort FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Field controls	No	No	Yes	No	No	Yes	No	No	Yes
Individual controls	No	No	Yes	No	No	Yes	No	No	Yes

Note: Field controls are the log number of students enrolled in an individual's field of study in the year of graduation, the average monthly full-time net income as well as the average occupational prestige (ISEI) score of graduates of the field of study in the year of the Microcensus survey interview. Individual controls are age, age squared, a binary indicator for living in an urban area as well as a set of dummies for the federal state of residence at the time of the Microcensus survey interview. Standard errors are clustered on the field by graduation year level. *** = significant at the 1 percent level, ** = significant at the 5 percent level, * = significant at the 1 percent level. *Source*: Statistical Yearbooks & Microcensus 2003–2011, own calculations.

Table 4: Effects of percent own gender in field on couple composition: graduation year, industry and occupation

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Partner similar graduation year			Partner in same industry			Partner in same occupation		
A. Men: Couple Sample									
Percent own gender	-0.002***	-0.004	-0.005*	-0.004***	0.003**	0.003**	-0.004***	-0.004***	-0.004***
	(0.000)	(0.003)	(0.003)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
Observations	11289	11289	11289	23947	23947	23947	23947	23947	23947
Adjusted R^2	0.005	0.011	0.017	0.051	0.090	0.090	0.054	0.069	0.073
B. Women: Couple Sample									
Percent own gender	-0.002***	-0.010***	-0.009***	-0.001***	-0.001	-0.002	-0.002***	0.001	0.001
	(0.000)	(0.003)	(0.003)	(0.000)	(0.002)	(0.002)	(0.000)	(0.002)	(0.002)
Observations	13111	13111	13111	18990	18990	18990	18990	18990	18990
Adjusted R^2	0.005	0.014	0.015	0.001	0.013	0.015	0.007	0.020	0.024
Field FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Birth cohort FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Field controls	No	No	Yes	No	No	Yes	No	No	Yes
Individual controls	No	No	Yes	No	No	Yes	No	No	Yes

Note: Field controls are the log number of students enrolled in an individual's field of study in the year of graduation, the average monthly full-time net income as well as the average occupational prestige (ISEI) score of graduates of the field of study in the year of the Microcensus survey interview. Individual controls are age, age squared, a binary indicator for living in an urban area as well as a set of dummies for the federal state of residence at the time of the Microcensus survey interview. Standard errors are clustered on the field by graduation year level. *** = significant at the 1 percent level, ** = significant at the 5 percent level, * = significant at the 1 percent level. *Source*: Statistical Yearbooks & Microcensus 2003–2011, own calculations.

A Appendix

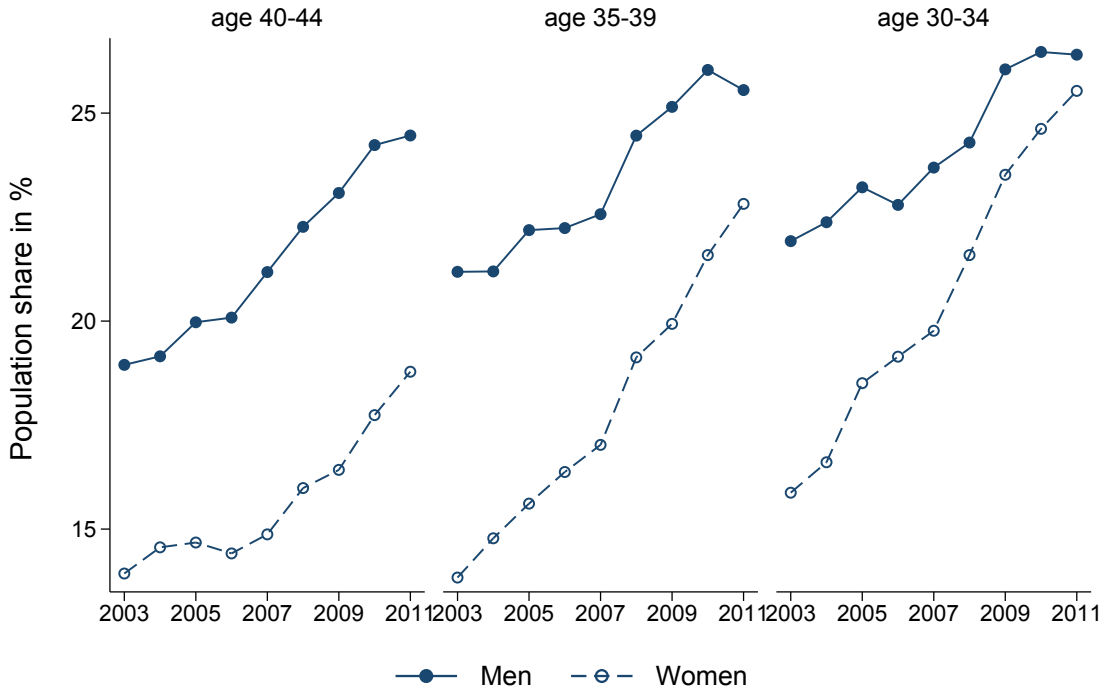

Figure A.1: University education by gender and age

Note: This graph shows the population share of individuals holding a university degree by gender and age groups over between 2003 and 2011. *Source*: Microcensus 2003–2011, own calculations.

Figure A.2: Age at completing education and marriage

Note: This graph shows the distribution of individuals' age at completing education and age at marriage by gender and level of education. *Source*: Microcensus 2003–2011, own calculations.

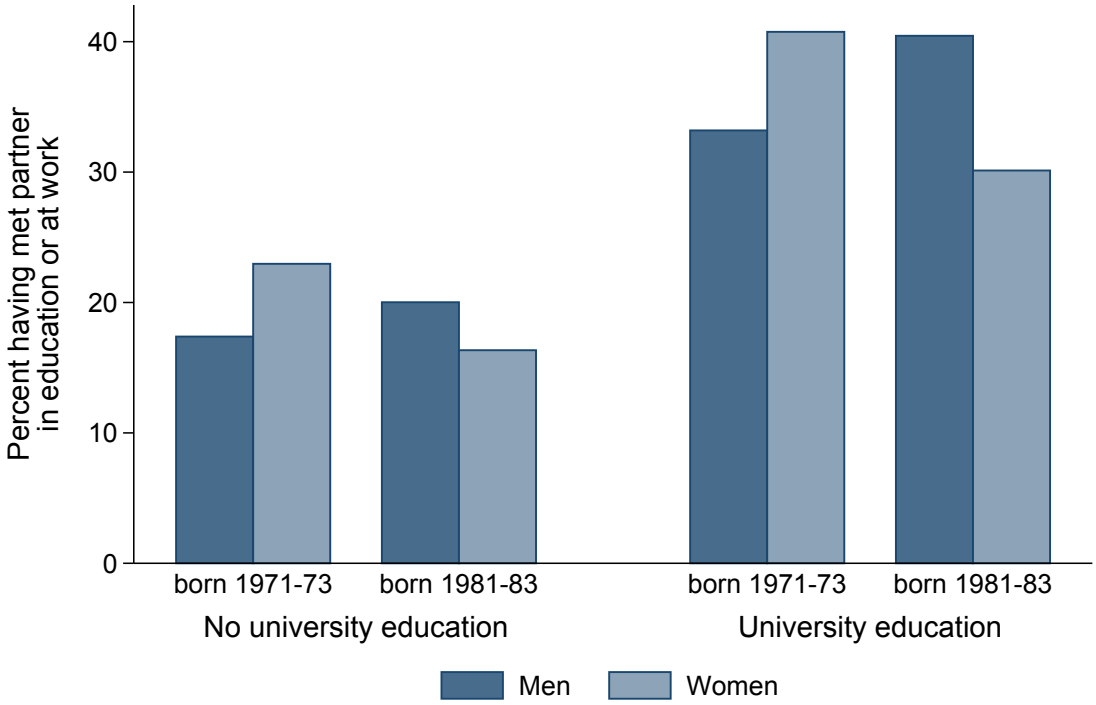

Figure A.3: Meeting of partner in education or at work

Note: This graph shows the fraction of couples who state that they have met in school, during education or at the workplace by level of education and birth cohort. *Source*: Panel Analysis of Intimate Relationships and Family Dynamics (pairfam), wave 1 (2008/2009), own calculations.

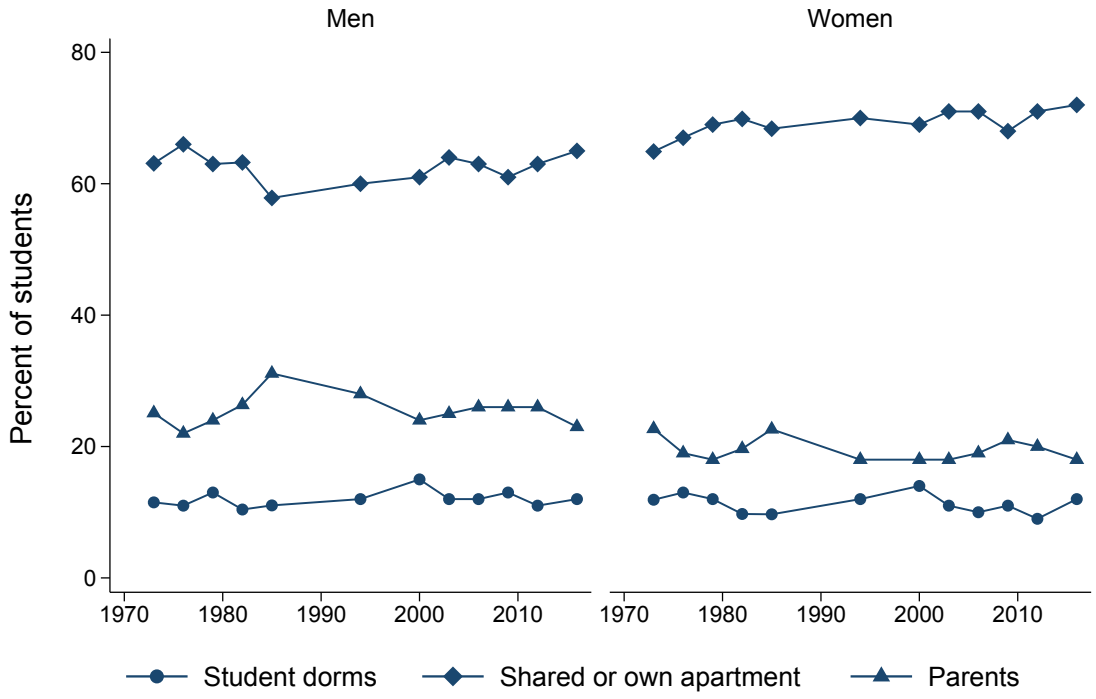

Figure A.4: Form of housing among university students in Germany

Note: This graph shows the percentage of university students (by gender) living in different forms of housing over time. *Source*: Social Survey of German Student Services (*Sozialerhebung Deutsches Studierendenwerk*), own calculations.

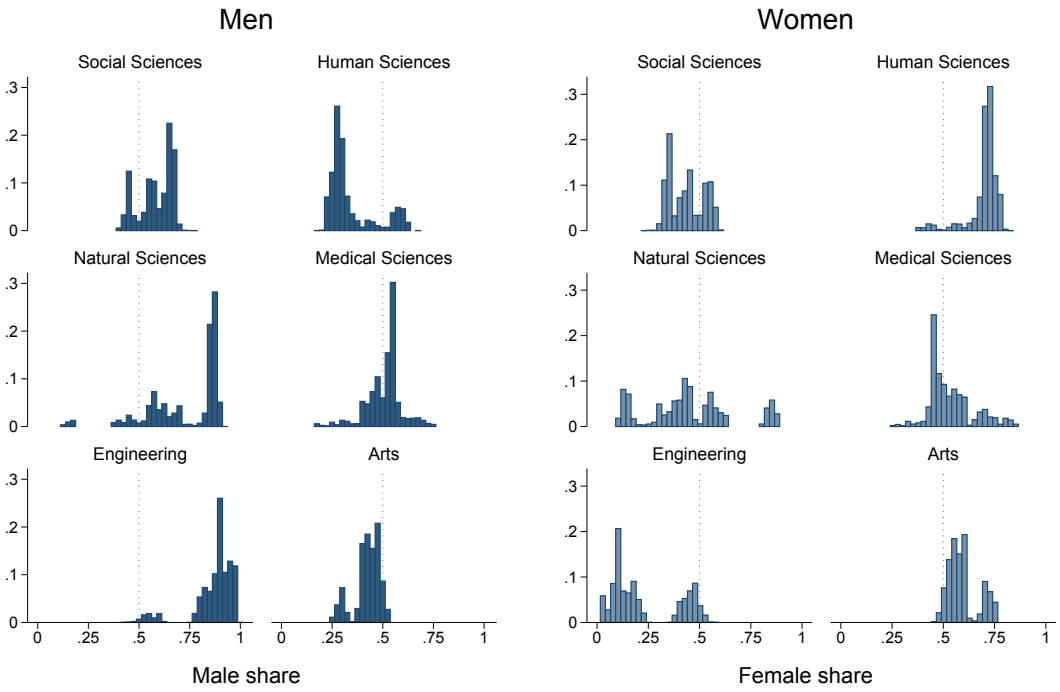

Figure A.5: Distribution of female share within field of study by field group

Note: This histogram graph shows the distribution of the gender share among students within field of study during university education by field groups. The vertical dashed lines indicate a perfectly balanced gender composition with a female share of 50%. *Source*: Statistical Yearbooks & Microcensus 2003–2011, own calculations.

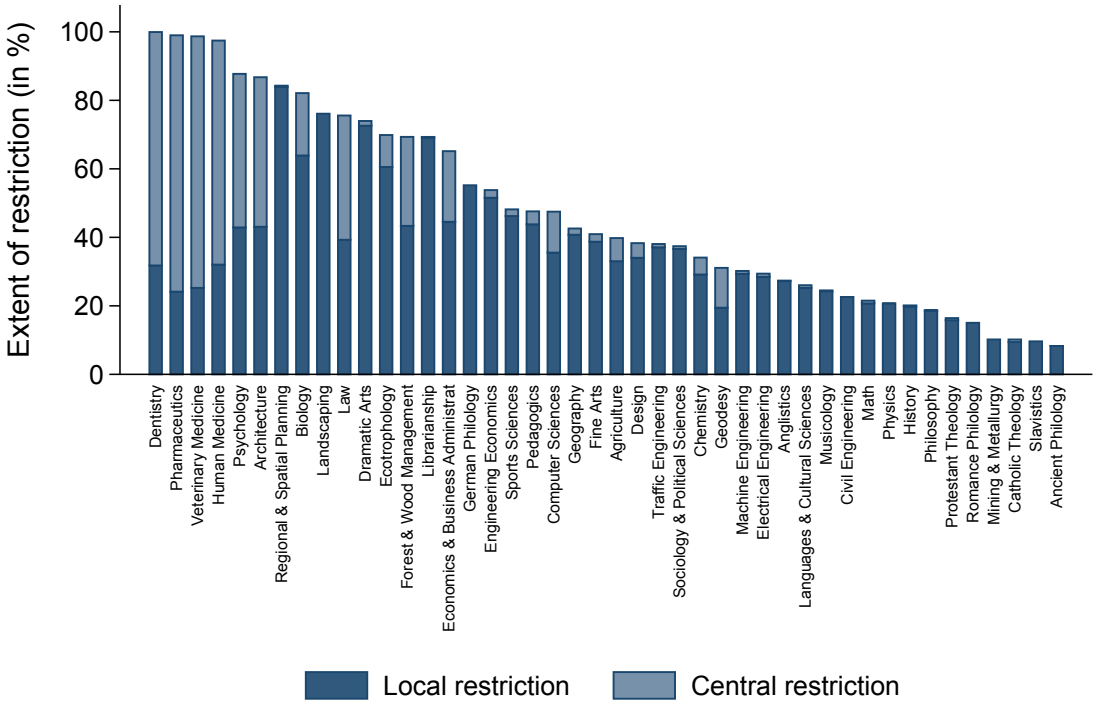

Figure A.6: Average level of admission restriction by field of study

Note: This bar graph shows the mean percentage of German universities where admission to university education is restricted (centrally or locally) over the period 1977–2011 by field of study. *Source*: German Rectors' Conference (*Hochschulrektorenkonferenz*, HRK), own calculations.

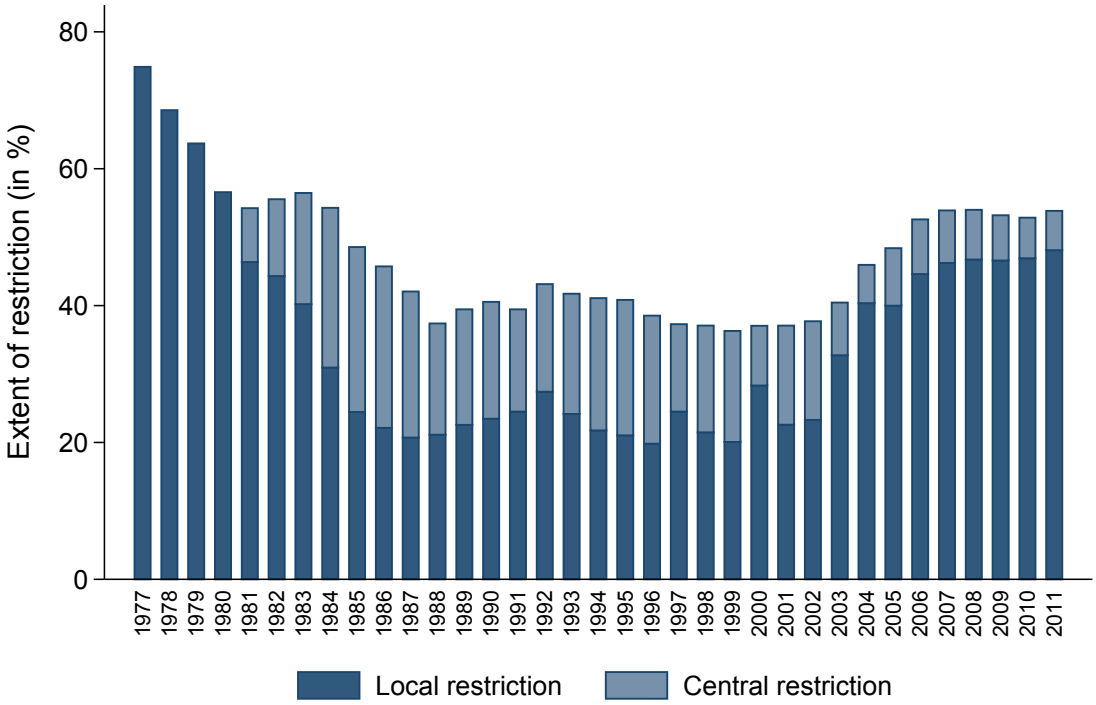

Figure A.7: Average level of admission restriction by year

Note: This bar graph shows the mean percentage of German universities where admission to university education is restricted (centrally or locally) for all fields of study by year. *Source*: German Rectors' Conference (*Hochschulrektorenkonferenz*, HRK), own calculations.

Table A.1: Gender composition by field of study

Field group	**Percent female**		**Observations**		
Field	Mean	Sd	Men	Women	Total
Social Sciences	**42.4**	**8.2**	**11001**	**10106**	**21107**
Law	45.2	3.2	1673	1815	3488
Economics and Business	37	4.4	7227	5644	12871
Sociology and Political Sciences	54.8	1.8	2101	2647	4748
Human Sciences	**69**	**8.7**	**2939**	**9200**	**12139**
Languages and Cultural Sciences	66.6	1.8	61	174	235
Protestant Theology	52.4	5	63	73	136
Catholic Theology	45.6	3.9	86	69	155
Pedagogics	72.1	2.7	1768	6379	8147
Philosophy	40.1	1.7	242	162	404
Psychology	69.4	4.8	148	498	646
History	44.1	.8	132	154	286
Librarianship	57.5	3.1	140	344	484
Ancient Philology	54.3	2.5	15	39	54
Anglistics	71.4	1.1	89	488	577
Romance Philology	78.1	1.2	12	114	126
Slavistics	74.2	2.5	44	148	192
German Philology	72.4	2.6	139	558	697
Natural Sciences	**32.7**	**20.8**	**5128**	**2803**	**7931**
Math	42.8	3.5	429	335	764
Agriculture	37.6	4.4	324	214	538
Sports Sciences	43.5	1.5	165	166	331
Computer Sciences	13.8	1.5	2189	367	2556
Physics	12.8	2.9	646	105	751
Chemistry	33.6	5.1	379	266	645
Biology	56.7	3.2	334	607	941
Geography	41.1	2.8	299	263	562
Forest and Wood Management	19.2	5.8	231	108	339
Ecotrophology	84.7	2	132	372	504
Medical Sciences	**51.4**	**10.2**	**1861**	**2157**	**4018**
Human Medicine	49.6	5.3	1395	1519	2914
Dentistry	42.6	9	332	249	581
Veterinary Medicine	72.7	8.7	90	205	295
Pharmaceutics	69.6	2.6	44	184	228
Engineering	**14.6**	**12.3**	**12727**	**2790**	**15517**
Machine Engineering	10.9	2.5	5299	935	6234
Mining and Metallurgy	11.2	4.8	728	103	831
Architecture	44.9	3.9	944	911	1855
Civil Engineering	17.8	3.3	1514	443	1957
Traffic Engineering	3.4	.3	135	5	140
Electrical Engineering	4	1.3	3179	209	3388
Engineering Economics	14.9	3.3	928	184	1112
Arts	**58.7**	**7.1**	**646**	**1109**	**1755**
Fine Arts	71.4	2.2	94	247	341
Dramatic Arts	59	1.8	101	107	208
Musicology	52.5	2.3	280	376	656
Design	58.2	2	171	379	550
Total	**40.5**	**22.1**	**34302**	**28165**	**62467**

This table shows the full list of fields of study employed and the numbers of observation of individuals in the microdata holding a degree in the respective field as well as the average percentage of female students prevailing in the respective year of graduation.
Source: Statistical Yearbooks & Microcensus 2003–2011, own calculations.