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Philipp Lergetporer, Katharina Werner, and Ludger Woessmann†

Abstract

The gap in university enrollment by parental education is large and persistent in many countries. In our representative survey, 74 percent of German university graduates, but only 36 percent of those without a university degree favor a university education for their children. The latter are more likely to underestimate returns and overestimate costs of university. Experimental provision of return and cost information significantly increases educational aspirations. However, it does not close the aspiration gap as university graduates respond even more strongly to the information treatment. Persistent effects in a follow-up survey indicate that participants indeed process and remember the information. Differences in economic preference parameters also cannot account for the educational aspiration gap. Our results cast doubt that ignorance of economic returns and costs explains educational inequality in Germany.

Keywords: inequality, higher education, university, aspiration, information, returns to education, survey experiment

JEL classification: D83, I24, J24, H75

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1. Introduction

A key rationale for government involvement in the education sector is to provide all citizens with the opportunity to obtain the professional qualifications they have the ability and passion to pursue. In reality, however, gaps in educational attainment between individuals from different family backgrounds are substantial (Black and Devereux, 2011; Björklund and Salvanes, 2011; Holmlund et al., 2011) and contribute to the persistence of inequality across generations (Corak, 2013; Autor, 2014; Alvaredo et al., 2017). These gaps do not just exist in outcomes, but – as our data show – already emerge in individuals' aspirations for higher education. One potential reason for gaps in educational aspirations is that individuals from families that do not have a background in higher education may underestimate the returns to university education and overestimate its costs. Indeed, evidence indicates that informing about the returns and lowering application costs can increase the aspirations and attainment of specific groups of students.[1] This has substantial policy relevance: If the lack of awareness of educational returns and costs differs by socioeconomic background, information campaigns about the returns to higher education and the options to receive student aid might help reduce educational inequality. In this paper, we study the extent to which differences in the knowledge of returns and costs of university education contribute to the socioeconomic gap in educational aspirations.

We conduct our analysis within a representative survey of the German adult population with more than 7,000 participants. We first elicit respondents' beliefs about the returns and costs of university education. We then provide random treatment groups with different types of information about the returns and costs of university education before eliciting everyone's aspirations for the ideal educational degree for their child. The survey experiments allow us to estimate how information provision affects educational aspirations in the different treatment groups compared to a control group that does not receive the information. On this basis, we evaluate the extent to which information provision is able to close the educational aspiration gap, focusing on the gap between individuals with and without a university degree.

We choose to focus on educational aspirations because they are a necessary condition for, and a strong predictor of, actual future educational choices.[2] By asking which educational

[1] See, among others, Jensen (2010), Bettinger et al. (2012), Hoxby and Turner (2013), Oreopoulos and Dunn (2013), Delavande and Zafar (2014), Wiswall and Zafar (2015a, 2015b), Pekkala Kerr et al. (2015), McGuigan et al. (2016), and Baker et al. (2017).

[2] See, for example, Jacob and Linkow (2010), Beaman et al. (2012), Spangenberg et al. (2011), and Attanasio and Kaufmann (2014). Decomposition analyses show that the aspirations of parents account for a substantial share of educational outcomes of children of school-leaving age (e.g., Chowdry et al., 2011; Polidano

degree respondents consider ideal (rather than realistic) for their hypothetical child, we obtain a measure of respondents' educational aspirations that abstracts from possible institutional or child-specific factors that may constrain actual educational choices (see also Bleemer and Zafar, 2018).[3] Since such constraints might lead to aspirations not translating into actual educational outcomes, our treatment effects should be interpreted as an upper bound of the potential impact of information on gaps in actual educational outcomes.[4] Furthermore, as they can be elicited from the whole population rather than only from parents or students who face educational decisions, focusing on ideal aspirations allows us to gain a representative assessment of the nationwide educational aspiration gap.

Our findings indicate that aspirations do indeed differ strongly by educational background. In the control group, 74 percent of university graduates but only 36 percent of those without university education consider a university degree (rather than an apprenticeship degree) the ideal educational outcome for their child. Intriguingly, this aspiration gap of 38 percentage points is similar to the gap in actual university enrollment decisions by family background (Middendorff et al., 2013).

We also find that individuals without university education tend to underestimate the returns and overestimate the costs of university education more than university graduates.[5] On average, respondents who hold a university degree correctly estimate the earnings advantages of university graduates but underestimate their unemployment advantages. In both cases, respondents who do not hold a university degree underestimate the returns to university education to a significantly larger extent. Similarly, while university graduates tend to overestimate tuition fees and underestimate available student aid, the extent of this is again stronger among respondents without a university degree. In principle, these informational asymmetries suggest that ignorance among those without university education could contribute to the educational aspiration gap.

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et al., 2013). Since students in Germany are tracked at age 10 into school types which differ in whether they lead to a university entrance certificate (*Abitur*), parents' aspirations are arguably particularly relevant in determining children's educational outcomes in Germany.

[3] One concern with asking respondents to abstract from possible constraints when eliciting choice expectations is that respondents might be unable to follow this instruction (e.g., Manski, 1999). This is not the case in our dataset: In a complementary oversample of parents, we show that unconstrained educational aspirations differ meaningfully from realistic expectations (see section 6.3).

[4] That is, if information affects aspiration gaps, it is not entirely clear whether these changes in aspirations would translate into actual attainment. If, on the other hand, information does not affect aspiration gaps, it is unlikely that it would affect gaps in actual educational outcomes.

[5] Throughout, we refer to differences in earnings and unemployment by educational degree as "returns" to education without implying that these differences necessarily reflect a causal effect of university education.

Our experimental results show that informing about the actual returns and costs of university education indeed significantly increases the educational aspirations of respondents. However, the information treatment effects are at least as strong among individuals with university education as among individuals without. As a consequence, information provision, if anything, increases rather than decreases the gap in educational aspirations. Specifically, informing participants about the higher earnings of people with a university degree compared to those without raises the share of respondents aspiring for a university degree by 11 percentage points among university graduates and by 5 percentage points among those without a university education. Informing participants about the magnitude of available government student aid raises educational aspirations by 8 percentage points among university graduates but does not affect aspirations of those without a university degree. Providing information on the lower unemployment rates of university graduates or on the fact that German universities currently do not charge tuition fees does not significantly affect educational aspirations.[6] These results are based on representative samples of the adult population, but we find similar results in the subgroup of parents with children who have not yet completed their education. Our findings cast doubt that ignorance of economic returns and costs of university education among persons without a university degree can explain the educational aspiration gap.

To test whether the provided information indeed raises participants' knowledge of the costs of university education, we conducted a follow-up survey about two weeks after the experiment. Results show that information provision persistently improves belief accuracy and certainty both for respondents with and without a university degree. This implies that our findings are unlikely to be driven by respondents' inattention to the information treatment or by differences in information processing between respondents with different educational backgrounds.

We also present descriptive evidence indicating the extent to which differences in beliefs about the returns and costs of university education can account for the educational aspiration gap. Prior beliefs show the expected associations with educational aspirations: University aspirations are significantly higher among individuals with initially higher beliefs about the earnings and unemployment premium of university graduates and about available student aid.

[6] The fact that university education is tuition free in Germany and the result that information about tuition fees and student aid does not shrink the aspiration gap suggests that (perceived) short-term credit constraints (e.g., Lochner and Monge-Naranjo, 2012) are unlikely to drive unequal university access in Germany.

However, these associations and the differences in prior beliefs by educational background are not large enough to account for substantial parts of the large educational aspiration gap.

Finally, we investigate whether differences in economic preference parameters can account for the educational aspiration gap. While the costs of university education are immediate, the benefits are realized only in the uncertain future. Therefore, differences in time preferences, risk preferences, and overconfidence between respondents with and without a university degree could be a complementary explanation for the educational aspiration gap. Our descriptive analysis shows that, even though these preference parameters differ markedly by educational background, they also cannot account for the gap in aspirations. In sum, our results suggest that consideration of economic returns, costs, and preferences does not add to an understanding of the educational aspiration gap in Germany. These findings suggest that the scope for interventions aimed at reducing informational or behavioral biases to enhance equity in Germany is limited.

Our paper contributes to the literature on how expectations of college returns and costs relate to educational choices.[7] In particular, we add to a range of experimental studies mostly from the American continent that investigate the effects of information provision on students' educational aspirations and choices.[8] While most related studies are based on small, self-selected student samples, often from disadvantaged backgrounds, our sample is representative of the German adult population, allowing us to provide a representative assessment of the educational aspiration gap in the society. In this sense, our paper is closest to the representative study of household heads in the United States by Bleemer and Zafar (2018), which finds positive effects of informing about college returns (but no effects for costs) on educational aspirations in a way that reduces socioeconomic aspiration gaps. As discussed further in the conclusion, different results in our setting may reflect important institutional differences between the United States and Germany such as differences in university costs or in the availability of alternative career paths, but it may also just reflect the fact that treatment effects on university graduates' aspirations may be subject to ceiling effects in the United States when aspirations are measured by intended college attendance. Our study is the first representative assessment of the effects of return and cost information on the educational aspiration gap outside the United States.

[7] See, for example, Arcidiacono (2004), Arcidiacono et al. (2012), Kaufmann (2014), Hoxby and Turner (2015), and Belfield et al. (2016).

[8] See Bettinger et al. (2012), Hoxby and Turner (2013), Oreopoulos and Dunn (2013), Dinkelman and Martínez (2014), Wiswall and Zafar (2015a), Hastings et al. (2015), Peter and Zambre (2017), and Baker et al. (2017).

The remainder of the paper is organized as follows. Section 2 introduces the survey we use for our analysis. Section 3 describes our experimental design. Section 4 presents the empirical model. Section 5 shows evidence on the socioeconomic gap in educational aspirations and in beliefs about the returns and costs of university education. Section 6 presents our experimental results on the effects of providing information about educational returns and costs on educational aspirations. Section 7 adds descriptive evidence on the extent to which differences in prior beliefs about returns and costs as well as differences in economic preferences can account for the educational aspiration gap. Section 8 concludes.

2. The ifo Education Survey

We conduct our analyses within the framework of the ifo Education Survey, an annual opinion survey on education policy that we have implemented in Germany (see Lergetporer et al., 2017). For the purposes of this paper, the sample covers a total of 7,270 respondents aged 18 and above, with 3,302 respondents sampled in 2016 and 3,968 respondents sampled in 2017. To ensure representativeness of the German adult population, the sample is drawn in two parts. To represent the population that uses the internet, 82 percent of respondents are sampled and surveyed via an online platform. The remaining 18 percent of respondents are persons who report that they do not use the internet; they are polled at their homes by trained interviewers. These respondents are provided with a tablet device for answering the survey to minimize any survey mode effects.[9]

The sample is weighted using official statistics on age, gender, educational attainment, region of residence, and municipality size. In both waves, the survey contains a total of more than 30 questionnaire items on different topics of education policy and also collects respondents' sociodemographic background characteristics, including time and risk preferences. The median respondent spent 18 (17) minutes answering the survey in 2016 (2017). Item non-response is low, for example at 2 percent for the main outcome measure of educational aspirations. Treatment status does not predict the share of missing answers for any outcome measure.

To assess whether treatment effects persist beyond the immediate horizon of the survey, we invited respondents in the online sample of the 2017 survey wave to participate in a later follow-up survey that re-elicits some outcomes, but does not comprise any information treatment. A total of 2,300 respondents (62 percent of the 2017 online sample) participated in

[9] The survey was conducted by the polling firm TNS Infratest (now called Kantar Public) in the spring of 2016 and 2017. See www.ifo.de/bildungsbarometer for additional detail.

the follow-up survey. The median time lag between the main survey and the follow-up is 12 days, ranging from 5 to 41 days (see section 6.4 for further details).

Table 1 provides an overview of participants' sociodemographic characteristics. In particular, 19 percent of respondents hold a university degree, 68 percent hold an apprenticeship degree, and 12 percent do not hold any professional degree.[10] Among all respondents, 59 percent have children and 28 percent have children who have not yet completed their education.

3. Experimental Design

The goal of our experimental investigation is to evaluate whether ignorance of the returns and costs of university education can contribute to an explanation of the socioeconomic gap in educational aspirations. To this end, we randomly provide information about the economic returns and costs and estimate whether this affects participants' educational aspirations for their children. In what follows, we first describe how we elicit educational aspirations. We then present the different experimental information treatments, which form the basis of our empirical analysis. Next, we report how we elicit participants' beliefs about returns and costs. Finally, we describe our follow-up survey.

3.1 Elicitation of Educational Aspirations

In Germany, people have two main options for their educational careers: they can either pursue an apprenticeship or a university education. At the end of lower secondary school (10th grade), the majority of students in Germany chooses either to start vocational training (usually in the form of a dual apprenticeship that combines formal schooling with in-company training) or to continue on an academic track in upper secondary school which leads to the university entrance certificate (*Abitur*).[11] The share of students on the academic path increased over the past decades. While school graduates' enrollment in apprenticeship education was more than twice as high as university enrollment in 1999, the latter exceeded the former by 2013 (Autorengruppe Bildungsberichterstattung, 2016; Thies et al., 2015).

[10] Throughout, holding a university degree includes degrees from Germany's so-called universities of applied sciences (*Fachhochschulen*).

[11] Students can leave school to start vocational training after grade 10 (grade 9 in some states) at the earliest. Those pursuing the academic track usually continue in upper secondary school to earn the *Abitur* after grade 12 or 13. For a sample of students in Berlin, Peter and Zambre (2017) show that information about labor-market benefits and funding opportunities of university education increases university aspirations of students from families without university background who are already enrolled in upper secondary school.

Our main outcome of interest is the aspiration that adults have for the educational outcome of their child. Therefore, we ask participants to answer the following question: "Irrespective of whether you have any children and of which educational degree your child holds or is likely to attain in the future: Which educational degree would match your personal ideal conception for your child?"[12] Respondents are asked to choose one of the two general degree categories available in Germany, either "apprenticeship degree" or "university degree."[13] This design allows us to estimate the effect of providing information on respondents' educational aspirations for the generation of their children.

3.2 Randomized Information Treatments on Returns and Costs

To test whether respondents' educational aspirations for their children depend on their knowledge of the returns and costs of university education, we devise two survey experiments that randomly assign respondents to a control group and to different information treatment groups. In the first experiment conducted in 2016, we provide participants with information on the economic returns to university education. In the second experiment conducted in 2017, we provide participants with information on the costs – tuition fees and available student aid – of obtaining a university degree.

The first experiment in 2016 focuses on the return side of economic considerations whether to pursue a university education. The sample is randomly split into three groups, one control group and two treatment groups. Respondents in the control group answer the question on educational aspirations described above without any further information. Before answering the same question, the first treatment group is informed that, on average, full-time employed university graduates earn about 2,750 Euro after taxes per month, compared to about 1,850 Euro for those with an apprenticeship degree and 1,400 Euro for those who do not hold any professional degree (own calculations based on the German Microcensus 2013). Respondents in the second treatment group are informed that the average unemployment rate of university graduates is 2.5 percent, while the unemployment rates of those with an apprenticeship degree and those without any degree are 5 percent and 20 percent, respectively (IAB, 2015).

The second experiment, conducted in 2017, focuses on the cost side of pursuing a university education. The sample is split into one control group and three treatment groups.

[12] Appendix Table A.1 presents the wording of the questionnaire items used in this paper.

[13] Even though it is possible to obtain both an apprenticeship and a university degree, we ask respondents to choose between the two in order to elicit their main preference. Empirically, the share of individuals who hold both degrees is very small (about 2 percent of respondents in our sample).

The first treatment informs respondents that university students in all of Germany currently do not have to pay any tuition fees before asking them the same question on educational aspirations as the uninformed control group. While university education tended to be free of charge in Germany, several states had introduced tuition fees of 500 Euro per semester during the time period between 2006 and 2014, and people may not be aware that tuition fees have been abolished again throughout Germany since then (Lergetporer and Woessmann, 2018). Respondents in the second treatment group are informed that comprehensive public student aid (known as "BAföG") is available to university students in Germany, only half of which has to be paid back later at most.[14] The treatment also includes the example that students with two non-working siblings whose parents' gross annual income does not exceed 50,000 Euro would generally be eligible for student aid payments of 649 Euro per month.[15] The third treatment group receives both pieces of information, on the lack of tuition fees and on the availability of student aid.

3.3 Elicitation of Beliefs about Returns and Costs

We are also interested in directly assessing the extent to which people with different educational backgrounds misperceive the returns and costs of a university degree. This will enable us to test whether different levels of ignorance are a relevant mechanism through which the information treatments may affect educational aspiration gaps. Much earlier in the survey, before providing information and eliciting aspirations, we therefore measure respondents' beliefs about the returns and costs of university education.[16]

To elicit baseline beliefs for the first experiment, we ask respondents in the first wave to estimate the monthly earnings and the unemployment rates of university graduates and of those without any professional degree. To anchor respondents' estimates, the questionnaire items inform them that current monthly earnings of those with an apprenticeship degree are about 1,850 Euro and that their unemployment rate is about 5 percent, respectively. The answers allow us to estimate the university premium perceived by respondents in comparison to apprenticeship education. After giving their respective answers, respondents are asked to

[14] BAföG is the well-known acronym of the applicable legislation, *Bundesausbildungsförderungsgesetz*.

[15] Since the exact amount of student aid depends on a large number of household characteristics, we use the example to give respondents an impression of student aid levels in Germany. See www.bafög.de/de/bundesausbildungs--foerderungsgesetz---bafoeg-204.php for the legal provisions and www.bafög.de/de/beispiele-183.php for selected examples [accessed 20 December 2017].

[16] We elicited beliefs of respondents in both control and treatment groups. This implies that potential information treatment effects on aspirations later in the survey are unlikely to represent pure priming effects, since both control and treatment groups were asked to think about returns and costs early on.

report how sure they are that their answer is close to correct on a 7-point scale (from 1 = "very unsure" to 7 = "very sure").

To elicit baseline beliefs for the second experiment, we ask respondents in the second wave to estimate what level of tuition fees students in their state are generally required to pay. The instructions explicitly mention that respondents should enter a value of zero in case they think no tuition fees are charged. We also ask respondents to estimate the level of public financial aid (*BAföG*) that university students are eligible for, asking them to imagine the example of students with two non-working siblings whose parents earn 50,000 Euro per year (see Appendix Table A.1 for details). After giving their answers, respondents again indicate how sure they are about their answers.

3.4 Follow-up Survey

The follow-up survey, conducted in 2017, again asks respondents to estimate the level of tuition fees and available student aid and to state the educational aspirations for their children. In the follow-up survey, all respondents answer the control-group version of the question, i.e., without any information provision.

This design allows us to speak to the persistence of information effects and to test whether information provision does indeed improve respondents' knowledge of the returns and costs of university education in a way that is still observable after a time period of about two weeks.

4. Empirical Model

The experimental design allows us to estimate the causal effects of information provision on educational aspirations in a simple linear probability model. In particular, we estimate the following regression:

$$y_i = \alpha_0 + \sum_k \alpha_1^k T_i^k + \delta' X_i + \varepsilon_i \quad (1)$$

where y_i is a dummy equal to one if respondent i prefers university education for her child, T_i^k is an indicator of whether respondent i received the information treatment k, X_i is a vector of control variables, and ε_i is an error term. The coefficients of interest, a_1^k, are identified by the random assignment of treatment status. Adding control variables should therefore not alter the estimated treatment coefficients, although it might increase the precision of the estimates. We therefore estimate versions of equation (1) with and without covariates.

As we are ultimately interested in the extent to which information provision is able to close the socioeconomic gap in educational aspirations, we also estimate treatment effect heterogeneities with respect to respondents' educational attainment. For this purpose, we extend the model in equation (1) to:

$$y_i = \beta_0 + \sum_k \beta_1^k T_i^k + \beta_2 E_i + \sum_k \beta_3^k \left(T_i^k E_i\right) + \eta_i \quad (2)$$

where E_i equals one if respondent i does not hold a university degree. The estimate of β_2 represents the educational aspiration gap, i.e., the association between respondents' educational background and their aspirations in the control group. The estimates of β_1 and $\beta_1 + \beta_3$ reflect the effect of information provision for respondents with and without university education, respectively. These are our parameters of interest as they show whether information provision affects the gap in educational aspirations.

While equations (1) and (2) test whether information provision affects respondents' educational aspirations for their children, we are also interested in the extent to which respondents' prior beliefs about the returns and costs of university education can account for the educational aspiration gap. Therefore, we also estimate the following regression:

$$y_i = \gamma_0 + \gamma_1 E_i + \sum_k \gamma_2^k B_i^k + \tau_i \quad (3)$$

where B_i^k is respondent *i*'s belief about the information provided in treatment *k* (i.e., the belief about earnings and unemployment rates across educational groups, tuition fees, and available student aid). The main parameter of interest is γ_1, which represents the educational aspiration gap that remains after accounting for differences in beliefs. The parameters γ_2 capture the association between beliefs and educational aspirations.

Balance across control and treatment groups. If the randomization procedure worked as intended, it provides balance between treatment and control groups on all observable and unobservable characteristics. To assess the balance of observable characteristics, columns 2-6 of Table 1 report the estimation results of the following equations:

$$T_i^k = \theta_0 + \theta_1 X_i + \omega_i \quad (4)$$

for each covariate *X* and each treatment group *k*.

Results indicate that covariates are indeed balanced across the different groups and do not predict treatment status. Of 90 estimates of θ_1, eleven are significant at the 10 percent level or lower, four are significant at the 5 percent level or lower, and one is significant at the 1

percent level. The observed differences match very closely the differences we would expect to observe by chance.

We also test the joint significance of all covariates in predicting treatment status (see the *p* values of the joint *F* tests reported at the bottom of Table 1). For none of our experiments, covariates are jointly significant in predicting treatment status. Similarly, item non-response on our main outcome measure, educational aspiration for the child, does not predict treatment status. In conclusion, we are reassured that randomization worked as intended, which allows the identification of causal treatment effects.

5. Results on Socioeconomic Gaps in Educational Aspirations and Beliefs

As background for our experimental analysis, we start the presentation of our empirical results by documenting the gaps in educational aspirations and in beliefs about returns and costs of university education between respondents with and without a university background.

5.1 The Educational Aspiration Gap

The first question of interest is which share of the German population aspires to university education for their children, and how this share varies with respondents' own educational background. As indicated in Figure 1, on average 43 percent of the German population considers a university degree the ideal educational outcome for their children. The majority of 57 percent of the population prefers their children to pursue an apprenticeship degree. Compared to other countries, the share of those aspiring to university education is relatively low in Germany. For instance, about 80 percent of respondents in a survey in the United States aspire to college education for their children (Bleemer and Zafar, 2018). This difference likely reflects the availability and dominant role of the apprenticeship system in Germany that provides an alternative that is well appreciated – despite the substantial average earnings differences indicated above.

Importantly, the population average masks substantial heterogeneity in aspirations by respondents' own educational background. While only about a third of respondents (36 percent) without a university degree aspire to university education for their children, this share is nearly three quarters (74 percent) among respondents who themselves hold a university degree. This difference of 38 percentage points is the educational aspiration gap that we try to explain in this paper.

Interestingly, the aspiration shares correspond closely to the actual current university enrollment decisions of children from different educational backgrounds in Germany

(Middendorff et al., 2013). Among children whose parents do not have a university degree, 43 percent enroll in the upper-secondary school track (*gymnasiale Oberstufe*) that leads to a university entrance certificate and 23 percent eventually enroll in university. By contrast, among children who have at least one parent with a university degree, 79 percent enroll in the upper-secondary school track and 77 percent enroll in university. The similarity between the aspirations elicited in our survey and actual enrollment decisions corroborates the relevance of our outcome of interest by suggesting a leading role of parental aspirations for ultimate educational decisions of children and for actual intergenerational educational mobility.

5.2 Gaps in Beliefs about Returns and Costs of University Education

A commonly hypothesized explanation for gaps in educational aspirations is that individuals without a university degree underestimate the returns and overestimate the costs of university education. In this section, we investigate the prevalence of imperfect information and informational asymmetries regarding earnings and unemployment rates by educational groups, as well as regarding the average level of tuition fees and available student aid. We regress respondents' expressed beliefs about these measures on an indicator for individuals who do not hold a university degree. To facilitate interpretation, we center respondents' beliefs at the correct value of the respective variable and express them in relative terms by dividing through the respective correct value: $\frac{Estimated\ value - Correct\ value}{Correct\ value}$.[17]

The results in Panel A of Table 2 indicate that even university graduates are not fully aware of the economic returns to university education. As indicated by the regression constant, on average respondents with a university degree estimate the earnings of university graduates roughly correctly (column 1). However, they overestimate the unemployment rate of university graduates by more than 280 percent (column 2). That is, even the average university graduate is partially ignorant about the labor-market returns to a university degree.

Importantly, the gap between beliefs and true values is significantly larger for respondents without a university education. The significant coefficients on the indicator for not having a university education show that people without a university education underestimate the earnings differential by an additional 4 percent and the unemployment

[17] As the correct value of tuition fees is zero, we divide tuition fees by 100 Euro. For unemployment rates, we multiply by -1 so that higher values correspond to lower unemployment estimates. To avoid being driven by severe outliers on the expressed beliefs, we trim the top and bottom 2 percent of the belief distributions throughout.

differential by an additional 130 percent compared to university graduates.[18] Consistent with their less correct beliefs, respondents without university education are also significantly less certain that their answers are close to correct (columns 3 and 4).

Panel B shows equivalent estimates for beliefs about tuition fees and student aid. Respondents with a university degree turn out to overestimate tuition fees by 206 Euro per semester on average and underestimate student aid by 62 percent. Again, this pattern is significantly more pronounced for respondents without a university education. They overestimate tuition fees by an additional 75 Euro and underestimate student aid by an additional 4 percent. As before, respondents without a university education are less certain about the accuracy of their answers, particularly for beliefs about tuition fees (columns 3 and 4). Next, we investigate to what extent these biased beliefs determine the socioeconomic gap in university aspirations.

6. Experimental Results on the Effects of Information on Aspirations

This section presents our main results. We analyze the extent to which alleviating the described biases in beliefs through randomized information provision affects educational aspirations. We provide evidence on the effects of providing information on the returns to and costs of university education, respectively, to the adult population. We also report results for the subgroup of parents. Finally, we test whether the information treatments of the main survey have persistent effects in a follow-up survey conducted about two weeks later.

6.1 Providing Information on Returns to University Education

Our experimental interventions show that providing participants with information about the respective earnings levels of people with different educational degrees increases their aspiration for their children to obtain a university education. The first column of Table 3, which is based on equation (1), shows that earnings information increases the share of respondents who aspire to university education for their children by 5 percentage points. Informing respondents about unemployment rates across educational groups yields a smaller,

[18] The differences in beliefs between respondents with and without a university degree are clearly visible in the underlying distributions, shown in Appendix Figure A.1. Taking into account the entire distributions, two-sample Kolmogorov-Smirnov tests reject the null hypothesis that beliefs do not differ by respondents' education.

statistically insignificant increase of 2 percentage points. The inclusion of standard covariates in column 2 does not affect the qualitative results.[19]

Estimating treatment effects by participants' own educational background reveals that providing information about the returns to university education does not, however, reduce the socioeconomic gap in educational aspirations. Quite to the contrary, the estimates in column 3 – based on equation (2) – indicate that the treatment effects of earnings and unemployment information tend to be even stronger for the group of university graduates (see also Figure 2). Providing earnings information significantly increases university aspirations among respondents with university education by 11 percentage points and without university education by 5 percentage points. A similar, albeit statistically insignificant, pattern emerges for information on unemployment rates, which increases aspirations of the two groups of respondents by 8 and 1 percentage points, respectively. While the differences between the two groups do not reach statistical significance, the point estimates indicate that treatment effects are substantially larger in the higher-educated group.[20] Thus, if anything, it is the university graduates who respond most strongly to information provision by raising the educational aspirations for their children. The results clearly show that the educational aspiration gap cannot be attributed to the underestimation of returns to university education among respondents without a university degree.

6.2 Providing Information on Costs of University Education

In the second experiment, we investigate whether incorrect beliefs about the costs of university education can account for the difference in educational aspirations across educational backgrounds. While the benefits of university education accrue over long time horizons, its costs are more immediate. Hence, costs of university education might be more salient when stating educational aspirations which, in turn, might render cost information more effective for mitigating the educational aspiration gap, in particular given the fact described above that respondents overestimate tuition fees and underestimate student aid.

Our results indicate, however, that informing about the costs of university education also does not reduce the aspiration gap. As shown in Table 4, informing respondents that universities in Germany generally do not charge tuition fees does not affect the expressed

[19] The covariates include the following sociodemographic characteristics: age, gender, income, employment status, born in Germany, living in West Germany, municipality size, living with a partner, parent status, risk tolerance, and patience.

[20] Among respondents without university education, 85 percent hold an apprenticeship degree and 15 percent do not hold any professional degree. Treatment effects of providing earnings and unemployment information are marginally significantly stronger for the latter group (results available upon request).

aspirations in the entire sample (columns 1 and 2). It also does not have heterogeneous effects on respondents with and without a university degree (column 3).[21]

Providing information on the level of student aid does in fact widen the educational aspiration gap. While there is no effect on university aspirations on average (column 1), this information treatment significantly increases the aspirations of respondents with a university degree by 8 percentage points but does not affect aspirations of those without a university degree (column 3). As a consequence, informing participants about the availability of student aid widens the gap in aspirations by 8 percentage points (marginally significant). For the third treatment, where respondents receive both pieces of information on tuition fees and student aid, there are again no significant effects.[22]

Overall, our results suggest that neither a lack of information on the benefits nor on the costs of university education is able to explain the gap in educational aspirations in Germany. This is in contrast to recent findings in the United States, where information on college returns has been found to decrease the educational aspiration gap by 20 to 30 percent (Bleemer and Zafar, 2018).[23]

6.3 Treatment Effects on Parents

The fact that our sample is representative for the German adult population enables us to assess the nationwide educational aspiration gap. A potential concern with the above results, however, is that the inability to close the aspiration gap through information provision might be driven by respondents who do not have children and hence might perceive the question as inconsequential. If information updating is costly (Benabou and Tirole, 2016), these

[21] The gap in educational aspirations turns out slightly larger in the 2017 survey than in the 2016 survey (41 versus 38 percentage points; see the coefficients on not having a university education in column 3 of Tables 3 and 4).

[22] Among respondents without university education, we find that information about tuition fees (marginally significantly) increases university aspirations of those without any degree while not affecting those with an apprenticeship degree. Information on student aid does not affect the aspirations of either of the two groups (results available upon request).

[23] The fact that we elicited respondents' beliefs prior to the information experiments allows us to estimate effect heterogeneities by initial beliefs, which can inform about the relative relevance of belief updating and salience. If the information treatments affect university aspirations through genuine belief updating, treatment effects should be larger the more a respondent underestimates returns and overestimates costs. If, on the other hand, the information treatments operate through increasing the salience of returns and costs when making educational choices, we would not expect such treatment effect heterogeneities. In line with Bleemer and Zafar (2018), we do not find strong evidence of effect heterogeneities by prior beliefs, suggesting that treatment effects mostly reflect increased salience of the provided information. This interpretation is consistent with the finding that providing earnings information increases university aspirations of university graduates even though these respondents hold correct initial beliefs about the earnings differential on average. However, we also find that the treatment effect of the earnings information is significant only in the subsample of those who initially underestimated the earnings differential and not among those who overestimated it, indicating that belief updating also plays a role (results available upon request).

respondents might fail to respond to new information in a hypothetical scenario, even though they would consider the information in an actual choice situation. To rule out that our results are driven by such inertia in expressed aspirations, we repeat the analysis for the subsample of parents whose children are still in the education system (N=920 in the returns experiment and N=1,058 in the costs experiment).

The results for the subgroup of parents are very similar to the full adult population. As in the full sample, there is a positive treatment effect of providing parents with earnings information, although this effect does not reach statistical significance at conventional levels on average (Appendix Table A.2). However, investigating heterogeneous treatment effects by respondents' educational background reveals a positive, significant, and large effect of 20 percentage points on parents who are university graduates themselves, and a small and insignificant effect on parents without university education. Consequently, the educational aspiration gap among parents, if anything, tends to increase with information provision on earnings.

A similar picture emerges for providing information on the costs of university education. Appendix Table A.3 shows that information on tuition fees and student aid does not close the aspiration gap among parents. In particular, information on student aid significantly increases the educational aspirations of parents with a university degree by 12 percentage points, whereas the point estimate is smaller and statistically insignificant for parents without a university degree.

Taken together, the finding that information on economic returns and costs of university education does not account for the educational aspiration gap in the German population is mirrored in the subsample of parents. Thus, our results are not driven by respondents without children who might perceive the question on educational aspirations as less relevant.

While aspirations for ideal, as opposed to realistic, educational degrees have the advantage that they are, in principle, less constrained by real-life institutional or child-specific factors (and thus potentially more responsive to information treatments), another potential concern could be that parents internalize observed constraints into their ideal aspirations (Manski, 1999). This could in principle account for our finding that treatment effects for respondents without a university degree are rather limited. To assess this possibility, we use data from an oversample of parents in the 2015 wave of the ifo Education Survey. Among parents of children who did not yet complete their educational career, we elicited parents' subjective likelihood that their child would graduate from university, as well as their ideal educational aspiration for their child (both measured on a 5-point Likert scale).

Expectably, parents without a university education report lower likelihoods of their children graduating from university. Importantly, though, the gap in educational aspirations between parents with and without a university degree is large (Appendix Table A.4, column 1) and remains significant when conditioning on the subjective expectation that the child will actually obtain a university degree (columns 2 and 3). These findings show that respondents' aspirations are not entirely determined by the realistic likelihood of what degree a child will obtain. Thus, the internalization of real-life constraints is unlikely to account for the rigidity of the ideal educational aspiration gap with respect to information provision.

6.4 Persistence of Information Treatments in the Follow-up Survey

To assess whether the information treatments truly change the information status of participants, we conducted a re-survey among the online sample in the 2017 wave of the ifo Education Survey about two weeks after the main survey. The follow-up survey again asks respondents about their educational aspirations for their child, as well as their beliefs about tuition fees and student aid, but does not contain any new information treatment. This allows us to test whether improved knowledge persists over a two-week period, which also addresses the potential concern that the limited treatment effects reported above are due to respondents not understanding or internalizing the information provided by the treatments.

Follow-up participation is high, with 62 percent of respondents (2,300 of the 3,696 online respondents in the main survey) participating again. Participation in the follow-up survey is not related to treatment status in the main survey, reducing potential concerns of bias from non-random selection into the follow-up. First, treatment status in the main survey does not predict participation in the follow-up survey (Appendix Table A.5).[24] Second, follow-up respondents' background characteristics are well balanced between respondents who had been assigned to the control group and the three information treatment groups in the main survey (Appendix Table A.6).

Table 5 reports the effects of providing information during the main survey on beliefs about tuition fees and student aid expressed about two weeks later in the follow-up survey. Respondents' answers to the same belief questions in the main survey are powerful predictors

[24] As the follow-up survey could only be conducted in the online part and not the offline part of the original sample, participants in the follow-up survey differ from participants in the representative main survey in several background characteristics. Of the significant differences shown in Appendix Table A.5, only risk tolerance and patience remain significant (and age becomes significant) when restricting the analysis to the participants in the online sample of the main survey, indicating that differences are mostly driven by our restriction of the follow-up survey to the online sample and not by individual decisions to participate in the follow-up survey.

for their answers in the follow-up survey. This considerable test-retest correlation strengthens confidence in our survey measures of beliefs.

More importantly, the randomized provision of information about fees and aid during the main survey significantly improves the accuracy of respondents' beliefs about the levels of tuition fees and student aid in the follow-up survey. In particular, informing respondents that there are no tuition fees significantly reduces respondents' estimates of tuition fees in the follow-up survey both in the fee-information-only treatment and in the joint treatment with aid information (with the former reaching significance only among university graduates, columns 1 and 2). As respondents on average overestimated the level of tuition fees in the main survey, the information treatments thus lead to an improved knowledge of tuition fee levels among participants about two weeks later. Furthermore, these persistent treatment effects do not differ significantly between respondents with and without a university education.

Similarly, informing about the level of student aid in the main survey significantly increases respondents' estimates of student aid in the follow-up survey both in the aid-information-only treatment and in the joint treatment with fee information (columns 3 and 4). Given the initial underestimation of student aid in the main survey, the positive treatment effects again indicate that information provision persistently improves beliefs about the level of available student aid. Again, the information treatment effects do not differ significantly between those with and without a university degree.

Information provision also significantly increases how certain respondents are about the accuracy of their beliefs. Results in columns 5-8 show that respondents who received the respective information in the main survey are more certain that their beliefs are close to correct in the follow-up survey. The same is not true for respondents who received the other piece of information that is not the subject of the respective belief question. There is no significant difference between those with and without a university education in the extent to which information provision raises certainty about their beliefs.

Despite their persistent effects on improved beliefs about the costs of university education, the information treatments still do not reduce the educational aspiration gap in the follow-up survey. As shown in Appendix Table A.7, the effects of providing information about tuition fees and student aid in the main survey on educational aspirations in the follow-up survey are very similar to the immediate effects in the main survey (Table 4) in being mostly small and statistically insignificant. The effect of providing information on student aid to individuals with a university degree is positive but shy of statistical significance, while the

difference in treatment to individuals without a university degree remains marginally significant.

Overall, the information treatments lead to persistent improvements of belief accuracy and certainty among respondents with and without a university degree about two weeks after the provision of the information in the main survey. This indicates that participants did process the information they received in the main survey and remember it in the follow-up survey, documenting that the information treatments do in fact lead to a persistently improved information status. Importantly for the interpretation of our analysis, the consistency of these findings across educational backgrounds also suggests that inattention or differences in information processing in the survey environment across educational backgrounds are unlikely to explain the lack of information treatment effects on the educational aspiration gap.

7. Descriptive Evidence on Gaps in Beliefs, Preferences, and Aspirations

We complement our experimental analysis by providing descriptive evidence on the extent to which differences between those with and without a university degree (i) in their beliefs about economic returns and costs of university education and (ii) in their economic preferences can account for the educational aspiration gap.

7.1 Can Differences in Prior Beliefs Account for the Educational Aspiration Gap?

Our experimental results show that information provision cannot close the gap in educational aspirations between respondents with different educational backgrounds. In this section, we provide complementary descriptive analysis to assess the role of prior beliefs in the aspiration gap. In particular, we estimate equation (3) for control-group respondents to get a sense of how much of the aspiration gap remains after conditioning on respondents' beliefs about the returns and costs of a university degree.[25]

As Table 6 shows, prior beliefs about the earnings and unemployment premium of university graduates are indeed significantly positively associated with university aspirations. While these associations point in the expected directions, conditioning on the differences in prior beliefs reduces the educational aspiration gap of 38.2 percentage points by only 2.1

[25] This analysis addresses another potential concern for why our information treatments might not close the educational aspiration gap: defiant reactions to preference-incongruent information might give rise to bias from so-called "backfire effects" (Nyhan and Reifler, 2010). In our experiments, this behavioral anomaly could arise if respondents who prefer an apprenticeship degree for their children reinforce this position after learning that the relative returns to this degree are lower than expected. This bias is not a concern in the analysis of this section, which is restricted to the uninformed control group.

percentage points.[26] Likewise, additionally controlling for the certainty with which respondents hold the beliefs does not mitigate the educational aspiration gap (column 3). The differences in prior beliefs about the returns to university education between those with and without a university degree (Table 2) and their association with educational aspirations (Table 6) are not large enough to account for a noteworthy part of the large educational aspiration gap.

Table 7 shows results of the equivalent analysis for prior beliefs about costs of university education. Again, respondents with higher beliefs about available student aid are (marginally significantly) more likely to aspire to a university degree for their children. By contrast, beliefs about tuition fees are unrelated to educational aspirations. Similar to the above findings, controlling for beliefs about university costs leaves the gap in aspirations unaffected.

These results corroborate our previous conclusion that information asymmetries about the returns and costs of university education between persons with and without a university degree cannot account for the educational aspiration gap. While differences in prior beliefs exist and are relevant for educational aspirations, these associations are not large enough to be able to account for the educational aspiration gap.

7.2 Can Differences in Economic Preferences Account for the Educational Aspiration Gap?

Finally, in a similar descriptive analysis we investigate the extent to which differences in economic preferences by educational background can account for the persistent gap in educational aspirations. So far, our analysis has focused on the role of asymmetric information regarding the returns and costs of university education. However, the costs of university education have to be incurred early on whereas the returns accrue only much later, so that in classic human capital investment theory educational decisions depend on the present discounted value of education (Becker, 1964). Thus, a potential alternative explanation for the gap in aspirations is that respondents with and without a university degree differ in time preferences and other economic preferences that determine the expected present discounted value of educational choices.

We evaluate the role of three such traits for the educational aspiration gap. In addition to time preferences, we investigate risk preferences and overconfidence. Our focus on risk preferences is motivated by the notion that educational decisions are characterized by

[26] Similarly, Belfield et al. (2016) find for high-school students in the United Kingdom that perceived returns of university education do not change the association between intended university attendance and parental education levels.

uncertainty about whether a degree will be completed and whether returns will materialize. Individuals with lower levels of risk tolerance might therefore prefer lower levels of education (Altonji, 1993). Relatedly, overconfidence might affect educational aspirations because of its link to the expected success of degree completion (Koch et al., 2015; Reuben et al., 2017).[27]

We measure respondents' time and risk preferences at the end of our survey using experimentally validated survey questions from Falk et al. (2016). Patience is elicited by the question, "In comparison to others, are you a person who is generally willing to give up something today in order to benefit from that in the future or are you not willing to do so?" Respondents record their answers on an 11-point Likert scale from 0 = "completely unwilling to give up something today" to 10 = "very willing to give up something today". Similarly, respondents answer the question on risk tolerance – "How do you see yourself: are you a person who is generally willing to take risks, or do you try to avoid taking risks?" – on an 11-point Likert scale from 0 = "completely unwilling to take risks" to 10 = "very willing to take risks".

To obtain a measure of relative overconfidence, we apply the method described by Ortoleva and Snowberg (2015) which compares the accuracy of respondents' beliefs with how sure they are that their beliefs are close to correct. In particular, the ifo Education Survey contains a number of questions that measure beliefs about different educationally relevant parameters, each followed by a question about the respondents' certainty that their expressed belief is close to correct (from 1 = "very unsure" to 7 = "very sure").[28] For each question, we regress certainty on a fourth-order polynomial of belief accuracy. Next, we subtract the predicted certainty for each respondent from her actual reported certainty. In a final step, using principal component analysis we aggregate these relative measures of overconfidence over all questions into our final measure of overconfidence.

A necessary condition for the three economic preference parameters to be able to account for the educational aspiration gap is that they differ between respondents with and without a university degree. Table 8 shows that respondents without a university education indeed have

[27] Since our study focuses on educational aspirations for children, the link from respondents' economic preferences to these aspirations might be more indirect than to the respondents' aspirations for themselves. However, parents' economic preferences have been shown to predict children's educational choices (Wölfel and Heineck, 2012). Relatedly, self-reported parental investment decisions in children correlate with beliefs about the productivity of these investments (Boneva and Rauh, 2018).

[28] In the 2016 survey, the belief questions refer to relative earnings by educational degrees, relative unemployment by educational degrees, the student achievement gap by socio-economic background, and school spending per student. In the 2017 survey, they refer to tuition fees, student aid, the student achievement gap by socio-economic background, and levels of public spending on education, social security, public safety, defense, and culture.

significantly lower values of patience, risk tolerance, and overconfidence.[29] These results, which are well in line with previous studies (e.g., Dohmen et al., 2011; Golsteyn et al., 2014), set the stage for analyzing the extent to which differences in these economic preferences are able to account for the gap in educational aspirations.

It turns out that, just as in the case of misinformation about returns and costs, conditioning on the three economic preference parameters does not close the educational aspiration gap. Table 9 shows results from regressions analogous to equation (3). Whether considered individually or jointly, risk tolerance and overconfidence do not enter the model significantly, whereas patience is significantly positively associated with educational aspirations. Still, accounting for differences in patience reduces the educational aspiration gap only by a tiny amount, from 39.7 to 38.5 percentage points.

In sum, we find differences in time and risk preferences and overconfidence by respondents' educational degrees that are consistent with the previous literature. Similar to the results on information asymmetries above, though, these differences cannot account for the large gap in educational aspirations.

8. Conclusion

As in many other countries, there is a large gap in actual and aspired university enrollment by parents' educational background in Germany. In our representative survey, the share of the adult population that aspires for their children to go to university is 38 percentage points lower among those without a university degree than among those with a university degree. This paper investigates whether lack of information on the returns and costs of university education among persons without a university degree can explain this educational aspiration gap. Using experiments with randomized information provision, we find that – although respondents without a university degree are more likely to underestimate the returns and overestimate the costs of higher education – alleviating these informational asymmetries does not close the educational aspiration gap. If anything, university graduates respond more strongly to the provided information by raising their educational aspirations, widening rather than closing the gap. Both respondents with and without a university education who received the information treatment show improved knowledge of university returns and costs in a follow-up survey about two weeks after the experiment, indicating that participants indeed

[29] For this analysis, we pool the 2016 and 2017 waves of the ifo Education Survey. About 12 percent of respondents participated in both waves. Standard errors are clustered at the individual level. Excluding these respondents does not alter our results (results available upon request).

processed the provided information. Furthermore, economic preferences that are important for educational decisions – time preferences, risk preferences, and overconfidence – differ by respondents' educational background, but they also cannot account for the gap in educational aspirations.

Our results indicate that consideration of the standard parameters of the traditional economic model of educational choices – returns, costs, time preferences, and other traits relevant for intertemporal choices – does not seem to add to an understanding of the educational aspiration gap in Germany. Consequently, there appears limited scope for policy interventions aimed at alleviating imperfect information such as information campaigns to close the gap in educational aspirations.[30] Several other studies have shown that informing (prospective) students about returns and costs can raise educational aspirations and choices in specific subgroups of the population such as low-income students or students who self-selected into an academic track. While these information effects on marginal students clearly carry policy relevance (and are in line with our results), they are uninformative about how information affects overall educational inequality in society.

In contrast to our findings, the representative U.S. study by Bleemer and Zafar (2018) finds that information about college returns decreases the gap in intended college attendance. Several differences between the United States and Germany might account for the diverging effect of information provision on the aspiration gap in the two countries. First, tuition fees and thus university costs are substantially higher in the United States than in Germany and most continental European and Nordic countries (OECD, 2017). While one might thus expect that short-term credit constraints are perceived as higher in the United States, the effect of cost information are in fact quite similar in the two countries. Second, differences may arise from differing earnings returns to a university degree, but returns are in fact only slightly larger in the United States (Hanushek et al., 2015; OECD, 2017). Third, the U.S. and German populations may differ in economic preference parameters. However, again, time and risk preferences appear quite similar in the two countries (Falk et al., 2018). Fourth, university enrollment rates are traditionally lower in Germany, where a large apprenticeship sector offers an alternative career path that is valued highly by large parts of the population. Consequently, baseline university aspiration is much higher in the United States than in Germany. In fact, the median likelihood that a U.S. respondent would recommend college education to a friend

[30] While our analysis is purely positive, the possibility that aspiration gaps may reflect individual preferences raises the normative question whether governments should take measures to mitigate the educational aspiration gap in the first place, as they may not improve welfare. However, education preferences are likely endogenous to family background (e.g., Carneiro and Heckman, 2002), complicating any welfare analysis.

in the Bleemer and Zafar (2018) study is 100 percent, and the mean is 82 percent. Among college graduates, this mean is as high as 90 percent. Thus, the closing of the aspiration gap in the U.S. study may also reflect ceiling effects in that college aspirations can hardly be raised any more in the higher-educated subgroup. In line with this explanation, in recent unpublished work Cheng and Peterson (2018) do not find that providing return and cost information closes the educational aspiration gap in the United States when aspirations for two-year and four-year degrees are considered rather than undifferentiated college attendance.

Independent of the exact reasons for why information provision does not close the educational aspirations gap in our representative German sample, our results have important implications for understanding the mechanisms of the intergenerational persistence of educational attainment. They show that providing information on university returns and costs is not sufficient for aligning the aspirations of those with and without university backgrounds. Thus, the large and persistent inequalities in university access by parental education in Germany do not seem to be due to a market failure induced by asymmetric information regarding pecuniary consequences of educational choices. This is consistent with the literature emphasizing the importance of non-pecuniary reasons for educational choices (e.g., Beffy et al., 2012; Wiswall and Zafar, 2015b). One such non-pecuniary reason might be the identity of parents and their children: Parents without a university degree might not aspire to university education for their children because university studies might lead to an alienation of the children from family identities (Akerlof and Kranton, 2002). Similarly, educational aspiration gaps might emerge from differences in the expected consumption value of university education or its cognitive costs (Belfield et al., 2016). We consider investigation of the empirical relevance of these non-pecuniary explanations for the educational aspiration gap an important area for future research.

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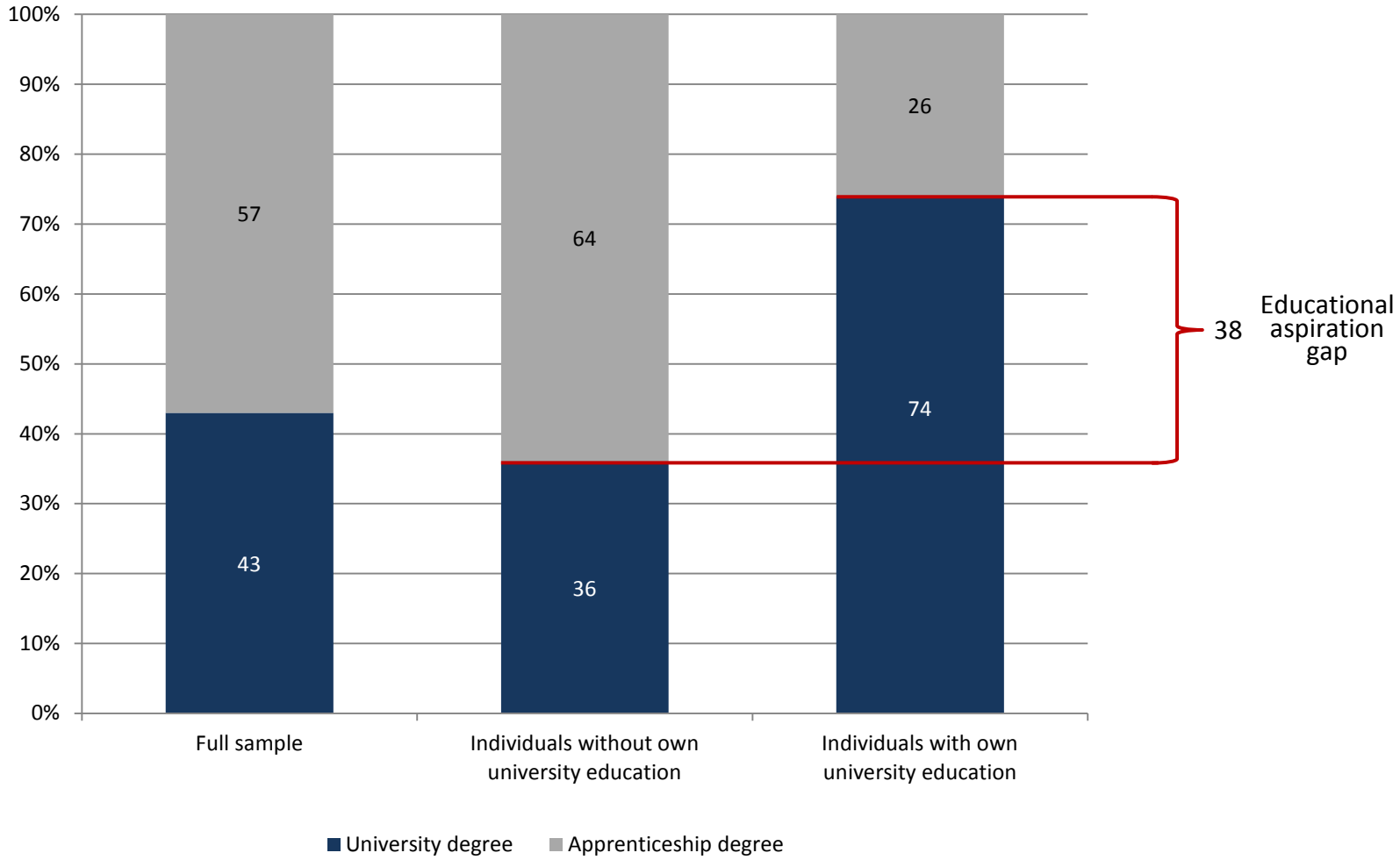
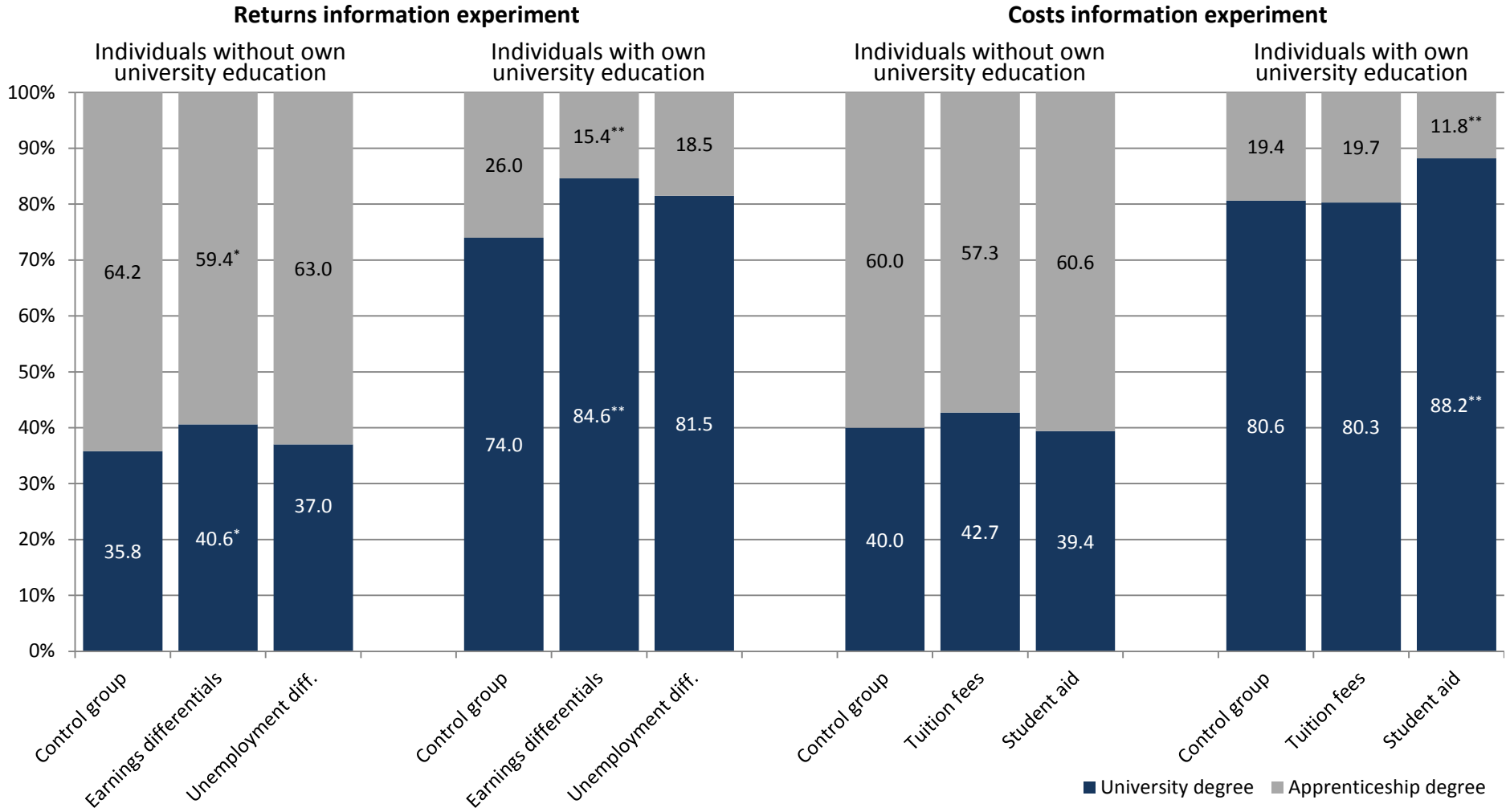
Figure 1: The educational aspiration gap: Adults' aspiration for the education of their child



Notes: Response to the question, "Irrespective of whether you have any children and of which educational degree your child holds or is likely to attain in the future: Which educational degree would match your personal ideal conception for your child?" Control group, weighted means. Data source: ifo Education Survey 2016 and 2017.

Figure 2: Effects of information experiments on adults' aspiration for the education of their child



Notes: Effects of random information provision about earnings differentials, unemployment differentials, tuition fees, and student aid, respectively, on respondents' ideal educational degree for their child. See column 3 of Tables 3 and 4 for underlying regression estimates. Significance levels of difference from respective control group: ** $p<0.05$, * $p<0.1$. Data source: ifo Education Survey 2016 and 2017.

Table 1: Summary statistics of background variables and balancing tests

	Mean	Covariates predicting treatment status for experiment with information on				
	[SD]	Earnings differential	Unemployment differential	Tuition fees	Student aid	Tuition fees and student aid
	(1)	(2)	(3)	(4)	(5)	(6)
Age	50.5	0.001	0.001	-0.001	-0.001*	-0.001*
	[18.7]	*(0.001)*	*(0.001)*	*(0.001)*	*(0.001)*	*(0.001)*
Female	0.513	-0.021	0.016	-0.016	-0.011	-0.019
		(0.025)	*(0.026)*	*(0.026)*	*(0.026)*	*(0.026)*
Monthly household income (Euro)	2221.4	-0.000	-0.000	-0.000	-0.000	-0.000
	[1392.0]	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Education						
No degree	0.123	-0.030	-0.054	-0.048	-0.015	0.024
		(0.043)	*(0.046)*	*(0.046)*	*(0.043)*	*(0.043)*
Apprenticeship degree	0.684	0.050*	0.042	0.066**	0.013	0.027
		(0.029)	*(0.030)*	*(0.028)*	*(0.027)*	*(0.028)*
University degree	0.193	-0.050	-0.020	-0.058*	-0.008	-0.054*
		(0.034)	*(0.035)*	*(0.030)*	*(0.030)*	*(0.030)*
Employment status						
Student	0.090	-0.078	-0.035	0.045	0.072*	0.056
		(0.058)	*(0.060)*	*(0.043)*	*(0.042)*	*(0.044)*
Active	0.503	-0.008	-0.021	0.022	0.007	0.044*
		(0.025)	*(0.026)*	*(0.026)*	*(0.026)*	*(0.026)*
Not active	0.408	0.033	0.034	-0.037	-0.032	-0.065**
		(0.025)	*(0.026)*	*(0.027)*	*(0.027)*	*(0.027)*
Born in Germany	0.948	0.061	-0.037	-0.005	-0.056	0.047
		(0.060)	*(0.057)*	*(0.063)*	*(0.060)*	*(0.061)*
Living in West Germany	0.800	-0.001	0.036	0.018	0.004	0.012
		(0.031)	*(0.032)*	*(0.031)*	*(0.030)*	*(0.031)*
Municipality size (7-point scale)	4.330	-0.019***	-0.008	0.000	0.002	-0.001
	[1.770]	*(0.007)*	*(0.007)*	*(0.007)*	*(0.007)*	*(0.007)*

(continued on next page)

Table 1 (continued)

	Mean	Covariates predicting treatment status for experiment with information on				
	[SD]	Earnings differential	Unemployment differential	Tuition fees	Student aid	Tuition fees and student aid
	(1)	(2)	(3)	(4)	(5)	(6)
Partner in household	0.549	0.010	0.023	-0.029	0.008	-0.017
		(0.026)	*(0.026)*	*(0.026)*	*(0.026)*	*(0.027)*
Has children	0.588	0.020	0.024	-0.024	-0.022	-0.027
		(0.026)	*(0.027)*	*(0.027)*	*(0.026)*	*(0.027)*
Parent of child currently in school	0.283	0.007	-0.006	0.003	-0.005	0.003
		(0.028)	*(0.028)*	*(0.029)*	*(0.029)*	*(0.029)*
Offline	0.182	0.020	0.051	-0.035	-0.047	-0.057
		(0.037)	*(0.036)*	*(0.041)*	*(0.040)*	*(0.042)*
Risk tolerance (11-point scale)	4.230	0.002	0.000	-0.002	0.001	0.002
	[2.509]	*(0.005)*	*(0.005)*	*(0.005)*	*(0.005)*	*(0.005)*
Patience (11-point scale)	5.978	-0.002	0.002	-0.001	0.011**	0.001
	[2.487]	*(0.005)*	*(0.005)*	*(0.005)*	*(0.005)*	*(0.006)*
Item non-response on aspiration for child	0.023	0.062	0.083	-0.106	0.002	-0.070
		(0.083)	*(0.082)*	*(0.152)*	*(0.146)*	*(0.145)*
F test for joint significance (*p* value)		0.499	0.372	0.204	0.903	0.309
Observations	7,270	2,701	2,616	2,001	2,051	1,996

Notes: First column: sample means; standard deviations in brackets (for non-binary variables). Subsequent columns: Each cell reports the coefficients from estimating equation (4) for the respective experiment (*p* values in parentheses). *p* values of *F* tests for joint significance are based on regressions of treatment status on all covariates jointly. Regressions weighted by survey weights. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. Data source: ifo Education Survey 2016 and 2017.

Table 2: Differences in beliefs about returns and costs of university education by respondents' own education level

Panel A: Beliefs on earnings and unemployment differentials

	Beliefs on		Certainty of beliefs on	
	Earnings differentials	Unemployment differentials	Earnings differentials	Unemployment differentials
	(1)	(2)	(3)	(4)
No university education	-0.043***	-1.328***	-0.217***	-0.153**
	(0.016)	*(0.366)*	*(0.080)*	*(0.077)*
Constant	-0.010	-2.809***	3.808***	3.497***
	(0.014)	*(0.339)*	*(0.073)*	*(0.070)*
Observations	3,106	3,096	3,205	3,185
R^2	0.0040	0.0076	0.0034	0.0018

Panel B: Beliefs on tuition fees and student aid

	Beliefs on		Certainty of beliefs on	
	Tuition fees	Student aid	Tuition fees	Student aid
	(1)	(2)	(3)	(4)
No university education	0.753***	-0.044**	-1.407***	-0.638***
	(0.123)	*(0.018)*	*(0.084)*	*(0.071)*
Constant	2.056***	-0.615***	4.700***	3.569***
	(0.095)	*(0.016)*	*(0.073)*	*(0.062)*
Observations	3,762	3,782	3,835	3,838
R^2	0.0085	0.0023	0.0874	0.0252

Notes: OLS regressions. No university education: dummy equal to one if respondent does not hold a university degree. Dependent variable: columns (1)-(2): beliefs as indicated in the column header, expressed as difference from the correct value, divided by the correct value (tuition fees: divided by 100 Euro); columns (3)-(4): certainty that belief is close to correct on 7-point Likert scale. Top and bottom 2 percent of the belief distribution trimmed in the belief samples. Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. Data source: ifo Education Survey 2016 and 2017.

Table 3: Effects of information about returns to university education on educational aspiration

	Aspiration for child: University degree		
	(1)	(2)	(3)
Information on earnings differentials	0.047*	0.059**	0.106**
	(0.025)	*(0.024)*	*(0.047)*
Information on unemployment differentials	0.019	0.018	0.075
	(0.026)	*(0.025)*	*(0.053)*
No unive1rsity education			-0.382***
			(0.042)
Information on earnings differentials x No university education			-0.058
			(0.054)
Information on unemployment differentials x No university education			-0.063
			(0.060)
Control mean		0.433	0.740
Covariates	No	Yes	No
Observations	3,229	3,128	3,223
R^2	0.0015	0.0836	0.1085
Information effects for "No university education": Earnings differentials			0.048*
Unemployment differentials			0.012

Notes: OLS regressions. Information was provided to a random subgroup of respondents. Dependent variable: dummy variable coded 1 if respondent prefers a university degree as ideal educational outcome for her child. No university education: dummy equal to one if respondent does not hold a university degree. Covariates: age, gender, income, employment status, born in Germany, living in West Germany, municipality size, living with a partner, parent status, risk tolerance, and patience. Bottom rows show estimates of Wald tests for H_0: $\beta_1 + \beta_3 = 0$ based on equation (2). Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. Data source: ifo Education Survey 2016.

Table 4: Effects of information about costs of university education on educational aspiration

	Aspiration for child: University degree		
	(1)	(2)	(3)
Information on tuition fees	0.006	0.002	-0.003
	(0.026)	*(0.025)*	*(0.042)*
Information on student aid	0.008	0.004	0.076**
	(0.026)	*(0.025)*	*(0.037)*
Information on both	-0.013	-0.020	0.027
	(0.026)	*(0.025)*	*(0.040)*
No university education			-0.406***
			(0.034)
Information on tuition fees x No university education			0.030
			(0.051)
Information on student aid x No university education			-0.082*
			(0.047)
Information on both x No university education			-0.033
			(0.050)
Control mean		0.493	0.806
Covariates	No	Yes	No
Observations	3,939	3,848	3,934
R^2	0.0003	0.0963	0.1216
Information effects for "No university education": Tuition fees			0.027
Student aid			-0.006
Both			-0.006

Notes: OLS regressions. Information was provided to a random subgroup of respondents. Dependent variable: dummy variable coded 1 if respondent prefers a university degree as ideal educational outcome for her child. No university education: dummy equal to one if respondent does not hold a university degree. Covariates: age, gender, income, employment status, born in Germany, living in West Germany, municipality size, living with a partner, parent status, risk tolerance, and patience. Bottom rows show estimates of Wald tests for H_0: $\beta_1 + \beta_3 = 0$ based on equation (2). Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. Data source: ifo Education Survey 2017.

Table 5: Effects of information provision in the main survey on beliefs about costs of university education in the follow-up survey

		Beliefs on				Certainty of beliefs on			
		Tuition fees in follow-up survey		Student aid in follow-up survey		Tuition fees in follow-up survey		Student aid in follow-up survey	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Information on tuition fees		-0.964	-2.214***	0.028	-0.034	0.333***	0.372**	0.125	-0.044
		(0.723)	*(0.838)*	*(0.072)*	*(0.097)*	*(0.092)*	*(0.176)*	*(0.079)*	*(0.146)*
Information on student aid		-0.282	-0.966	0.167**	0.136	0.074	0.026	0.322***	0.426***
		(0.671)	*(0.809)*	*(0.072)*	*(0.104)*	*(0.085)*	*(0.163)*	*(0.081)*	*(0.161)*
Information on both		-1.939***	-1.513	0.140**	0.103	0.293***	0.066	0.241***	0.309**
		(0.639)	*(1.020)*	*(0.069)*	*(0.093)*	*(0.092)*	*(0.178)*	*(0.081)*	*(0.153)*
No university education			2.545***		0.064		-0.623***		-0.471***
			(0.884)		*(0.104)*		*(0.126)*		*(0.115)*
Information on tuition fees x No university education			1.469		0.077		-0.010		0.253
			(1.238)		*(0.132)*		*(0.205)*		*(0.173)*
Information on student aid x No university education			0.741		0.038		0.106		-0.106
			(1.172)		*(0.136)*		*(0.190)*		*(0.186)*
Information on both x No university education			-0.704		0.044		0.334		-0.057
			(1.286)		*(0.126)*		*(0.207)*		*(0.179)*
Dependent variable in main survey		0.550***	0.531***	0.263***	0.262***	0.537***	0.502***	0.435***	0.415***
		(0.072)	*(0.073)*	*(0.080)*	*(0.080)*	*(0.017)*	*(0.019)*	*(0.019)*	*(0.020)*
Constant		5.022***	3.248***	-0.204***	-0.250***	1.637***	2.215***	1.555***	1.956***
		(0.492)	*(0.675)*	*(0.068)*	*(0.095)*	*(0.084)*	*(0.135)*	*(0.075)*	*(0.116)*
Observations		2,293	2,293	2,295	2,295	2,289	2,289	2,290	2,290
R^2		0.1078	0.1185	0.0434	0.0447	0.3130	0.3267	0.2186	0.2344
Information effects for "No university education":	Tuition fees		-0.745		0.043		0.362***		0.209**
	Student aid		-0.225		0.173*		0.131		0.320***
	Both		-2.217***		0.147*		0.400***		0.252***

Notes: OLS regressions. Dependent variables recorded in follow-up survey conducted about two weeks after the main survey (median interval: 12 days). Information was provided to a random subgroup of respondents in the main survey. No university education: dummy equal to one if respondent does not hold a university degree. Dependent variable: columns (1)-(4): beliefs as indicated in the column header, expressed as difference from the correct value, divided by the correct value (tuition fees: divided by 100 Euro); columns (5)-(8): certainty that belief is close to correct on 7-point Likert scale. Bottom rows show estimates of Wald tests for H_0: $\beta_1 + \beta_3 = 0$ based on equation (2). Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. Data source: ifo Education Survey 2017.

Table 6: Prior beliefs on returns to university education and the educational aspiration gap

	Aspiration for child: University degree		
	(1)	(2)	(3)
No university education	-0.382***	-0.361***	-0.361***
	(0.042)	*(0.041)*	*(0.041)*
Beliefs on earnings differentials		0.268***	0.247***
		(0.062)	*(0.062)*
Beliefs on unemployment differentials		0.006**	0.006**
		(0.003)	*(0.003)*
Certainty of beliefs on earnings differentials			0.008
			(0.018)
Certainty of beliefs on unemployment differentials			0.023
			(0.018)
Constant	0.740***	0.771***	0.664***
	(0.037)	*(0.037)*	*(0.060)*
Observations	1,036	966	966
R^2	0.0936	0.1216	0.1285

Notes: OLS regressions. Control group only. No university education: dummy equal to one if respondent does not hold a university degree. Beliefs on earnings and unemployment differentials: expressed as difference from the correct value, divided by the correct value. Certainty: certainty that belief is close to correct on 7-point Likert scale. Dependent variable: dummy variable coded 1 if respondent prefers a university degree as ideal educational outcome for her child. Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. Data source: ifo Education Survey 2016.

Table 7: Prior beliefs on costs of university education and the educational aspiration gap

	Aspiration for child: University degree		
	(1)	(2)	(3)
No university education	-0.406***	-0.404***	-0.402***
	(0.034)	*(0.035)*	*(0.037)*
Beliefs on tuition fees		0.008	0.008
		(0.006)	*(0.006)*
Beliefs on student aid		0.079*	0.085*
		(0.046)	*(0.046)*
Certainty of beliefs on tuition fees			-0.011
			(0.011)
Certainty of beliefs on student aid			0.022*
			(0.012)
Constant	0.806***	0.832***	0.808***
	(0.027)	*(0.040)*	*(0.063)*
Observations	1,031	963	962
R^2	0.1161	0.1307	0.1346

Notes: OLS regressions. Control group only. No university education: dummy equal to one if respondent does not hold a university degree. Beliefs on tuition fees and student aid: expressed as difference from the correct value, divided by the correct value (tuition fees: divided by 100 Euro). Certainty: certainty that belief is close to correct on 7-point Likert scale. Dependent variable: dummy variable coded 1 if respondent prefers a university degree as ideal educational for her child. Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. Data source: ifo Education Survey 2017.

Table 8: Difference in economic preferences by respondents' education level

	Patience	Risk tolerance	Overconfidence
	(1)	(2)	(3)
No university education	-0.712***	-0.776***	-0.516***
	(0.081)	*(0.085)*	*(0.055)*
Observations	7,214	7,236	6,775
R^2	0.0129	0.0153	0.0177

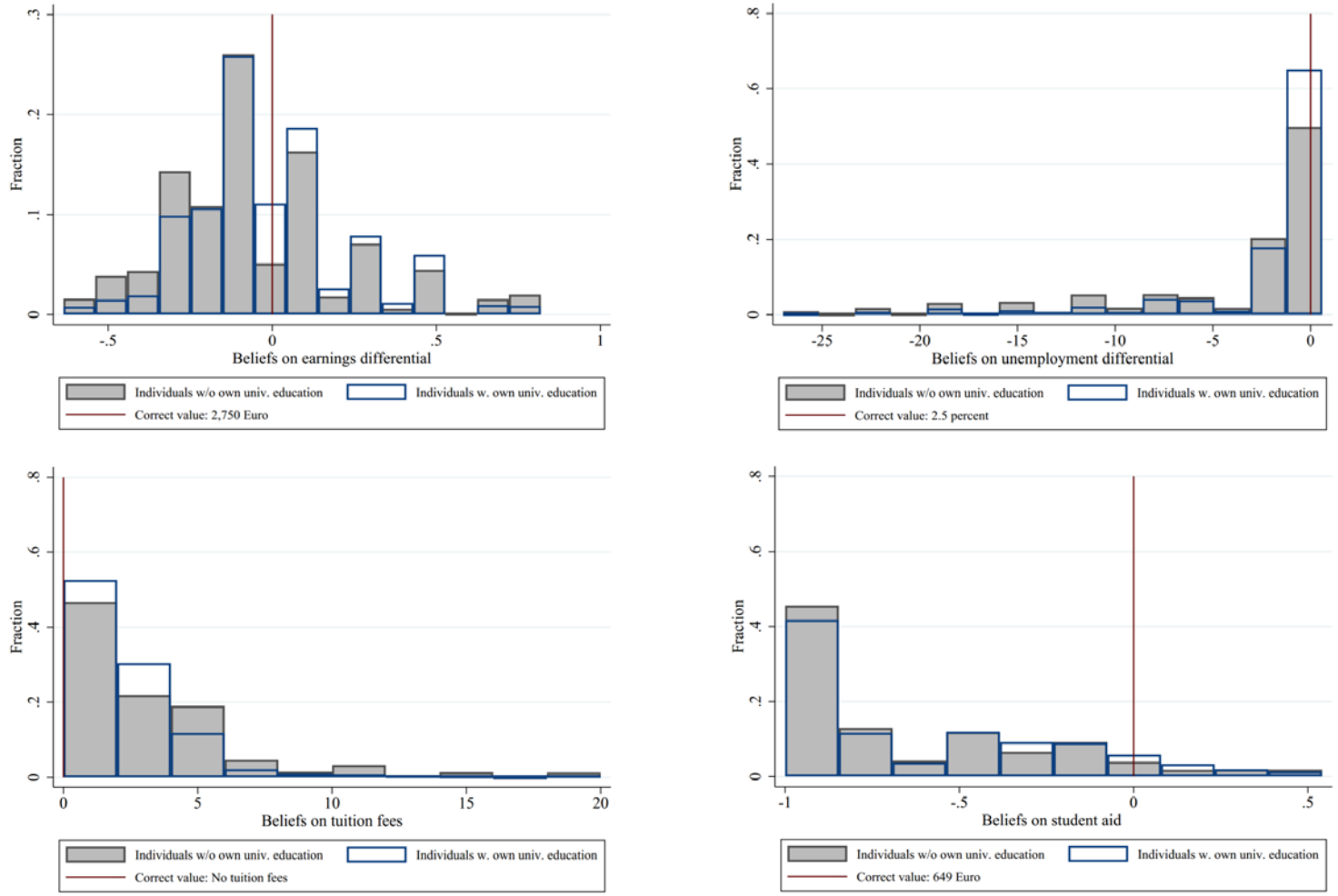
Notes: OLS regressions. No university education: dummy equal to one if respondent does not hold a university degree. Includes wave fixed effects. Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. Data source: ifo Education Survey 2016 and 2017.

Table 9: Economic preferences and the educational aspiration gap

	Aspiration for child: University degree				
	(1)	(2)	(3)	(4)	(5)
No university education	-0.397***	-0.385***	-0.393***	-0.389***	-0.385***
	(0.027)	*(0.027)*	*(0.027)*	*(0.028)*	*(0.028)*
Patience		0.011**			0.014***
		(0.005)			*(0.005)*
Risk tolerance			0.000		-0.006
			(0.005)		*(0.005)*
Overconfidence				0.010	0.010
				(0.007)	*(0.008)*
Constant	0.776***	0.677***	0.747***	0.756***	0.694***
	(0.022)	*(0.044)*	*(0.036)*	*(0.028)*	*(0.048)*
Observations	2,067	2,061	2,065	1,940	1,940
R^2	0.1060	0.1102	0.1070	0.1116	0.1160

Notes: OLS regressions. Control group only. No university education: dummy equal to one if respondent does not hold a university degree. Dependent variable: dummy variable coded 1 if respondent prefers a university degree as ideal educational outcome for her child. Includes wave fixed effects. Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. Data source: ifo Education Survey 2016 and 2017.

Figure A.1: Distributions of beliefs about returns and costs of university education by respondents' own education level



Notes: Beliefs about returns and costs of university education, expressed as difference from the correct value, divided by the correct value (tuition fees: divided by 100 Euro). Grey bars with dark grey borders: individuals without own university education. Transparent bars with blue borders: individuals with own university education. Correct values indicated by vertical lines. Top and bottom 2 percent of the distributions trimmed. Control groups, weighted distributions. Data source: ifo Education Survey 2016 and 2017.

Table A.1: Wording of survey questions

Wave	No.	Group	Wording	Answer categories
2016	6	All	Persons with a professional degree (apprenticeship) currently earn on average about 1,850 Euro net per month (full-time position). What is your best guess, how much do the following groups with lower/higher education attainment earn on average? - Persons without a professional degree – Persons with a university degree	Two answers in Euro net per month, open-ended
2016	7	All	The unemployment rate of persons with a professional degree (apprenticeship) is currently about 5 percent. What is your best guess, what is the unemployment rate of the following groups with lower/higher educational degrees? - Persons without a professional degree - Persons with a university degree	Two answers in percent, open-ended
2017	7	All	What is your best guess, how high are the tuition fees that students in your state as a general currently have to pay? (Enter "0" if you guess that students in your state as a general currently do not have to pay tuition fees.)	In Euro per semester (half year), open-ended
2017	8	All	What is your best guess, how much public student aid (BAföG) are students generally eligible for whose parents earn 50,000 Euro gross per year? Think of students who have two non-working siblings, do no longer live with their parents, and are covered by their family's health insurance. (Enter "0" if you guess that these students do not receive BAföG.)	In Euro per month, open-ended
2016/ 2017	23/ 21	Control	Irrespective of whether you have any children and of which educational degree your child holds or is likely to attain in the future: Which educational degree would match your personal ideal conception for your child?	Single choice: Professional degree (apprenticeship), University degree
2016	23	Treatment "Earnings differential"	Persons without a professional degree earn on average about 1,400 Euro net per month, persons with a professional degree (apprenticeship) about 1,850 Euro and persons with a university degree about 2,750 Euro. Irrespective of whether … [see Control]	[see Control]
2016	23	Treatment "Unemployment differential"	The unemployment rate of persons without a professional degree is currently 20 percent, for persons with a professional degree (apprenticeship) it is about 5 percent and for persons with a university degree it is about 2.5 percent. Irrespective of whether … [see Control]	[see Control]
2017	21	Treatment "Tuition fees"	Currently, students in all of Germany do not have to pay tuition fees. Irrespective of whether … [see Control]	[see Control]
2017	21	Treatment "Student aid"	In Germany, comprehensive public student aid (BAföG) is available, only half of which has to be paid back later at most. For example, students with two non-working siblings whose parents earn 50,000 Euro gross per year at most are generally eligible for 649 Euro per month. Irrespective of whether … [see Control]	[see Control]
2017	21	Treatment "Both"	Currently, students in all of Germany do not have to pay tuition fees. In addition, comprehensive public student aid (BAföG) is available, only half of which has to be paid back later at most. For example, students with two non-working siblings whose parents earn 50,000 Euro gross per year at most are generally eligible for 649 Euro per month. Irrespective of whether … [see Control]	[see Control]

Notes: No. refers to position of the question in the respective survey.

Table A.2: Effects of return information on educational aspiration: Parents

	Aspiration for child: University degree			
	All respondents	Parents	All respondents	Parents
	(1)	(2)	(3)	(4)
Information on earnings differentials	0.047*	0.066	0.106**	0.196**
	(0.025)	*(0.046)*	*(0.047)*	*(0.089)*
Information on unemployment differentials	0.019	0.066	0.075	0.115
	(0.026)	*(0.046)*	*(0.053)*	*(0.098)*
No university education			-0.382***	-0.277***
			(0.042)	*(0.087)*
Information on earnings differentials x No university education			-0.058	-0.158
			(0.054)	*(0.102)*
Information on unemployment differentials x No university education			-0.063	-0.063
			(0.060)	*(0.110)*
Control mean	0.433	0.454	0.740	0.690
Observations	3,229	920	3,223	920
R^2	0.0015	0.0038	0.1085	0.0721
Information effects for "No university education": Earnings differentials			0.048*	0.039
Unemployment differentials			0.012	0.053

Notes: OLS regressions. Sample restriction for parents includes only respondents who state that at least one of either their oldest or youngest child is still in formal education. Information was provided to a random subgroup of respondents. Dependent variable: dummy variable coded 1 if respondent prefers a university degree as ideal educational outcome for her child. No university education: dummy equal to one if respondent does not hold a university degree. Bottom rows show estimates of Wald tests for H_0: $\beta_1 + \beta_3 = 0$ based on equation (2). Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. Data source: ifo Education Survey 2016.

Table A.3: Effects of cost information on educational aspiration: Parents

	Aspiration for child: University degree			
	All respondents	Parents	All respondents	Parents
	(1)	(2)	(3)	(4)
Information on tuition fees	0.006	0.002	-0.003	-0.016
	(0.026)	*(0.047)*	*(0.042)*	*(0.074)*
Information on student aid	0.008	0.057	0.076**	0.122**
	(0.026)	*(0.048)*	*(0.037)*	*(0.049)*
Information on both	-0.013	-0.024	0.027	-0.078
	(0.026)	*(0.048)*	*(0.040)*	*(0.091)*
No university education			-0.406***	-0.448***
			(0.034)	*(0.058)*
Information on tuition fees x No university education			0.030	0.054
			(0.051)	*(0.090)*
Information on student aid x No university education			-0.082*	-0.046
			(0.047)	*(0.072)*
Information on both x No university education			-0.033	0.098
			(0.050)	*(0.105)*
Control mean	0.493	0.507	0.806	0.858
Observations	3,939	1,058	3,934	1,057
R^2	0.0003	0.0035	0.1216	0.1086
Information effects for "No university education": Tuition fees			0.027	0.038
Student aid			-0.006	0.076
Both			-0.006	0.020

Notes: OLS regressions. Sample restriction for parents includes only respondents who state that at least one of either their oldest or youngest child is still in formal education. Information was provided to a random subgroup of respondents. Dependent variable: dummy variable coded 1 if respondent prefers a university degree as ideal educational outcome for her child. No university education: dummy equal to one if respondent does not hold a university degree. Bottom rows show estimates of Wald tests for H_0: $\beta_1 + \beta_3 = 0$ based on equation (2). Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. Data source: ifo Education Survey 2017.

Table A.4: Aspiration vs. expected likelihood of obtaining a university degree

	Aspiration for child: University degree		
	(1)	(2)	(3)
No university education	-0.194***	-0.082**	-0.071**
	(0.034)	*(0.034)*	*(0.033)*
Subjective likelihood that child earns a university degree			
Continuous measure		0.166***	
		(0.010)	
Dummy: unlikely			-0.171***
			(0.036)
Dummy: likely			0.313***
			(0.033)
Constant	0.738***	0.119**	0.550***
	(0.030)	*(0.051)*	*(0.040)*
Observations	2,258	2,258	2,258
R^2	0.0247	0.1834	0.1913

Notes: OLS regressions. Sample: parents of children who did not yet complete their educational career, 2015 survey. Dependent variable: dummy variable coded 1 if respondent states that she would consider a university degree the ideal educational outcome for her child (by selecting "4" or "5" on a 5-point Likert scale). No university education: dummy equal to one if respondent does not hold a university degree. Subjective likelihood that child earns a university degree is recorded on a 5-point Likert scale from 1 = "impossible" to 5 = "absolutely certain". Dummy "unlikely" is coded 1 if respondents answer 1 or 2 on the 5-point scale. Dummy "likely" is coded 1 if respondents answer 4 or 5 on the 5-point scale. Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. Data source: ifo Education Survey 2015.

Table A.5: Prediction of participation in the follow-up survey

	Participation in follow-up survey	
Treatment status in the main survey		
Information on tuition fees	-0.001	*(0.022)*
Information on student aid	-0.031	*(0.022)*
Information on both	-0.032	*(0.022)*
Covariates		
Age	-0.001	*(0.001)*
Female	-0.068***	*(0.017)*
Monthly household income	0.000*	*(0.000)*
Education (baseline: no degree)		
Apprenticeship degree	0.062**	*(0.028)*
University degree	0.054	*(0.033)*
Employment status (baseline: student)		
Active	0.133***	*(0.031)*
Not active	0.103***	*(0.037)*
Born in Germany	0.061*	*(0.038)*
Living in West Germany	0.036*	*(0.019)*
Municipality size	0.006	*(0.005)*
Partner in household	0.015	*(0.018)*
Has children	-0.000	*(0.020)*
Risk tolerance	-0.010***	*(0.003)*
Patience	0.014***	*(0.003)*
Constant	0.321***	*(0.068)*
Observations	3,866	
R^2	0.0255	

Notes: OLS regressions. Dependent variable: dummy variable coded 1 if respondent participated in the follow-up survey. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. Data source: ifo Education Survey 2017.

Table A.6: Summary statistics and balancing tests: Follow-up survey

	Mean	Covariates predicting treatment status in main-survey experiment with information on		
	[SD]	Tuition fees	Student aid	Tuition fees and student aid
	(1)	(2)	(3)	(4)
Age	48.1	-0.000	-0.001	-0.002*
	[15.3]	*(0.001)*	*(0.001)*	*(0.001)*
Female	0.475	-0.028	0.010	-0.018
		(0.033)	*(0.033)*	*(0.033)*
Monthly household income	2396.3	-0.000*	-0.000*	-0.000
	[1466.4]	*(0.000)*	*(0.000)*	*(0.000)*
Education				
No degree	0.079	0.054	0.068	0.031
		(0.060)	*(0.059)*	*(0.060)*
Apprenticeship degree	0.579	0.021	-0.009	0.051
		(0.033)	*(0.033)*	*(0.034)*
Academic degree	0.343	-0.039	-0.012	-0.065*
		(0.035)	*(0.034)*	*(0.035)*
Employment status				
Student	0.100	-0.030	0.049	0.057
		(0.062)	*(0.058)*	*(0.057)*
Active	0.686	0.069**	0.035	0.036
		(0.035)	*(0.035)*	*(0.035)*
Not active	0.214	-0.071*	-0.070*	-0.076**
		(0.038)	*(0.038)*	*(0.038)*
Born in Germany	0.959	0.077	0.140*	0.050
		(0.081)	*(0.084)*	*(0.077)*
Living in West Germany	0.811	-0.038	-0.016	-0.010
		(0.039)	*(0.040)*	*(0.039)*
Municipality size	4.343	-0.010	-0.005	-0.020**
	[1.774]	*(0.009)*	*(0.009)*	*(0.009)*

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Table A.6 (continued)

	Mean	Covariates predicting treatment status in main-survey experiment with information on		
	[SD]	Tuition fees	Student aid	Tuition fees and student aid
	(1)	(2)	(3)	(4)
Partner in household	0.585	-0.059*	-0.040	-0.053
		(0.033)	*(0.033)*	*(0.034)*
Has children	0.561	0.001	-0.016	-0.049
		(0.033)	*(0.033)*	*(0.033)*
Parent of child currently in school	0.326	-0.010	0.006	-0.039
		(0.036)	*(0.036)*	*(0.037)*
Risk tolerance	4.245	-0.002	0.001	-0.002
	[2.519]	*(0.007)*	*(0.006)*	*(0.007)*
Patience	6.176	-0.004	0.011	0.004
	[2.384]	*(0.007)*	*(0.007)*	*(0.007)*
F test for joint significance (*p* value)		0.490	0.248	0.208
Observations	2,300	1,184	1,189	1,157

Notes: Follow-up survey. First column: sample means; standard deviations in brackets (for non-binary variables). Subsequent columns: Each cell reports the coefficients from estimating equation (4) for the respective experiment (*p* values in parentheses). *p* values of *F* tests for joint significance are based on regressions of treatment status on all covariates jointly. Regressions weighted by survey weights. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. Data source: ifo Education Survey 2017.

Table A.7: Effects of cost information on educational aspiration: Follow-up survey

	Aspiration for child: University degree	
	(1)	(2)
Information on tuition fees	-0.000	-0.011
	(0.029)	*(0.048)*
Information on student aid	-0.036	0.055
	(0.029)	*(0.044)*
Information on both	-0.004	0.059
	(0.029)	*(0.045)*
No university education		-0.339***
		(0.039)
Information on tuition fees x No university education		0.036
		(0.059)
Information on student aid x No university education		-0.100*
		(0.056)
Information on both x No university education		-0.061
		(0.056)
Control mean	0.543	0.788
Observations	2,300	2,300
R^2	0.0009	0.1029
Information effects for "No university education": Tuition fees		0.024
Student aid		-0.045
Both		-0.002

Notes: OLS regressions. Information was provided to a random subgroup of respondents in the main survey. Dependent variable: dummy variable coded 1 if respondent prefers a university degree as ideal educational outcome for her child. No university education: dummy equal to one if respondent does not hold a university degree. Bottom rows show estimates of Wald tests for H_0: $\beta_1 + \beta_3 = 0$ based on equation (2). Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. Data source: ifo Education Survey 2017.