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Earnings Information and Public Preferences for University Tuition: Evidence from Representative Experiments

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Earnings Information and Public Preferences for University Tuition: Evidence from Representative Experiments[*]

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Abstract

Higher education finance depends on the public's preferences for charging tuition, which may be partly based on beliefs about the university earnings premium. To test whether public support for tuition depends on earnings information, we devise survey experiments in representative samples of the German electorate (N>15,000). The electorate is divided, with a plurality opposing tuition. Providing information on the university earnings premium raises support for tuition by 7 percentage points, turning the plurality in favor. The opposition-reducing effect persists two weeks after treatment. Information on fiscal costs and unequal access does not affect public preferences. We subject the baseline result to various experimental tests of replicability, robustness, heterogeneity, and consequentiality.

Keywords: tuition, higher education, information, earnings premium, public opinion, voting

JEL classification: H52, I22, D72, D83

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1. Introduction

The question whether higher education should be free or whether students should pay tuition creates strong political tensions. Politicians in countries with long traditions of tuition suggest making higher education free of charge, and countries without tuition see attempts to introduce it. For example, in the past two US presidential campaigns, several leading Democratic candidates campaigned for tuition-free colleges. In traditionally tuition-free Germany, seven of the sixteen states introduced tuition in the mid-2000s. Whenever governments try to introduce or raise tuition, there is substantial public opposition. Plans for tuition raises in England triggered a wave of student unrest in 2010, and proposed tuition hikes regularly spark campus protests in the US.[1] In Germany, four of the seven state governments that had introduced tuition got voted out of power in the next election, and all abandoned tuition within a few years. In political debates, proponents argue that tuition provides universities with resources necessary to maintain quality and make future well-offs pay for part of the services they receive. Opponents argue that tuition undermines access and equity in tertiary education. The fiscal, human capital, and equity implications of tuition have been studied extensively (e.g., Lovenheim and Turner, 2017). But the key role that public preferences for tuition play in shaping higher education policy raises the question of what determines these preferences.

In this paper, we study how factual information about the university earnings premium affects public preferences for tuition. Beliefs about the relative earnings of graduates and non-graduates are a key ingredient in the efficiency and equity assessment of whether to charge tuition. Larger earnings premia may be viewed as a sign of a worthwhile investment and may make it seem fair that students pay for the services they receive. Studying the extent to which correcting beliefs about relative earnings through information provision affects policy preferences is highly relevant from a political economy perspective: The fact that voters often base their policy preferences on biased beliefs is a major reason for the implementation of welfare-reducing economic policies in democratic systems (e.g., Romer, 2003). There is ample evidence that the public holds inaccurate beliefs in many policy areas (e.g., Gilens, 2001; Alesina, Miano, and Stantcheva, 2020; Nyhan, 2020) and that providing factual information can affect policy preferences (e.g., Haaland, Roth, and Wohlfart, 2021). But nothing is known

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[1] For example, one protest against plans to raise tuition in England drew 50,000 students in November 2010 (BBC, November 21, 2012, www.bbc.com/news/education-20412792 [accessed May 14, 2021]). Over time, there have been many campus protests across colleges in the US against proposed tuition hikes (e.g., Washington Post, November 20, 2014, www.washingtonpost.com/news/post-nation/wp/2014/11/20/university-of-california-students-protest-tuition-hikes-a-look-at-some-campus-protests-over-the-years/ [accessed May 14, 2021]), and observers increasingly raise concerns about soaring student debt (e.g., Oreopoulos and Petronijevic, 2013).

about whether public preferences for higher education finance are responsive to information provision, a research gap that we aim to address in this paper.

Recent German history provides a prototype of the political economy conflicts that surround tuition. After the Constitutional Court had declared a federal ban on tuition unconstitutional in 2005, nearly half the states introduced tuition of mostly 500 Euro per semester (see section 2.2). By 2014, however, all had abolished tuition again in response to apparently overwhelming public opposition. In fact, though, little is known about whether the public at large – as opposed to special interest groups – favors or opposes tuition and what shapes these public preferences.

To elicit the electorate's preferences for tuition, we conduct five representative surveys of the German voting-age population between 2014 and 2020 with over 15,000 observations in total. We design a series of experiments that test the effects of correcting potentially biased beliefs about the earnings differential between persons with and without a university degree on public support for tuition.[2] We subject the randomized information treatment to several tests of replicability, robustness, and heterogeneity and study persistence in a follow-up survey a couple of weeks after the information treatment. We compare results to additional experimental treatments that provide information on the public costs and unequal access to university education and test experimentally whether political consequentiality changes the self-reported survey measure.

Our surveys indicate that the German public is strongly divided over whether or not to charge tuition. In the control groups of the five surveys, 43-47 percent oppose tuition and 40-47 percent favor it (the remainder is undecided). In all surveys, a slight public plurality is against tuition.

The results of our information experiments show that informing about the university earnings premium turns the plurality opposing tuition into a strong plurality in favor. When respondents are informed about the relative earnings of university graduates and non-graduates, support for tuition increases by 6.9 percentage points and opposition decreases by 8.2 percentage points, rendering 49.6 percent of the electorate in favor and 37.8 percent opposed. The results indicate that informing the electorate about the university earnings premium can strongly raise support for financing universities through tuition and in our case shift political pluralities. Public preferences for tuition are thus partly based on imperfect relevant information, which is also evident from respondents' baseline beliefs about the earnings differential that we elicited prior to the experiments.

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[2] Previous evidence suggests that people are ill-informed about relevant aspects regarding university tuition (e.g., Bettinger et al., 2012; Hoxby and Turner, 2015; McGuigan, McNally, and Wyness, 2016).

By contrast, we do not find significant effects of the information treatments on costs and access on public preferences for tuition. Information about the public costs of university does not change support for or opposition to tuition, which is particularly interesting given that respondents largely underestimate public costs of university at baseline. Thus, correcting misperceptions through information provision is not a sufficient condition for changing policy preferences (e.g., Kuziemko et al., 2015; Haaland and Roth, 2021). We also find no treatment effects of providing information about unequal access to university by family background, for which respondents hold relatively accurate beliefs at baseline.

Fostering research credibility, we replicate the effect of providing earnings information with the same size in three different representative samples. We also show that the treatment effect is insensitive to whether the earnings information is presented in relative or absolute terms.

An analysis of treatment-effect heterogeneity by baseline beliefs shows some evidence that the treatment effect is stronger for those who initially underestimated the earnings differential, suggesting that treatment effects at least partly operate through information-based updating, although salience-based updating also plays a role (Bleemer and Zafar, 2018).[3] The pattern is mostly driven by respondents who are relatively confident about their baseline beliefs, which highlights the importance to differentiate between confidently held false beliefs and random guesses when analyzing information effects (e.g., Kuklinski, 2000; Lergetporer, Werner, and Woessmann, 2020; Haaland, Roth, and Wohlfart, 2021).

Conducting a follow-up survey about two weeks after the information was provided, we show that the information treatment yields a persistent improvement of respondents' beliefs. Treatment effects on respondents' preferences for tuition also persist in the follow-up survey. Thus, the treatment effects measured immediately after information provision in the main survey reflect genuine and persistent belief updating and not merely short-lived reactions to the treatment such as experimenter-demand effects or priming effects.

We test the generality of our results by analyzing effect heterogeneity with respect to respondents' sociodemographic characteristics, political activity, and interest-group membership. Treatment effects vary little across sociodemographic subgroups. Reassuringly from a political-economy perspective, treatment effects also do not differ between voters and non-voters, between those for whom education is or is not important for their vote choice, and

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[3] Information-based updating means that the treatment affects preferences for tuition by updating respondents' beliefs about the size of the university earnings premium. Salience-based updating instead means that the treatment directs respondents' attention to the university earnings premium when forming their preferences for tuition. Bettinger et al. (2021) provide experimental evidence for the importance of salience-based updating in explaining why an informational intervention with school parents improves children's educational outcomes.

between partisans and non-partisans of the conservative party that initially introduced tuition. But there is significant heterogeneity by respondents' pecuniary self-interest: Current and potential students are generally less supportive of tuition and do not react significantly to the information treatment.

Finally, we conduct two additional experiments to clarify the interpretation of our survey-based measure for preferences for tuition. First, by eliciting preferences for different levels of tuition, we show that respondents think of a level of 500 Euro per semester (i.e., the level that had been charged in Germany before tuition was abolished) when answering our main outcome question (which is phrased in a general way without specifying a specific tuition level). Second, although public-opinion surveys have immense policy relevance (e.g., Blinder and Krueger, 2004; Hager and Hilbig, 2020), survey answers do not generally have immediate consequences. We show experimentally that stated preferences for tuition do not change when augmenting respondents' perceptions about the political consequentiality of their survey answers by informing them that average answers will be passed on to state politicians, which validates the relevance of the outcome measure. Overall, our results imply that informing the public about the relevant underlying fact of the university earnings premium can increase the political feasibility to reform higher education finance.

Our paper contributes to several strands of economics literature. It relates to the normative[4] and positive political economy literature on education finance (e.g., Fernandez and Rogerson, 1995; Epple and Romano, 1996; Glomm, Ravikumar, and Schiopu, 2011). De Fraja (2001) and Borck and Wimbersky (2014) investigate how voter majorities for alternative systems of higher education finance are affected by household characteristics such as income, ability, and risk preferences. In contrast to the theoretical literature, empirical evidence on the determinants of public preferences over higher education finance is scarce. While some empirical papers relate political processes to university funding (e.g., Lowry, 2001), we are unaware of any experimental evidence on what determines public support for tuition. We also extend the political economy literature by emphasizing the role of beliefs and information in shaping the electorates' preferences on higher education finance.

Our analysis of the determinants of the electorates' preferences for university tuition is also linked to the literature on effects of university costs on student outcomes. For example,

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[4] Normative economic models often come out in favor of some degree of user financing in higher education (e.g., Wigger and Weizsäcker, 2001; Barr, 2004; Jacobs and van der Ploeg, 2006; Diris and Ooghe, 2018), but we do not take a normative stance here. Our research interest is purely positive, concerning earnings information as a determinant of electoral majorities towards tuition.

Dynarski (2003), Field (2009), and Bleemer et al. (2021) provide evidence from the US, Garibaldi et al. (2012) from Italy, and Murphy, Scott-Clayton, and Wyness (2019) from England. Dwenger, Storck, and Wrohlich (2012), Hübner (2012), and Bietenbeck, Marcus, and Weinhardt (2020) investigate effects of the above-mentioned German reforms. In contrast to concerns articulated in the German tuition debate, these studies suggest that the effects of tuition on average student outcomes or equity were rather limited in Germany. Our results may inform why tuition was dropped nevertheless.

Our study also relates to the growing economics literature that uses information experiments to study determinants of educational choices (e.g., Wiswall and Zafar, 2015; Bleemer and Zafar, 2018; Abraham et al., 2020) and of public policy preferences in different areas (e.g., Cruces, Perez-Truglia, and Tetaz, 2013; Bursztyn, 2016; Alesina, Stantcheva, and Teso, 2018; Lergetporer et al., 2018; Lergetporer, Werner, and Woessmann, 2020; Settele, 2021; Haaland, Roth, and Wohlfart, 2021). We extend this literature by applying information experiments to the political economy of higher education finance.

The paper is structured as follows. Section 2 provides conceptual background on the role of information in public preferences for higher education finance and institutional background for Germany. Section 3 describes our data and the experimental design. Section 4 presents the results. Section 5 concludes.

2. Background

We start by providing conceptual background on the role of information in the political economy of financing higher education (section 2.1) and institutional background on tuition in Germany (section 2.2). We argue that Germany provides an interesting case to study public opinion on whether higher education should be free or not.

2.1 The Role of Information in Public Support for Tuition

The political economy of higher education finance. Higher education can be financed either publicly by governments or privately by students themselves (or by any combination of the two). In practice, the extent to which students have to pay for attending university differs immensely around the world. While public universities in some countries such as England, Japan, and the United States charge annual tuition of 5,000 dollars and more on average,

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attending university is free of any charge in the public university systems of all Nordic countries and several other continental European countries (OECD, 2020).[5]

Whether to charge tuition for attending higher education or not is determined in the political process. In fact, in many countries there are fundamental debates about whether college should be free of charge or not (see Murphy, Scott-Clayton, and Wyness, 2019, for recent discussion). Obviously, there has been substantial public opposition against introducing or raising tuition in any country that has tried to do so. The form of higher education finance is thus ultimately a question of political economy. At the most basic level, it comes down to the question whether voters favor or oppose that students pay (part of) the costs of university attendance themselves (e.g., De Fraja, 2001; Borck and Wimbersky, 2014). Apart from public opinion, other factors such as the power of special interest groups of course also play a role in the political process. While not ignoring these aspects, our analysis is mainly concerned with understanding the preferences of the electorate and its determinants.

Information about the university earnings premium and the public's opinion on tuition. The beliefs of the electorate are often biased (e.g., Gilens, 2001; Alesina, Miano, and Stantcheva, 2020; Nyhan, 2020), and its (mis)information can play an important role in elections (e.g., Allcott, and Gentzkow, 2017). A major welfare concern when public preferences are based on systematically biased beliefs is that the democratic process can yield suboptimal policies (e.g., Romer, 2003; Caplan, 2007; Dal Bó, Dal Bó, and Eyster, 2018). Given the importance of understanding potential obstacles to the implementation of policies that reflect voters' true preferences, a growing body of research investigates how information provision affects public preferences (see Haaland, Roth, and Wohlfart, 2021, for a survey). We apply the experimental analysis of imperfect information to the topic of the public's preferences for charging university tuition.

Our main focus is on information about the earnings premium related to higher education.[6] Beliefs about the earnings advantage of university graduates may affect the electorate's opinion about how much students should contribute to the costs of attending university. Recent literature shows that many people are unaware of the size of the earnings premium of higher education,

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[5] The average annual tuition charged by public or government-dependent institutions for bachelor programs in 2017/18 is 5,090 US dollars in Japan, 8,804 dollars in the United States, and 12,038 dollars in England (OECD, 2020). Tuition in independent private institutions is even higher, reaching 29,478 dollars on average in the United States. Countries where public universities do not charge any tuition include Denmark, Estonia, Finland, Greece, Norway, Poland, the Slovak Republic, Slovenia, and Sweden (OECD, 2020).

[6] In line with other studies (e.g., Bleemer and Zafar, 2018), we do not mean to imply that these differentials reflect causal returns to university education.

so that providing information on the relative earnings of university graduates can affect college-going decisions (e.g., Jensen, 2010; Wiswall and Zafar, 2015; Bleemer and Zafar, 2018). In a similar way, providing information on the earnings premium may affect political support for tuition.

The direction in which earnings information affects support for tuition is a priori ambiguous and therefore ultimately an empirical question. On the one hand, from an equity perspective, informing voters who underestimate the university earnings premium may increase their support for tuition because of fairness considerations regarding graduates' and non-graduates' individual earnings. On the other hand, they may interpret earnings-premium information as indication of productivity-enhancing effects of university education and consequently decrease support for tuition based on efficiency considerations, i.e., to minimize the barriers to reap these productivity gains. In both cases, the opposite effects may be expected for respondents who overestimate the earnings premium.

We also study two additional aspects of information that feature prominently in the public and political discourse over tuition: public costs of and unequal access to university. If voters are unaware of the current cost of university to society, providing them with information about how much the government spends for university education may trigger budget considerations about the right public-private balance of university funding (see Lergetporer et al., 2018, for similar evidence regarding public school spending). In addition, if voters are motivated by distributional considerations and misinformed about the extent of intergenerational inequality (e.g., Alesina, Stantcheva, and Teso, 2018), providing information about the differing university access of children from different family backgrounds may affect voters' views on charging tuition.[7]

Special interest groups. Beyond misinformation among the electorate, one additional reason for the possible enactment of policies that are inconsistent with voters' true preferences is that special interest groups may exert stronger impact on the political process than other groups. Special interest groups may invest resources to influence voting outcomes in their favor (e.g., Grossman and Helpman, 2001). In further analysis, we therefore study whether support for tuition, as well as the information effects, differ between groups that do and do not have a particular pecuniary self-interest in whether higher education is financed by tuition or not.

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[7] We focus on information provision in these three dimensions – earnings, costs, and unequal access – because they touch upon fundamental economic concepts related to higher education finance and because they feature prominently in public debates about tuition. Of course, we do not suggest that these are the only dimensions in which information provision might affect public preferences for tuition, and we consider investigating further potential determinants an obvious avenue for future research.

2.2 Institutional Background on Higher Education Finance in Germany

To study the determinants of voter support for tuition vs. providing higher education free of charge – a discussion that regularly comes up in many countries – we turn to the German setting. In Germany, the legislative and executive power over public higher education is vested in the 16 states (*Länder*). The federal government can only issue framework legislation concerned with general principles of tertiary education.[8] Tuition was banned from public universities in 1970. This ban was enacted in federal legislation (*Hochschulrahmengesetz*) in 2002. Shortly thereafter, six of the 16 states filed a lawsuit against the nationwide ban because it interfered with their constitutionally guaranteed autonomy in education policy. In 2005, the Federal Constitutional Court ruled in favor of the suing states, granting each state the right to implement university tuition autonomously. Subsequently, seven states – all with the conservative CDU/CSU party in government – introduced tuition in 2006 or 2007. Most tuition states charged a fixed amount of 500 Euro per semester.[9]

The introduction of tuition was met by nationwide student protests and controversial legal and political debates with high media coverage. Ultimately, public opposition led to the abolishment of tuition in every single state between 2010 and 2014.[10] A case in point is Bavaria, where a public petition against tuition that was signed by more than 1.3 million eligible voters (14 percent of the electorate) led to the abolishment of tuition by fall term 2013/14. The fact that only 216,000 students were enrolled at Bavarian universities at the time suggests that the abolishment was backed by large parts of the general population.

The topic of university tuition also played a prominent role in state election campaigns in all other six tuition states. In most states, the incumbent CDU got voted out of power in the next state elections, often with the tuition topic allegedly playing a major role, and the newly elected social-democratic governments abolished tuition shortly after assuming office (see Kauder and

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[8] The permanent funding for universities comes from states' general budgets. The allocation formulas for each university vary across states. The regulation that prohibited the federal government from engaging in permanent funding of higher education was relaxed in 2014. The vast majority (91 percent) of university students in Germany attend public institutions (Statistisches Bundesamt, 2019).

[9] As exceptions, universities in Bavaria (North Rhine-Westphalia) were allowed to charge tuition between 300 Euro (0 Euro) and 500 Euro per semester, but most charged 500 Euro per semester anyways. The other tuition states are Baden-Württemberg, Hamburg, Hesse, Lower Saxony, and Saarland.

[10] Several national newspapers continuously published dossiers on the political debate over tuition (see Dwenger, Storck, and Wrohlich, 2012, for a short account). For the political controversies and the importance of public opinion for the abolishment of tuition in Germany, see, e.g., Times Higher Education, May 23, 2013, www.timeshighereducation.com/news/unbridled-success-germanys-fee-foes-claim-victory/2003928.article [accessed May 14, 2021] or Economy Watch, October 8, 2014, www.economywatch.com/features/Germany-scraps-tuition-fees-after-mass-student-protests-cause-shift-in-public-opinion.10-08-14.html [accessed May 14, 2021].

Potrafke, 2013, for a detailed account). While the political debate about tuition has subsided after its abolition, it regained momentum and triggered new student protests in response to the introduction of tuition of 1,500 Euro per semester for non-EU students in Baden-Württemberg in 2017. This form of tuition was also announced in North Rhine-Westphalia, but its introduction was ultimately halted in response to public opposition.

These background features make Germany a particularly interesting case to study the determinants of public support for tuition. The fact that some German states had introduced tuition but failed to keep them up in the political process means that voters are aware that the question of tuition is a politically relevant topic. At the same time, it is a politically open topic where the electorate's preferences may have implications for actual policy reform initiatives. Given this setting, our results may be most relevant for countries that, like Germany, struggle to introduce or maintain tuition. Still, voter responsiveness to information may also carry broader relevance for countries with longer traditions of charging tuition, in particular when the desirability of free higher education is publicly debated.

3. Data, Experimental Setup, and Empirical Strategy

This section describes our opinion survey (section 3.1), experimental designs (section 3.2), and empirical model (section 3.3) and shows balancing of treatment groups (section 3.4).

3.1 The Opinion Survey

Our analysis is based on five waves of the *ifo Education Survey*, an annual opinion survey on education policy that we conducted in Germany. The surveys containing our experiments on public preferences for tuition were carried out between April and July of the years 2014-2017 and 2020 and covered nationally representative samples of the German adult population (2014-2017: 18 years and older; 2020: 18 to 69 years). Each year, respondents were asked to answer some 30 questions on different education topics and provided sociodemographic information at the end of the survey.

The surveys were implemented by the polling firms Kantar Public and Respondi who have access to nationally representative panels of adults. Between 2014 and 2017, sampling was administered in a stratified way to account for the fact that a sizeable share of citizens (decreasing from 22 percent in 2014 to 17 percent in 2017) does not use the internet. Persons who use the internet were selected from an online panel and polled through an online survey. Persons who do not use the internet were polled at their homes, where trained interviewers provided them with tablet computers to complete the survey autonomously. All respondents

answered all questions on a computer. This mixed-mode approach ensures that our sample is representative of the electorate, an aspect crucial to derive general political-economy statements (e.g., in the framework of median voter models). The 2020 wave was implemented as a full online survey.[11]

We employ survey weights calibrated to match administrative statistics with respect to age, gender, parental status, school degree, federal state, and municipality size. Inclusion of these weights does not substantially change the results of this paper, speaking towards the validity of our sampling strategy and the high quality of our data (results available upon request).

Each survey included an item asking respondents about their preferences for university tuition. To study the effects of information on participants' responses experimentally, respondents were randomly split into one control group and up to three treatment groups. To ensure representativeness in each experimental group and sufficient power to detect treatment effects, we generally aimed for 1,000 observations per experimental group. Table 1 shows the data structure across waves and treatment groups. In total, there are 15,518 observations in the treatment and controls groups of the experiments studied in this paper over the five waves. As item non-response is very low at around 1 percent on average,[12] the overall sample size is 15,412 observations in the experiments.[13]

In the 2017 wave, we additionally conducted a follow-up survey about two weeks after the main survey to test whether information effects persist beyond the initial setting (see below for details).

3.2 The Survey Experiments

In the different waves of the *ifo Education Survey*, we elicit respondents' preferences for tuition and conduct survey experiments that use random assignment to treatment and control groups. In each wave, we elicit preferences for tuition in the control group by asking: "Do you favor or oppose that students at German universities cover a part of the costs of their studies themselves by tuition?" Respondents could pick one of five answer categories: strongly favor,

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[11] Grewenig et al. (2018) show that re-weighted online-survey data can yield representativeness for the entire population of onliners and offliners.

[12] Whenever a question was left blank during the survey, a pop-up window with an encouragement to answer the respective question appeared. Respondents did not have the option to go back in the survey. Treatment status does not predict item non-response in our experiments (see Appendix Table A2).

[13] The 15,412 observations come from 13,192 individuals, as some respondents participated in more than one wave. In regressions that pool different waves, we cluster standard errors at the individual level. Excluding respondents who participated again does not alter our results (available upon request).

somewhat favor, neither favor nor oppose, somewhat oppose, and strongly oppose.[14] Since our representative samples comprise respondents from various educational backgrounds, including nearly 40 percent with at most a basic school degree, we deliberately designed our survey instruments as simple as possible to minimize the possibility of comprehension problems.

Information on Relative Earnings, Public Costs, and Unequal Access (Wave 2014)

In the first wave, we conducted an experiment to test how factual information on (i) the relative earnings differential between persons with and without a university degree, (ii) public costs per university student, and (iii) unequal access to university by parental background affects public preferences for tuition.

In the experiment, we randomly assigned respondents to one of four experimental groups. In the control group, we elicited preferences for tuition as indicated above. The three treatment groups were asked the exact same question, but they were additionally provided with different pieces of information directly above the question on the same survey screen.

In the first treatment group (*Earnings information*), respondents were informed that university graduates earn about 40 percent more each year than persons with a vocational education (apprenticeship) – the main alternative in the German education system. We computed this number using the German sample of the Programme for the International Assessment of Adult Competencies (PIAAC) 2012.

The second treatment group (*Cost information*) was informed that public expenditures for universities amount to 8,600 Euro per student each year (Statistisches Bundesamt, 2014).

In the third treatment group (*Access information*), respondents were informed that 75 percent of individuals whose parents hold a university degree, but only 25 percent of those without university-educated parents, go to university themselves, and that this difference already existed before tuition was introduced in Germany (Middendorff et al., 2013).

To gauge respondents' baseline beliefs on the aspects covered in the treatments, we elicited their beliefs about relative earnings, public costs, and unequal access to university earlier on in the survey. To make the potential correction of false beliefs less immediate and thus to reduce

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[14] Appendix Table A1 shows the question wording of all experiments. A summary description of the entire survey is available at www.ifo.de/ifo-bildungsbarometer. To prompt respondents to give a considered answer and to minimize the error of central tendency, the category "neither favor nor oppose" was placed below the other four answer categories. In methodological experiments on questions unrelated to tuition, we found that this reduces the error of central tendency and leaves the relative frequency of policy support and opposition unaffected. Other survey design details, such as the ordering and number of answer categories or their horizontal versus vertical presentation, also did not affect answering behavior (detailed results available upon request).

the possibility of backfire effects (Nyhan and Reifler, 2010), these belief-elicitation questions were posed much earlier in the survey, well before the survey experiment.

Information on Absolute Earnings and Baseline Beliefs with Confidence (Wave 2015)

In the second wave, we implemented a robustness test of the earnings information treatment. In the control group, we elicited public preferences for tuition with the exact same question as in wave 2014. In the experimental treatment, we aim to test whether treatment effects of earnings information depend on providing it in relative or absolute terms. Rather than the relative information of the first wave, in the second wave we provide information on absolute earnings of individuals with different degrees. Specifically, in the treatment group (*Earnings information*) respondents were informed that on average, university graduates earn about 2,450 Euro net per month, persons with a vocational education (apprenticeship) about 1,850 Euro, and those without a degree about 1,400 Euro.[15] Acknowledging the importance of replication to foster credibility of economic research (e.g., Maniadis et al., 2014), this treatment assesses the robustness and replicability of the effect of earnings information in the first wave.

To uncover the mechanisms through which the earnings information treatment impacts preferences for tuition, we elicited beliefs about net monthly earnings from all respondents earlier in the survey. This allows us to estimate heterogeneous treatment effects by baseline beliefs. We also asked how sure respondents were that their answer was close to correct on a scale from 1 ("very unsure") to 7 ("very sure") to differentiate between confidently held false beliefs ("misinformation") and random guesses ("uninformedness") (Kuklinski et al., 2000).

Tuition Levels (Wave 2016)

The experiment in the third wave included two experimental treatments (in addition to the standard control group) to investigate to what extent public preferences depend on the level of tuition. As in the previous waves, the question posed to the control group did not specify the level of tuition. This was to keep the question as short and simple as possible and to keep it general rather than making results dependent on any specific choice of levels. To test whether public preferences for tuition depend on their level, as well as which level of tuition respondents might have in mind when answering the control-group question, we implemented two treatments that specify two different levels of tuition.

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[15] These numbers are median earnings in the German Microcensus 2012 (Research Data Centres of the Federal Statistical Office and the statistical offices of the Länder, Microcensus, census year 2012). As income taxes are directly deduced from the pay slip, this presentation of net earnings data is arguably most accessible to Germans. The relative earnings differential in wave 2014 is based on gross income data from PIAAC.

In the first treatment group (*Level 500*), respondents were asked whether they favor or oppose tuition of 500 Euro per semester. This level reflects the amount charged when tuition had been in place in Germany (see section 2.2). In the second treatment group (*Level 1500*), respondents were asked about their opinion on tuition of 1,500 Euro per semester. Apart from indicating the specific tuition levels, the questions were phrased exactly as in the control group.

Persistence of Treatment Effects of Earnings Information (Wave 2017)

In the fourth wave, we aimed to investigate whether the effect of earnings information persists beyond the short-run setting of the main survey. We thus conducted a follow-up survey about two weeks after the main survey. To yield enough power for the follow-up, respondents in the main survey were split into just two experimental groups: a control group and a treatment group (*Earnings information*) that received the earnings information. Specifically, similar to wave 2015, respondents in the treatment group were informed about net monthly earnings of persons with university degree (2,750 Euro), vocational degree (1,850 Euro), and no degree (1,400 Euro) before answering the same tuition question as the uninformed control group.[16] The treatment was supplemented with a graphical depiction of the earnings information.

To test whether the impact of providing earnings information persists beyond the immediate survey horizon, we invited respondents of the online sample of the main survey to participate in a follow-up survey at a later point. The follow-up survey re-elicited preferences for tuition but did not comprise any information treatment. A total of 2,363 respondents (64 percent of the online sample) participated in the follow-up survey. Their characteristics are well balanced between treatment and control condition assigned in the main survey. The median time elapsed between the main and the follow-up survey was 12 days (ranging from 5 to 41 days).

Validating Stated Preferences by Assigning Political Consequentiality (Wave 2020)

The experiment in the 2020 wave addresses a general potential concern with using stated preferences as outcomes of interest. In particular, survey responses may be susceptible to reporting bias because they have no immediate political consequences (e.g., Carson, 2012; Kling et al., 2012). Pioneered by Grigorieff, Roth, and Ubfal (2020), recent research has

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[16] To provide respondents with the most recent information, we used the latest available version (2013) of the German Microcensus to compute earnings (Research Data Centres of the Federal Statistical Office and the statistical offices of the Länder, Microcensus, census year 2013). The slight change in numbers between 2012 and 2013 reflects that the Microcensus records earnings in 24 bins, with median earnings of university graduates increasing from the 2,450 Euro bin to the neighboring 2,750 Euro bin. Since treatment effects are statistically indistinguishable between waves 2015 and 2017, this feature does not seem to affect our results substantively.

validated self-reported survey responses with actual political behavior such as signing petitions or donating money to charity (e.g., Alesina, Miano, and Stantcheva, 2018; Haaland and Roth, 2020; Haaland, Roth, and Wohlfart, 2021; Settele, 2021).

Following this approach, we randomized respondents between a control group in which we elicited stated preferences for tuition using the same survey question as in the previous waves and a treatment group (*Consequential*). On a survey screen shown before stating their preferences for tuition, respondents in the treatment group were informed that the aggregate answers to the tuition question will be passed on to their respective state parliament politicians. As announced, later on we sent each of the 157 education-policy spokespersons in the 16 state parliaments an email informing them about the public support for tuition (details available upon request). Similar to signing a petition, we thereby induce direct political consequences to respondents' survey answers.[17]

3.3 Empirical Model

Our analysis of treatment effects is based on the following regression model:

$$y_i = \alpha + \beta_k T_{ki} + \lambda' Z_i + \varepsilon_i \tag{1}$$

where y_i is individual i's preferences for tuition, T_{ki} is an indicator of whether individual i received treatment k, Z_i is a vector of control variables, and ε_i is an error term that is uncorrelated with all right-hand-side variables.[18] The parameter of interest is β_k, which represents the average treatment effect of treatment k on preferences for tuition. Additional control variables are not required to identify the causal treatment effects due to random assignment to the experimental groups. Nevertheless, the inclusion of covariates may increase the precision of estimates.[19]

To analyze effect heterogeneity of a given treatment across subgroups (defined over respondents' characteristics or prior beliefs), we extend our basic regression model to:

$$y_i = \alpha + \beta_1 T_i + \beta_2 S_i + \beta_3 T_i S_i + \lambda' Z_i + \varepsilon_i \tag{2}$$

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[17] This experiment is also related to the contingent-valuation literature that has shown that hypothetical biases are absent once respondents view their survey answers as consequential for political action (Landry and List, 2007; Vossler and Watson, 2013).

[18] In wave 2014, $k \in \{$*Earnings information, Cost information, Access information*$\}$; in 2015 and 2017, $k =$ *Earnings information*; in 2016, $k \in \{$*Level 500, Level 1500*$\}$; in 2020, $k =$ *Consequential*.

[19] See table notes for lists of included covariates. The share of missing covariate data is very low in our samples (below 1 percent, on average). Throughout the paper, we impute missing covariates by a constant and include dummies indicating imputed values for each covariate. All qualitative results hold when instead observations with missing covariates are dropped (results available upon request).

where S_i equals one if respondent i is member of the respective subgroup, 0 otherwise. The treatment effect for non-members of the subgroup is given by β_1, and β_3 measures the additional effect on the subgroup.

3.4 Tests of Randomization

To test whether randomization in our experiments successfully balanced respondents' characteristics across treatment and control groups, we investigate whether our rich set of covariates differs by treatment status. The initial columns of Appendix Table A2 present means of observable characteristics for the control groups of the different waves. The remaining columns report coefficients and significance levels of regressions of the form

$$C_i = \alpha + \gamma_k T_{ki} + \varepsilon_i \tag{3}$$

for each covariate C_i and each experiment separately.

It is reassuring that only 13 out of 262 regressions (5.0 percent) yield a coefficient γ_k that is significant at the 5 percent level, as would be expected by pure chance. Thus, the balancing tests suggest that random assignment worked as intended.

4. Results

This section presents our experimental results on how information provision affects public support for tuition. We start with the baseline results of providing information on the university earnings premium (section 4.1). We then compare it to the effects of providing information on fiscal costs and unequal access (section 4.2). Next, we show that the earnings information effect replicates across three surveys and is insensitive to relative or absolute earnings information (section 4.3). Then, we study heterogeneity by baseline beliefs (section 4.4), persistence in a follow-up survey (section 4.5), and heterogeneous treatment effects across sociodemographic subgroups, respondents' political activity, and special interest groups (section 4.6). Finally, we investigate whether survey answers are affected by the level of tuition and their political consequentiality (section 4.7).

4.1 Baseline Results: Information Treatment on the University Earnings Premium

Our baseline results refer to the effect of experimentally providing information about the university earnings premium on the public's preferences for whether or not students should cover part of the university costs themselves. Based on equation (1), Table 2 reports the effects of information provision on preferences for tuition in the first survey (wave 2014). To depict

political majorities for or against tuition, the first two columns focus on whether respondents are in favor of tuition (combining the answer categories "strongly favor" and "somewhat favor"), whereas the latter two columns focus on opposition against tuition (combining "somewhat oppose" and "strongly oppose"). The residual answer category on the five-point scale is "neither favor nor oppose."[20] Estimates in columns 1 and 3 do not include covariates, whereas columns 2 and 4 include standard covariates as indicated in the table notes.

Results indicate that at baseline, the German population is divided about charging tuition, with a plurality against it. 40.0 percent of respondents in the uninformed control group favor tuition and 45.7 percent oppose tuition (see control mean in Table 2); the remaining 14.3 percent are undecided. Given the indication that public opposition against tuition played an important role in their abolishment (see section 2.2), it is remarkable that only a plurality, but not a solid majority of the electorate opposes tuition. This suggests that special interest groups (studied in section 4.6 below) may have been particularly relevant in the abolition of tuition.

Informing participants about the earnings premium of university graduates substantially increases support for tuition, shifting the plurality of the public in favor of tuition. Treatment *Earnings information* increases support for tuition significantly by 8.1 percentage points to 48.1 percent (column 1). Likewise, the treatment reduces opposition against tuition significantly by 8.9 percentage points to 36.8 percent (column 3). Respondents' initial beliefs about the university earnings premium, elicited earlier in the survey, indicate that a larger share of the public underestimates the earnings gap.[21] Thus, alleviating biased beliefs about the earnings differential through information provision has profound effects on public support for tuition, shifting the plurality of the public towards supporting tuition. As expected, regression coefficients hardly budge when covariates are included (columns 2 and 4).

Results for individual answer categories separately indicate that public opinion is shifted throughout the spectrum (Appendix Table A3). Based on the preference elicitation on a five-point scale, treatment *Earnings information* thus impacts strongly as well as weakly held preferences.

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[20] All regression results presented in this paper are estimated using OLS, but nonlinear (probit or multinomial logit) models yield qualitatively identical results (available upon request).

[21] Early in the 2014 survey, we elicited respondents' baseline beliefs on how much university graduates earn compared to persons with a vocational degree using a six-point scale (answer categories: less; about the same; up to 25 percent more; 25-50 percent more; 50-100 percent more; more than 100 percent more). On this question, 43 percent of respondents tick the correct answer category (25-50 percent more), 39 percent underestimate the earnings differential, and 18 percent overestimate it. See section 4.4 for further analysis of baseline beliefs.

4.2 Treatment Effects of Information on Fiscal Costs and Unequal Access

In the same survey experiment, we also investigate experimentally whether public preferences for tuition are affected by information on costs and access to higher education. These estimates can serve as a reference point for the earnings information effect. In contrast to earnings information, the other two information treatments do not significantly change preferences for tuition (Table 2).

Specifically, support for and opposition to tuition are unaffected by whether respondents in treatment *Cost information* are informed about how much the federal government and the federal states currently spend on tertiary education for each student. The null effect of the cost information treatment is particularly remarkable as respondents' baseline beliefs about annual public costs per university student, elicited early on in the survey, are far below the actual value (median belief: 2,000 Euro; actual costs: 8,600 Euro). In line with previous studies (e.g., Kuklinski et al., 2000; Kuziemko et al., 2015; Haaland and Roth, 2021; Lergetporer, Werner, and Woessmann, 2020), correcting false beliefs through information provision thus proves not to be a sufficient condition for shifting policy preferences.

Similarly, public preferences for tuition are unaffected by being informed about unequal access to university by parental background. Treatment *Access information* informs participants that about 75 percent of children of parents with a university degree and 25 percent of children of parents without a university degree take up university studies. In this case, the reason for the null effect of the information treatment might be that the public is already relatively well informed about the extent of unequal access to university education: 82 percent of respondents correctly anticipated that the university participation rate of individuals whose parents hold a university degree is 50 percent or more (after being informed that the respective share for those without university-educated parents is 25 percent).[22]

In sum, our result that information about the earnings differential between persons with and without a university degree affects the public's preferences regarding higher education finance is not paralleled by similar effects of the information treatments on fiscal costs and unequal access to university education.[23] Next, we investigate the replicability and sensitivity,

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[22] There are, of course, several possible explanations for why information treatments fail to affect policy preferences. For treatment *Cost information*, it might be that (i) public costs are simply irrelevant for respondents when forming preferences for tuition or that (ii) government spending levels are less tangible and informative than, e.g., earnings differentials. For treatment *Access information*, it might be that (i) respondents fail to connect the information provided with tuition policies as the connection between the two is arguably relatively indirect (e.g., Kuziemko et al., 2015) or that (ii) the information provided is too complicated for respondents to digest.

[23] In wave 2017, we included two additional randomly provided pieces of information on higher education finance: the current absence of tuition in Germany and the availability of comprehensive public student aid (so-

underlying belief-updating process, persistence, and heterogeneity of the *Earning information* effect.

4.3 Tests for Replicability and Sensitivity of the Earnings Information Treatment

To validate the estimated effect of earnings information on preferences for tuition, we subject the *Earnings information* treatment to replication and sensitivity tests in two further surveys (waves 2015 and 2017). Wave 2014 presented the earnings information in relative terms, indicating the earnings advantage of university graduates in percent. To test whether the treatment effect is sensitive to the provision of relative earnings information, waves 2015 and 2017 presented the earnings information in absolute terms, indicating the respective net monthly earnings levels of individuals with different degrees (see section 3.2 for details).

Intriguingly, the 2014 results are perfectly robust in the alternative presentation to a new representative sample in 2015 and replicate in yet another representative sample of the German electorate in wave 2017. The pooled estimation in Table 3 indicates that the *Earnings information* treatment effects are in fact statistically indistinguishable across the three waves. Likewise, baseline preferences for tuition in the control group are very similar across the three survey waves.

In the absolute earnings case in wave 2015, 43.8 percent of control-group participants favor charging tuition and 46.4 percent oppose it. In the treatment group that is informed about the respective absolute earnings of different graduates, support for tuition is again significantly increased (by 5.7 percentage points) and opposition reduced (by 7.8 percentage points), turning the plurality around to be in favor of tuition.

In the replication in wave 2017, results are again almost identical. In the control group, 43.3 percent favor tuition and 45.8 percent oppose it. Treatment *Earnings information* raises support by 7.1 percentage points and reduces opposition by 8.0 percentage points. In fact, in the case of wave 2017, a slight majority of 50.4 percent of respondents in the informed treatment group is in favor of students paying tuition.

Figure 1 shows pooled results of the *Earnings information* experiment across the three waves. On average, providing information on the university earnings premium increases support for tuition by 6.9 percentage points from 42.7 to 49.6 percent and reduces opposition by 8.2 percentage points from 46.0 to 37.8 percent.

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called *BAföG*). This information was provided on a previous screen in relation to a question on participants' hypothetical educational aspirations (Lergetporer, Werner, and Woessmann, 2021). These information treatments also did not significantly affect opinions on tuition (detailed results available upon request).

In sum, the effect of *Earnings information* replicates in three different representative samples of the German voting-age population and does not hinge on whether the earnings differential is presented in relative or absolute terms. This replication exercise corroborates that the reported treatment effect does not reflect a false-positive result but rather the true causal effect of the treatment on public preferences (Maniadis et al., 2014).

4.4 Information- and Salience-based Updating: Heterogeneity by Baseline Beliefs

To study whether the treatment effect of *Earnings information* differs by baseline beliefs about the earnings differential, early in the survey waves 2015 and 2017 we elicited respondents' beliefs about the earnings differential and the confidence with which respondents hold these prior beliefs.[24] Specifically, we provided information on the earnings of persons with a vocational degree (1,850 Euro) as an anchor and asked respondents to guess the average net monthly earnings of university graduates. In the 2015 wave, the median belief of 2,500 Euro is close to the correct value 2,450 Euro, and guesses range from 1,800 Euro at the 10th percentile to 3,500 Euro at the 90th percentile. To ensure that our results are not driven by extreme outliers, we winsorized observations at the 2nd and 98th percentile of the guess distribution for the analysis.

Results of an interacted model indicate that the effect of the information treatment decreases with prior beliefs about the university earnings premium in the 2015 wave. Following equation (2), the interacted specification of Table 4 includes an interaction term between treatment *Earnings information* and initial beliefs. Relative beliefs are expressed as the difference between the estimated earnings of university graduates and actual earnings of those without a degree, divided by the actual earnings difference between the two groups (i.e., they equal 1 if the respondent correctly estimates the earnings differential). Thus, the main effect on the treatment indicator in the interacted specification indicates the treatment effect for those who thought that university graduates earned the same as those without a degree. Results indicate that the treatment effect on support for tuition is marginally significantly stronger the lower the initial guess of the university earnings premium (column 1). For individuals who guessed that there was no earnings premium, the treatment effect is estimated at 12.6 percentage points. Thus, the information treatment induced a larger information shock on the preferences of underestimators than on those who hold more accurate beliefs. The treatment effect on

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[24] An experimental investigation in wave 2017 shows that the elicited beliefs about the earnings differential do not change if belief accuracy is incentivized, suggesting that unincentivized belief measures do not suffer from systematic reporting bias in this setting (Grewenig et al., 2021).

opposition against tuition shows a similar pattern of heterogeneity, although insignificantly so (column 4).[25]

To be able to differentiate inaccurately held beliefs from general ignorance, we also elicited how confident respondents are about their beliefs on a scale from 1 ("very unsure") to 7 ("very sure").[26] Splitting the sample by the confidence with which respondents hold their beliefs, the pattern of heterogeneous treatment effects by baseline beliefs is more pronounced for those who are relatively sure about their beliefs (columns 2 and 5 of Table 4) than for their counterparts (columns 3 and 6), which resembles previous findings on concerns for educational inequality (Lergetporer, Werner, and Woessmann, 2020). Thus, the heterogeneity pattern suggests that treatment effects are at least partly due to *information-based updating* in the sense that the treatment corrects confidently held false beliefs.

The stronger effect in the confident subsample also shows in the 2017 wave, whereas the pattern on the interaction with initial beliefs is not as clear (Appendix Table A4). At least in the confident subsample (column 2), the earnings information treatment effect declines with baseline beliefs, although not significantly so. This indicates that part of the change in policy preferences may also be due to *salience-based updating* in which the treatment increases the salience of earnings considerations relative to other potential factors affecting respondents' preferences for tuition (see Bleemer and Zafar, 2018, for a discussion of the two updating concepts).[27]

4.5 Persistence of the Information Treatment Effect in a Follow-up Survey

The treatment effects presented thus far are measured directly after information provision within the same survey. To investigate whether the effect of the *Earnings information* treatment persists beyond the immediate survey horizon, in wave 2017 we re-elicited beliefs about

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[25] If, in an alternative non-linear specification, we categorize respondents with prior beliefs within (below, above) the ± 10 percent range around the true value as correct (under-, over-) estimators, the treatment significantly increases support for (and decreases opposition against) tuition only among underestimators but does not significantly affect overestimators or those with correct beliefs (results available upon request).

[26] 25.9 percent of respondents are relatively sure that their stated belief is close to correct (choosing a value between 5 and 7), 41.7 percent are relatively unsure (choosing a value between 1 and 3), and 32.4 percent choose the middle category. Interestingly, belief accuracy and confidence are not positively correlated. This finding is in line with earlier evidence on public misperceptions about welfare (see Kuklinski et al., 2000).

[27] In wave 2014, we elicited baseline beliefs on a six-point scale. Effects of the relative earnings information treatment are significant and positive for those who underestimate the relative earnings premium, but small and statistically insignificant for those who correctly guessed that university graduates earn "25-50 percent more" than persons with a vocational degree (results available upon request). While this is consistent with information-based updating, treatment effects are also positive for overestimators. As we did not elicit respondents' confidence in their stated beliefs in the 2014 wave, we cannot distinguish whether overestimation reflects random guessing (in which case positive treatment effects are consistent with information-based updating) or confidently held false beliefs (which would speak towards salience-based updating).

earnings and preferences for tuition (without any information treatment) in a follow-up survey about two weeks after the main survey. Of the 3,696 participants in the online version of the main survey, 2,363 respondents (64 percent) participated again in the follow-up survey.[28] While several observable characteristics predict participation in the follow-up, characteristics of follow-up survey participants are well balanced between treatment and control group (see Appendix Table A5). Furthermore, treatment status in the main survey does not significantly predict participation in the follow-up survey. Thus, treatment effects in the follow-up survey can be interpreted as the persistent causal effect of the *Earnings information* treatment among those who selected to participate in the follow-up survey.

Being informed about the earnings of university graduates in the main survey significantly improves participants' guesses of these earnings in the follow-up survey. Identifying guesses within an interval of 20 percent above or below the true value as correct guesses, the estimates in the first three columns of Table 5 show that treated individuals are 12 percentage points more likely to guess graduate earnings correctly than individuals from the control group, reducing both underestimation and overestimation.[29]

Earnings information provision in the main survey also retains a persistent effect on preferences for tuition in the follow-up survey. The estimates in columns 4 and 6 of Table 5 indicate that treatment *Earnings information* turns a plurality against tuition in the control group (44 percent in favor, 48 percent opposed) into a plurality favoring tuition (46 percent in favor, 42 percent opposed). While the opposition-reducing effect is highly significant, the support-increasing effect is shy of statistical significance. The inclusion of control variables does not alter the qualitative results of the follow-up survey (columns 5 and 7).

The results of the follow-up survey indicate that a significant share of participants remembers the information provided in the main survey and updates their beliefs accordingly. This finding speaks against the relevance of experimenter-demand effects, i.e., the phenomenon that respondents may infer the experimenters' intentions from the treatment and adapt their answers accordingly (e.g., Zizzo, 2010): The persistence of the treatment effects beyond the immediate survey context in which information is provided ameliorates the general potential concern with information experiments that treatment effects are only due to experimenter-demand effects or short-lived priming effects (e.g., Cavallo, Cruces, and Perez-Truglia, 2017;

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[28] This take-up rate is relatively high compared to other recent follow-up surveys, such as 14 percent in Kuziemko et al. (2015) and 24 percent in Alesina, Stantcheva, and Teso (2018), and similar to the 66 percent in Haaland and Roth (2020).

[29] The same qualitative results are obtained for alternative intervals such as 15 or 25 percent (results available upon request).

Haaland and Roth, 2020; Haaland, Roth, and Wohlfart, 2021). Consistently, previous research shows that experimenter demand effects are likely absent in (survey) experiments (de Quidt, Haushofer, and Roth, 2018; Mummolo and Peterson, 2019) and that anonymous online surveys like ours are not prone to social desirability bias (Das and Laumann, 2010).

4.6 Subgroups Analysis: Sociodemographic Characteristics, Political Activity, and Interest Groups

The analyses so far focused on average treatment effects among the electorate. Next, we analyze effect heterogeneity across various subgroups to investigate the generality of our findings across sociodemographic characteristics and to focus on the politically active population and on special interest groups.

As background, we provide descriptive evidence on how preferences for tuition vary across different population subgroups. Appendix Table A6 presents OLS regressions of support for tuition on respondents' characteristics using stacked data of the control groups in all waves. Each cell in column 1 presents the coefficient of a bivariate regression of preferences for tuition on the respective characteristic, and column 2 presents a multivariate regression including all characteristics simultaneously. Older people, males, and full-time employees are more likely to support tuition. In addition, partisans of the conservative party that had introduced tuition (CDU) are more supportive of charging tuition. Expectably, interest-group members such as persons who hold a university entrance qualification (i.e., potential future students) and current university students are less supportive of tuition. These associations are in line with an interpretation that policy preferences partly reflect pecuniary self-interest.

To investigate whether the earnings information treatment affects different subgroups differently, Table 6 reports heterogeneous treatment effects for different subgroups of respondents.[30] Based on equation (2), the table depicts the main treatment effects for the respective omitted subgroup (β_1, column 1) and coefficients on the treatment-subgroup interaction terms (β_3, column 2). Depending on the respective characteristic, the sample is split into two or three subgroups. Despite our large sample size, statistical power to identify subgroup heterogeneity is somewhat limited, particularly for small subgroups. Therefore, the heterogeneity analyses should be interpreted with caution.

Sociodemographic characteristics. Overall, the analyses show little evidence of strongly heterogeneous treatment effects across sociodemographic subgroups, with hardly any

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[30] The shown analysis uses support for tuition as the dependent variable; qualitative results are identical when instead using opposition against tuition.

statistically or quantitatively significant subgroup differences. The pattern suggests that effects reported in the previous sections are rather general and not due to extreme reactions of subgroups with certain sociodemographic characteristics. Of the ten sociodemographic indicators contained in the table, the only two marginally significant (p<0.1) differences indicate smaller treatment effects for respondents with higher socioeconomic status – persons with above-median household income and with parents with a university degree.

Political activity. From a political-economy perspective, it is noteworthy that treatment effects also do not differ significantly for politically active people. Respondents who report that they vote frequently and respondents who consider education topics important for their voting decision do not respond differently to the treatment than their counterparts. As these subgroups' preferences are most likely represented in the political process, the fact that our treatment also affects these groups' preference for tuition underlines the political-economy relevance of our findings.

Interest groups. The only two interactions terms (of the 19 interactions in Table 6) that are statistically significant at the 5 percent level concern interest-group members with pecuniary self-interest in tuition. Persons who hold a university entrance qualification and current students – i.e., those who would have to pay tuition if it were introduced – exhibit significantly smaller reactions to the *Earnings information* treatment than the rest of the population. The fact that the treatment is less effective for these subgroups is relevant as these special interest groups might play a key role in determining higher education finance (Glomm, Ravikumar, and Schiopu, 2011). At the same time, parents – another important interest group – do not react significantly differently to the treatment than non-parents.

4.7 Interpretation of Survey Measures: Tuition Levels and Political Consequentiality

To clarify the interpretation of our outcome measure, in a couple of final experimental analyses we investigate whether our survey measure of preferences for tuition is affected by specifying a particular level of tuition and by assigning political consequences to the stated preferences.

Tuition levels. In wave 2016, we investigate experimentally which levels of tuition respondents have in mind when answering the tuition question. The two experimental treatments mention specific levels of tuition, whereas the control group again has no explicit reference to specific tuition levels. Treatment *Level 500* indicates tuition of 500 Euro per semester – i.e., the level that had been charged in Germany before tuition was abolished. The treatment does not significantly affect public support for or opposition to tuition compared to

the control group (Panel A of Table 7). This suggests that respondents seem to have the previously experienced tuition level in mind when stating preferences for tuition in general (i.e., without specifying a level).

By contrast, treatment *Level 1500* – which indicates tuition of 1,500 Euro per semester – has a strong negative impact on public preferences for tuition. It reduces support by 11.7 percentage points and increases opposition by 10.0 percentage points, creating a majority of 56.1 percent against tuition. Thus, public support declines at tuition levels three times as high as the previously experienced level.

Political consequentiality. In wave 2020, we investigate experimentally whether survey statements of preferences for tuition suffer from reporting bias because survey answers do not bear immediate (political) consequences. The randomly chosen treatment group is informed that average answers to the survey question on tuition will be passed on to state politicians, which induces direct political consequences to respondents' survey answers.

Panel B of Table 7 shows that the precisely estimated effects of treatment *Consequential* are small and statistically insignificant, indicating no difference in answer behavior of our standard non-consequential elicitation from the consequential answers. These results mitigate concerns that that lack of direct consequentiality of survey answers may bias respondents' stated preferences for tuition.

5. Conclusions

While efficiency and equity considerations of different forms of higher education finance have been extensively studied, their political feasibility ultimately depends on whether they find political majorities, which is less clear a priori. We provide causal and representative evidence on how the provision of earnings information shapes the electorate's preferences for university tuition. We implement a series of experiments in five survey waves representative of the German electorate with a total of more than 15,000 responses.

Our experimental treatments show that information about the university earnings premium has a strong and significant effect on public preferences for charging tuition, turning a plurality against tuition into a plurality favoring tuition. By contrast, public preferences for tuition are unaffected by our information treatments on public costs of and unequal access to university. The treatment effect of earnings information is replicated in three separate representative surveys, insensitive to relative or absolute earnings information, stronger the lower respondents' initial guesses of graduate earnings, and persistent beyond the short-run survey setting. Treatment effects are quite general, with no significant differences across

sociodemographic subgroups or by political activity of respondents. However, two special interest groups – persons with a university entrance qualification and current university students – do not react significantly to the treatment.

At the most basic level, we provide proof of concept that provision of earnings information can affect public preferences for tuition. This calls for incorporating citizens' imperfect information into political economy models of higher education finance (e.g., De Fraja, 2001; Borck and Wimbersky, 2014). From a policy perspective, our results suggest that information campaigns might help to gather public support for reforming higher education finance. Since information imperfections among the public can yield suboptimal policies in democratic decision-making processes (Romer, 2003), such information provision might enhance welfare. While the electorate responds strongly to earnings information, our results indicate that information concerning budgetary and redistributive considerations may be of secondary relevance for opinion on tuition.

Recently soaring fiscal deficits in most OECD countries and the ensuing necessity for fiscal consolidation bring about the need to reconsider public education finance. This paper identifies earnings information as a relevant determinant of public support for reforms in this policy area. The German setting is particularly relevant for the external-margin question of whether or not to charge tuition, a discussion that regularly comes up in many countries including the United States. Obviously, the generalizability of our findings to other country contexts requires further research as they may depend on institutional and political circumstances. While acceptance of the principle of tuition may be higher in countries with longer experience of tuition, tuition levels seen as too high or rising too fast may still set upper limits to higher education finance reforms.

This paper covers how information on earnings and other economic aspects of higher education affect public preferences for tuition, but it does not address other potentially important determinants such as income-contingent payment designs (studied in our companion paper, Lergetporer and Woessmann, 2021), the usage of tuition revenues, or public provision of student aid. We consider the exploration of alternative settings and further determinants of public support for higher education finance schemes an important direction for future research.

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Figure 1: The effect of providing earnings information on public preferences for tuition
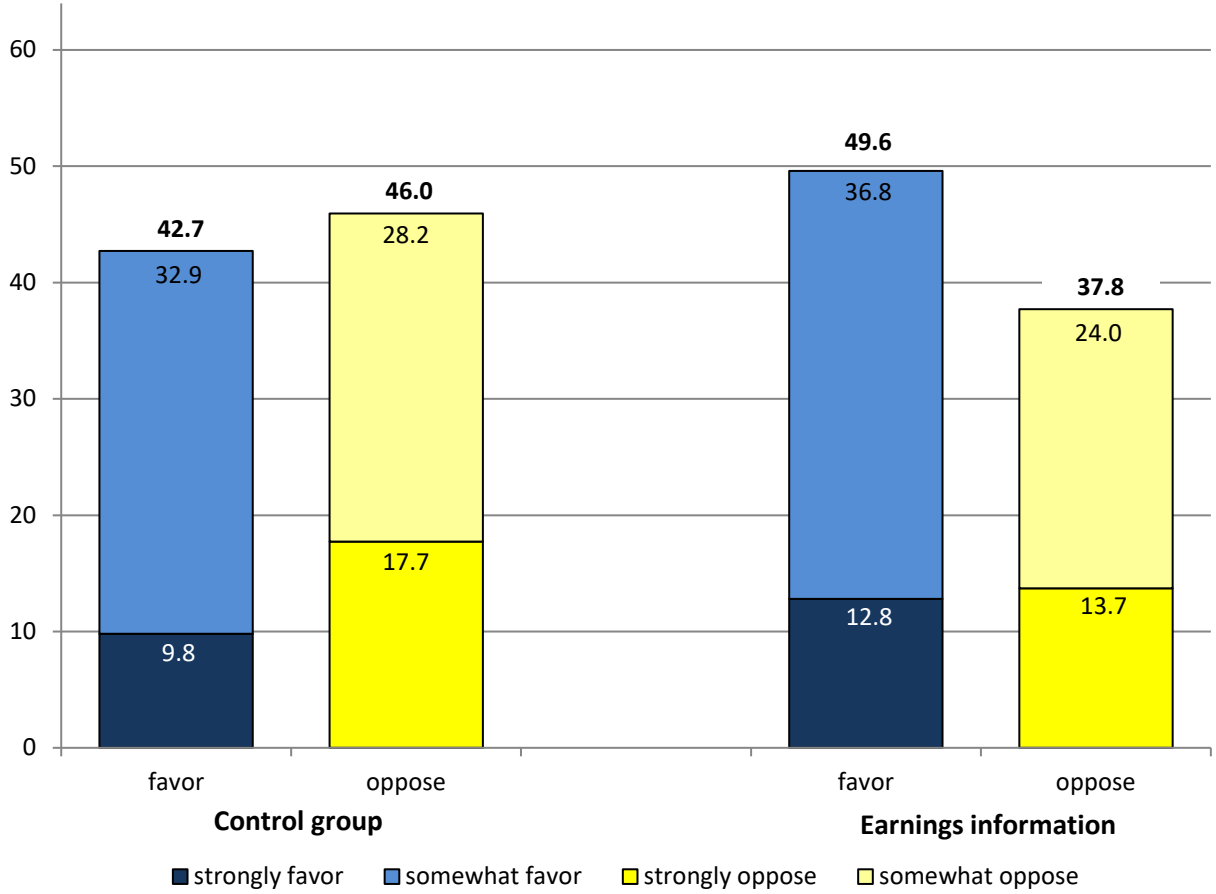
Notes: Residual category: "neither favor nor oppose." Data source: ifo Education Survey 2014, 2015, and 2017.

Table 1: Data structure: Survey waves, experimental groups, and numbers of observations

	Control group	Treatment groups			Total
	(1)	(2)	(3)	(4)	(5)
Wave 2014	1,032	*Earnings information (relative)* 1,030	*Cost information* 1,056	*Access information* 1,053	4,171
Wave 2015	1,390	*Earnings information (absolute)* 1,355			2,745
Wave 2016	781	*Level 500* 804	*Level 1500* 865		2,450
Wave 2017	2,075	*Earnings information (absolute)* 2,003			4,078
Wave 2020	1,050	*Consequential* 1,024			2,074
Total					15,518

Notes: Numbers of observations per group. Numbers include participants with missing responses on the tuition question. The total number of responses on the tuition question is 15,412 observations. See Appendix Table A2 for item non-response. Data source: ifo Education Survey 2014-2017 and 2020.

Table 2: Effects of providing information about earnings, costs, and access on preferences for tuition

	Support for tuition		Opposition against tuition	
	(1)	(2)	(3)	(4)
Earnings information	0.081***	0.083***	-0.089***	-0.091***
	(0.024)	(0.023)	(0.024)	(0.023)
Cost information	0.027	0.033	-0.003	-0.011
	(0.024)	(0.023)	(0.024)	(0.023)
Access information	-0.029	-0.012	0.038	0.021
	(0.023)	(0.023)	(0.024)	(0.023)
Covariates	No	Yes	No	Yes
Control mean	0.400	0.400	0.457	0.457
Observations	4,123	4,123	4,123	4,123
R^2	0.007	0.058	0.009	0.079

Notes: OLS regressions. *Earnings information, Cost information,* and *Access information*: experimental treatments in the survey experiment. Sample: Wave 2014. Dependent variable: Col. (1)-(2): Dummy variables 1 = "strongly favor" or "somewhat favor" tuition, 0 otherwise; col. (3)-(4): Dummy variables 1 = "strongly oppose" or "somewhat oppose" tuition, 0 otherwise. Residual category: "neither favor nor oppose." Control mean: mean of the outcome variable in the control group. Covariates include age, income, patience, altruism, and dummies for gender, born in Germany, living in a tuition state, city size, living with partner in household, parents' university degree, working in the education sector, highest educational attainment, professional degree, employment status, parent status, and political party preferences. Missing values of covariates are imputed; regressions with covariates include imputation dummies. Data source: ifo Education Survey 2014. Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table 3: Replicability of treatment effect of earnings information on preferences for tuition

	Support for tuition		Opposition against tuition	
	(1)	(2)	(3)	(4)
Earnings information	0.081***	0.084***	-0.089***	-0.091***
	(0.024)	(0.023)	(0.024)	(0.023)
Earnings information × Wave 2015	-0.024	-0.033	0.010	0.019
	(0.036)	(0.035)	(0.035)	(0.034)
Earnings information × Wave 2017	-0.010	-0.017	0.008	0.015
	(0.030)	(0.030)	(0.030)	(0.029)
Wave 2015	0.038	0.040	0.007	-0.001
	(0.025)	(0.025)	(0.025)	(0.025)
Wave 2017	0.033	0.036*	0.002	-0.005
	(0.021)	(0.021)	(0.021)	(0.021)
Covariates	No	Yes	No	Yes
Control mean	0.400	0.400	0.457	0.457
Observations	8,832	8,832	8,832	8,832
Clusters	7,830	7,830	7,830	7,830
R^2	0.001	0.048	0.001	0.064

Notes: OLS regressions. *Earnings information*: experimental treatment in the survey experiments. Sample: Waves 2014, 2015, 2017. Dependent variable: Col. (1)-(2): Dummy variables 1 = "strongly favor" or "somewhat favor" tuition, 0 otherwise; col. (3)-(4): Dummy variables 1 = "strongly oppose" or "somewhat oppose" tuition, 0 otherwise. Residual category: "neither favor nor oppose." Control mean: mean of the outcome variable in the control group in wave 2014. See notes to Table 2 for list of covariates. Data source: ifo Education Survey 2014, 2015, and 2017. Regressions weighted by survey weights. Robust standard errors (clustered at the individual level) in parentheses. Significance levels: *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table 4: Heterogeneous treatment effects by initial earnings beliefs (wave 2015)

	Support for tuition			Opposition against tuition		
	All	Sure about belief	Not sure about belief	All	Sure about belief	Not sure about belief
	(1)	(2)	(3)	(4)	(5)	(6)
Earnings information	0.126***	0.180**	0.101*	-0.109**	-0.139*	-0.088
	(0.047)	(0.084)	(0.055)	(0.046)	(0.079)	(0.054)
Belief (% of Actual)	0.042	0.033	0.045	-0.013	0.006	-0.023
	(0.026)	(0.046)	(0.031)	(0.025)	(0.045)	(0.030)
Earnings information × Belief	-0.066*	-0.107*	-0.049	0.038	0.064	0.022
	(0.034)	(0.058)	(0.041)	(0.033)	(0.055)	(0.040)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,682	750	1,932	2,682	750	1,932
R^2	0.056	0.130	0.053	0.072	0.139	0.072

Notes: OLS regressions. *Earnings information*: experimental treatment in the survey experiment. Sample: Control group and earnings information treatment group in wave 2015. Dependent variable: Col. (1)-(3): Dummy variables 1 = "strongly favor" or "somewhat favor" tuition, 0 otherwise; col. (4)-(6): Dummy variables 1 = "strongly oppose" or "somewhat oppose" tuition, 0 otherwise. Residual category: "neither favor nor oppose." Belief: continuous variable measuring the difference of the estimated earnings of university graduates from the actual earnings of those without a degree as a percentage of the actual earnings difference between the two groups (i.e., variable equals 1 if earnings differential is estimated correctly). Control mean: mean of the outcome variable in the control group. "Sure about belief": subgroup of respondents who were relatively sure that the stated belief is close to correct (choosing a value between 5 and 7 on a scale from 1 ("very unsure") to 7 ("very sure"). "Not sure about belief": respondents who chose a value between 1 and 4. Covariates include age, income, and dummies for gender, born in Germany, living in a tuition state, city size, living with partner in household, parents' university degree, working in the education sector, school education, university degree, university student status, employment status, parent status, political partisanship, voting behavior and considering education important for the vote choice. Missing values of covariates are imputed; regressions include imputation dummies. Data source: ifo Education Survey 2015. Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Table 5: Persistence of information treatment effects in a follow-up survey

	Beliefs			Support for tuition		Opposition against tuition	
	Too low	Correct	Too high				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Earnings information	-0.052***	0.122***	-0.070***	0.027	0.022	-0.054***	-0.046**
	(0.016)	(0.020)	(0.016)	(0.020)	(0.020)	(0.020)	(0.020)
Covariates	Yes	Yes	Yes	No	Yes	No	Yes
Control mean	0.222	0.563	0.216	0.437	0.437	0.478	0.478
Observations	2,362	2,362	2,362	2,363	2,363	2,363	2,363
R^2	0.089	0.046	0.062	0.001	0.066	0.003	0.085

Notes: OLS regressions. *Earnings information*: experimental treatment in the main survey. Sample: Wave 2017 (follow-up survey participants). Dependent variable: Col. (1)-(3): Dummy variables 1 = belief of graduate earnings is below, within, or above the correct range, respectively, where the correct range is defined by being within an interval of 20 percent below or above the true value, 0 otherwise; col. (4)-(5): Dummy variables 1 = "strongly favor" or "somewhat favor" tuition, 0 otherwise; col. (6)-(7): Dummy variables 1 = "strongly oppose" or "somewhat oppose" tuition, 0 otherwise. Control mean: mean of the outcome variable in the control group. Covariates include age, income, patience, risk tolerance, and dummies for gender, born in Germany, living in a tuition state, city size, living with partner in household, parents' university degree, working in the education sector, highest educational attainment, professional degree, employment status, parent status, political party preferences, and voting behavior. Missing values of covariates are imputed; regressions with covariates include imputation dummies. Data source: ifo Education Survey 2017. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Table 6: Heterogeneous treatment effects for different subgroups

	Treatment (omitted subgroup) (1)	Treatment-subgroup interaction (2)	
Sociodemographic characteristics			
Age 45-65	0.060*** (0.019)	× Age under 45	0.010 (0.028)
		× Age over 65	0.014 (0.034)
Male	0.065*** (0.019)	× Female	0.007 (0.026)
Born in Germany	0.070*** (0.013)	× Not born in Germany	-0.011 (0.056)
No tuition state	0.049** (0.022)	× Tuition state	0.028 (0.027)
Monthly household income below median	0.088*** (0.018)	× Income above median	-0.046* (0.026)
No partner in household	0.051** (0.021)	× Partner in household	0.030 (0.026)
Has parent(s) without university degree	0.081*** (0.015)	× Has parent(s) with university degree	-0.052* (0.028)
Not working in education sector	0.068*** (0.013)	× Works in education sector	0.009 (0.048)
Not full-time employed	0.077*** (0.016)	× Full-time employed	-0.021 (0.027)
Political activity and preferences			
Frequent voter	0.062*** (0.017)	× No frequent voter	0.020 (0.038)
Education important for vote choice	0.067*** (0.017)	× Education not important for vote choice	-0.005 (0.035)
No CDU partisan	0.070*** (0.015)	× CDU partisan	-0.009 (0.030)
Interest groups			
No school degree	0.112*** (0.022)	× Middle school degree	-0.044 (0.030)
		× University entrance qualification	-0.099*** (0.031)
No university degree	0.078*** (0.014)	× University degree	-0.063* (0.034)
No university student	0.074*** (0.013)	× University student	-0.116** (0.058)
No children	0.058*** (0.022)	× At least one child ≤ 18	0.028 (0.032)
		× All children > 18	0.010 (0.030)

Notes: Each row represents a separate OLS regression according to equation (2) that includes the experimental treatment *Earnings information* and its interaction term(s) with subgroup indicator(s). Dependent variable: Support for tuition (dummy variable 1 = "strongly favor" or "somewhat favor" tuition, 0 otherwise). Col. (1): Coefficient on *Earnings information*, reflecting the treatment effect in the respective omitted subgroup. Col. (2): Coefficient(s) on the interaction term(s) between *Earnings information* and the indicated subgroup indicator(s), reflecting the difference in the treatment effect between the omitted subgroup and the respective indicated subgroup. Sample: Waves 2014, 2015, 2017. Data source: ifo Education Survey 2014, 2015, and 2017. Regressions weighted by survey weights. Robust standard errors (clustered at the individual level) in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Table 7: Sensitivity of stated preferences to tuition levels and political consequentiality

Panel A: Levels of tuition

	Support for tuition		Opposition against tuition	
	(1)	(2)	(3)	(4)
Level 500	-0.033	-0.029	0.031	0.029
	(0.029)	(0.029)	(0.030)	(0.030)
Level 1,500	-0.117***	-0.111***	0.100***	0.091***
	(0.028)	(0.027)	(0.029)	(0.029)
Covariates	No	Yes	No	Yes
Control mean	0.424	0.424	0.460	0.460
Observations	2,426	2,426	2,426	2,426
R^2	0.010	0.055	0.007	0.058

Panel B: Consequentiality of survey answer

Consequential	0.029	0.033	-0.002	-0.004
	(0.024)	(0.023)	(0.024)	(0.023)
Covariates	No	Yes	No	Yes
Control mean	0.412	0.412	0.472	0.472
Observations	2,074	2,074	2,074	2,074
R^2	0.001	0.074	0.000	0.074

Notes: OLS regressions. *Level 500, Level 1500,* and *Consequential*: experimental treatments in the survey experiments. Sample: Waves 2016 (Panel A), 2020 (Panel B). Dependent variable: Col. (1)-(2): Dummy variables 1 = "strongly favor" or "somewhat favor" tuition, 0 otherwise; col. (3)-(4): Dummy variables 1 = "strongly oppose" or "somewhat oppose" tuition, 0 otherwise. Residual category: "neither favor nor oppose." Control mean: mean of the outcome variable in the control group. Covariates include age, income, patience, risk tolerance, and dummies for gender, born in Germany, living in a tuition state, city size (only in wave 2016), living with partner in household, parents' university degree, working in the education sector, highest educational attainment, professional degree, employment status, parent status, political party preferences, and voting behavior. Missing values of covariates are imputed; regressions with covariates include imputation dummies. Data source: ifo Education Survey 2017 and 2020. Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table A1: Wording of survey questions

Exp. group	English translation	German original
Control group *(all waves)*	Do you favor or oppose that students at German universities cover a part of the costs of their studies themselves by tuition?	Sind Sie dafür oder dagegen, dass Studierende, die an einer Universität oder Hochschule[a] in Deutschland studieren, einen Teil der Studienkosten durch Studiengebühren tragen?
Wave 2014		
Earnings information	University graduates earn about 40 percent more each year than persons with a vocational education (apprenticeship). Do you favor or oppose… (see Control)	Personen mit einem abgeschlossenen Studium verdienen Jahr für Jahr durchschnittlich rund 40 Prozent mehr als Personen mit einer beruflichen Ausbildung (Lehre). Sind Sie… (see Control)
Cost information	The federal government and the federal states currently spend about 8,600 Euro per student at a university each year. Do you favor or oppose… (see Control)	Bund und Länder geben derzeit im Durchschnitt jährlich rund 8.600 Euro für einen Studienplatz an einer Universität oder Hochschule aus. Sind Sie… (see Control)
Access information	About 75 percent of the children of parents with a university degree take up university studies, and about 25 percent of the children of parents without a university degree do so. This difference already existed before tuition was introduced in Germany. Do you favor or oppose… (see Control)	Von Kindern aus Akademikerfamilien nehmen etwa 75 Prozent ein Studium auf, von Kindern aus Nicht-Akademikerfamilien sind es etwa 25 Prozent. Diesen Unterschied gab es auch schon vor der Einführung von Studiengebühren in Deutschland. Sind Sie… (see Control)
Wave 2015		
Earnings information	On average, university graduates earn about 2,450 Euro net per month, persons with a vocational education (apprenticeship) earn about 1,850 Euro and persons without any degree earn about 1,400 Euro. Do you favor or oppose… (see Control)	Personen mit einem abgeschlossenen Studium verdienen durchschnittlich etwa 2.450 Euro netto im Monat, Personen mit abgeschlossener beruflicher Ausbildung (Lehre) etwa 1.850 Euro und Personen ohne abgeschlossene Ausbildung etwa 1.400 Euro. Sind Sie… (see Control)
Wave 2016		
Level 500 [1500]	Do you favor or oppose that students at German universities cover a part of the costs of their studies themselves by tuition of 500 [1,500] Euro per semester (half year)?	Sind Sie dafür oder dagegen, dass Studierende, die an einer Universität oder Hochschule in Deutschland studieren, einen Teil der Studienkosten durch Studiengebühren in Höhe von 500 [1500] Euro pro Semester (Halbjahr) tragen?
Wave 2017		
Earnings information	On average, university graduates earn about 2,750 Euro net per month, persons with a vocational education (apprenticeship) earn about 1,850 Euro and persons without any degree earn about 1,400 Euro. Do you favor or oppose… (see Control)	Personen mit einem abgeschlossenen Studium verdienen durchschnittlich etwa 2.750 Euro netto im Monat, Personen mit abgeschlossener beruflicher Ausbildung (Lehre) etwa 1.850 Euro und Personen ohne abgeschlossene Ausbildung etwa 1.400 Euro. Sind Sie… (see Control)
Wave 2020		
Consequential	Information: The average answers to the following question will be passed on to the state parliament politicians of your federal state after the survey has been completed. Your answer is therefore particularly important. Do you favor or oppose… (see Control)	Information: Die durchschnittlichen Antworten auf die nachfolgende Frage werden nach Abschluss der Befragung an die Landtagspolitiker*innen Ihres Bundeslandes weitergegeben. Ihre Antwort ist daher besonders wichtig. Sind Sie … (see Control)

Notes: Exp. group: experimental group to which the respective question is posed. Answer categories: strongly favor; somewhat favor; somewhat oppose; strongly oppose; neither favor nor oppose (Ich bin sehr dafür; eher dafür; eher dagegen; sehr dagegen; weder dafür noch dagegen). In the five waves, the questions were numbers 31, 27, 21, 27, and 3, respectively, of the ifo Education Survey. [a] Literal translation: "universities or universities of applied sciences."

Table A2: Summary statistics and balancing tests

	Control groups Mean					Wave 2014 Difference			Wave 2015 Difference	Wave 2016 Difference		Wave 2017 Difference	Wave 2020 Difference
	Wave 2014	Wave 2015	Wave 2016	Wave 2017	Wave 2020	Earnings info.	Cost info.	Access info.	Earnings info.	Level 500	Level 1500	Earnings info.	Conse-quential
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Age	51.00	49.40	50.11	49.57	44.08	-1.42	-0.55	-1.30	1.27	-1.11	0.19	1.87**	0.19
Female	0.50	0.53	0.51	0.51	0.49	0.01	0.01	0.03	-0.01	-0.01	-0.01	0.01	0.04*
Born in Germany	0.94	0.95	0.96	0.95	0.95	-0.00	0.01	0.01	0.00	-0.01	-0.01	-0.01	0.00
Tuition state	0.69	0.73	0.72	0.70	0.69	-0.02	0.02	0.05**	-0.03	-0.01	-0.04	0.02	0.04*
City size $\geq$ 100,000	0.33	0.32	0.31	0.32		0.01	-0.04*	-0.02	-0.00	0.02	0.05*	-0.01	
Monthly household income (€)	2,133	2,215	2,131	2,252	2,710	8.9	-37.3	-33.3	74.2	71.5	2.3	30.8	28.9
Partner in household	0.58	0.59	0.54	0.55	0.59	0.02	-0.01	-0.04	0.01	0.04	0.04	-0.01	0.03
Parent(s) with univ. degree	0.24	0.27	0.23	0.28	0.31	0.01	0.02	0.02	0.00	0.03	0.03	-0.02	0.00
Works in education sector	0.06	0.11	0.08	0.08	0.13	0.01	0.01	0.01	-0.02	0.01	-0.01	0.00	-0.01
Highest education attainment													
No degree/basic degree	0.40	0.39	0.38	0.37	0.32	0.02	-0.00	-0.00	-0.01	0.01	0.01	0.03	0.01
Middle school degree	0.32	0.31	0.32	0.31	0.29	-0.03	-0.01	-0.01	-0.00	-0.00	-0.04	-0.02	-0.01
Univ. entrance qualification	0.28	0.30	0.30	0.32	0.39	0.00	0.01	0.01	0.01	-0.01	0.02	-0.01	0.00
Professional degree													
No degree	0.10	0.13	0.14	0.09	0.10	0.01	-0.01	0.02	-0.04*	-0.04*	-0.01	0.02	-0.02
Vocational degree	0.72	0.70	0.70	0.71	0.66	0.00	-0.01	-0.02	0.03	0.01	0.00	-0.01	0.03
University degree	0.15	0.16	0.12	0.15	0.22	-0.01	0.01	0.01	-0.00	0.00	-0.00	-0.01	0.00
In training	0.07	0.06	0.06	0.09	0.05	0.01	0.02	0.01	-0.01	0.03	0.02	-0.01	0.00
University student	0.05	0.05	0.05	0.06	0.03	0.00	-0.00	0.01	-0.01	0.01	0.01	-0.00	0.00
Employment status													
Full-time employed	0.37	0.33	0.34	0.37	0.50	-0.04	-0.01	-0.03	0.04	0.03	0.01	-0.04**	-0.02
Part-time employed	0.09	0.13	0.15	0.12	0.15	0.03**	0.01	0.03**	-0.01	-0.02	-0.05***	-0.00	0.00

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Table A2 (continued)

	Control groups Mean					Wave 2014 Difference			Wave 2015 Difference	Wave 2016 Difference		Wave 2017 Difference	Wave 2020 Difference
	Wave 2014	Wave 2015	Wave 2016	Wave 2017	Wave 2020	Earnings info.	Cost info.	Access info.	Earnings info.	Level 500	Level 1500	Earnings info.	Conse-quential
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Self-employed	0.02	0.04	0.03	0.04	0.06	0.02**	0.01	0.02*	-0.00	0.01	0.02*	-0.00	-0.03**
Unemployed	0.07	0.07	0.06	0.05	0.04	-0.01	-0.02	-0.01	-0.03**	-0.00	-0.03**	-0.00	0.02
Parent status													
No children	0.37	0.32	0.43	0.43	0.46	0.02	0.01	0.01	0.00	-0.04	-0.03	-0.01	-0.02
At least one child ≤ 18	0.23	0.31	0.20	0.208	0.25	0.00	-0.02	-0.01	-0.02	0.01	0.01	-0.00	0.00
All children > 18	0.40	0.37	0.37	0.37	0.29	-0.02	0.01	0.00	0.01	0.03	0.01	0.02	0.02
Political party preference													
CDU	0.26	0.26	0.21	0.25	0.22	0.00	0.01	-0.04**	0.00	-0.01	-0.01	0.01	0.02
SPD	0.22	0.22	0.17	0.20	0.12	-0.02	-0.01	-0.01	-0.01	0.01	0.02	0.01	-0.00
Linke	0.05	0.08	0.08	0.08	0.09	0.01	0.01	0.01	0.01	-0.01	-0.02	-0.00	-0.01
Grüne	0.09	0.07	0.08	0.06	0.13	0.01	0.01	0.01	0.01	0.01	-0.01	-0.01	-0.00
Other	0.06	0.05	0.15	0.14	0.17	0.02*	0.00	0.01	-0.01	-0.00	0.00	-0.01	0.01
None	0.33	0.33	0.32	0.29	0.29	-0.02	-0.02	0.02	-0.00	-0.00	0.01	0.00	-0.02
Patience (11-point scale)	6.86		5.79	6.04	7.40	-0.29**	-0.14	-0.02		0.18	0.26	-0.09	-0.04
Altruism (11-point scale)	7.15					0.11	0.22*	0.14					
Risk tolerance (11-point scale)			4.24	4.27	5.43					0.07	0.10	-0.16*	-0.23*
Frequent voter		0.77	0.77	0.82	0.82				0.04*	-0.02	-0.00	-0.02	-0.00
Education important vote		0.72	0.75	0.74					-0.01	0.03	0.05**	-0.03*	
Non-response	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01	-0.00	0.00	0.01	0.00
Observations	1,032	1,390	781	2,075	1,050	1,030	1,056	1,053	1,355	804	865	2,003	1,024

Notes: Weighted group means. "Difference" displays the difference in means between the control group of the respective year and the treatment groups. Significance levels of "Difference" stem from linear regressions of the respective background variable on treatment dummies. Data source: ifo Education Survey 2014-2017, and 2020. Regressions weighted by survey weights. Significance levels: *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table A3: Effects of information provision on preferences for tuition: Detailed results by five answer categories

	Strongly favor (1)	Somewhat favor (2)	Neither favor nor oppose (3)	Somewhat oppose (4)	Strongly oppose (5)
Earnings information	0.027*	0.056**	0.008	-0.036*	-0.054***
	(0.016)	(0.022)	(0.017)	(0.021)	(0.017)
Cost information	0.000	0.033	-0.023	-0.007	-0.004
	(0.014)	(0.022)	(0.016)	(0.021)	(0.019)
Access information	-0.011	-0.001	-0.009	0.024	-0.003
	(0.014)	(0.022)	(0.017)	(0.022)	(0.019)
Covariates	Yes	Yes	Yes	Yes	Yes
Control mean	0.101	0.299	0.143	0.267	0.190
Observations	4,123	4,123	4,123	4,123	4,123
R^2	0.025	0.034	0.029	0.017	0.072

Notes: OLS regressions. Dependent variable: Dummy variables 1 = answer category given in respective table header, 0 otherwise. Control mean: mean of the outcome variable in the control group. Covariates include age, income, patience, altruism, and dummies for gender, born in Germany, living in a tuition state, city size, living with partner in household, parents' university degree, working in the education sector, highest educational attainment, professional degree, employment status, parent status, and political party preferences. Missing values of covariates are imputed; regressions with covariates include imputation dummies. Data source: ifo Education Survey 2014. Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table A4: Heterogeneous treatment effects by initial earnings beliefs (wave 2017)

	Support for tuition			Opposition against tuition		
	All	Sure about belief	Not sure about belief	All	Sure about belief	Not sure about belief
	(1)	(2)	(3)	(4)	(5)	(6)
Earnings information	0.059**	0.122**	0.048	-0.055**	-0.109*	-0.048
	(0.028)	(0.059)	(0.032)	(0.028)	(0.058)	(0.031)
Belief (% of Actual)	-0.014	0.003	-0.016	0.040***	0.004	0.047***
	(0.016)	(0.032)	(0.018)	(0.016)	(0.031)	(0.018)
Earnings information × Belief	0.019	-0.018	0.025	-0.027	0.030	-0.039
	(0.022)	(0.044)	(0.026)	(0.022)	(0.042)	(0.024)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,003	1,014	2,988	4,003	1,014	2,988
R^2	0.068	0.123	0.066	0.081	0.122	0.084

Notes: OLS regressions. *Earnings information*: experimental treatment in the survey experiment. Sample: Control group and earnings information treatment group in wave 2015. Dependent variable: Col. (1)-(3): Dummy variables 1 = "strongly favor" or "somewhat favor" tuition, 0 otherwise; col. (4)-(6): Dummy variables 1 = "strongly oppose" or "somewhat oppose" tuition, 0 otherwise. Residual category: "neither favor nor oppose." Belief: continuous variable measuring the difference of the estimated earnings of university graduates from the actual earnings of those without a degree as a percentage of the actual earnings difference between the two groups. Control mean: mean of the outcome variable in the control group. "Sure about belief": subgroup of respondents who were relatively sure that the stated belief is close to correct (choosing a value between 5 and 7 on a scale from 1 ("very unsure") to 7 ("very sure"). "Not sure about belief": respondents who chose a value between 1 and 4. Covariates include age, income, and dummies for gender, born in Germany, living in a tuition state, city size, living with partner in household, parents' university degree, working in the education sector, school education, university degree, university student status, employment status, parent status, political partisanship, voting behavior and considering education important for the vote choice. Missing values of covariates are imputed; regressions include imputation dummies. Data source: ifo Education Survey 2017. Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Table A5: Summary statistics and balancing tests: Follow-up survey

	Summary statistics by participation status		Balancing in follow-up survey	
	Non-participants	Participants	Control group	Treatment group
	Mean	Difference	Mean	Difference
	(1)	(2)	(3)	(4)
Age	40.13	6.70***	51.09	0.83
Female	0.58	-0.01***	0.52	-0.01
Born in Germany	0.94	0.01	0.96	0.01
Tuition state	0.66	0.01	0.72	0.00
City size ≥ 100,000	0.40	-0.04**	0.30	0.01
Monthly household income (€)	2,312	97.60*	2,302	35.89
Partner in household	0.57	0.02	0.57	0.01
Has parent(s) with university degree	0.34	-0.03**	0.26	-0.03
Works in education sector	0.10	-0.01	0.07	0.00
Highest education attainment				
No degree/basic degree	0.19	0.03**	0.39	0.00
Middle school degree	0.36	0.03**	0.31	0.01
University entrance qualification	0.45	-0.07***	0.3	-0.02
Professional degree				
No degree	0.07	-0.01	0.07	0.02*
Vocational degree	0.63	0.09***	0.77	-0.01
University degree	0.17	0.01	0.14	0.01
In training	0.18	-0.10***	0.06	-0.01
University student	0.14	-0.07***	0.04	0.00
Employment status				
Full-time employed	0.39	0.01	0.35	-0.02
Part-time employed	0.13	0.00	0.12	0.00
Self-employed	0.04	0.00	0.04	0.00

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Table A5 (continued)

	Summary statistics by participation status		Balancing in follow-up survey	
	Non-participants Mean (1)	Participants Difference (2)	Control group Mean (3)	Treatment group Difference (4)
Unemployed	0.05	0.00	0.05	-0.01
Parent status				
No children	0.55	-0.10***	0.40	-0.02
At least one child ≤ 18	0.23	-0.01	0.19	0.01
All children > 18	0.21	0.11***	0.41	0.00
Political party preference				
CDU	0.22	0.02	0.23	0.02
SPD	0.19	0.02	0.25	-0.02
Linke	0.08	0.01	0.08	-0.01
Grüne	0.07	-0.01	0.05	-0.01
Other	0.14	0.00	0.12	0.02
None	0.30	-0.03**	0.27	-0.01
Patience (11-point scale)	6.24	0.03	6.29	-0.06
Risk tolerance (11-point scale)	4.71	-0.37***	4.18	0.08
Frequent voter	0.76	0.07***	0.85	-0.02
Education important vote	0.78	-0.04***	0.72	-0.02
Observations	1,333	2,363	1,183	1,180

Notes: Unweighted group means. Col. (1) and (2) compare online respondents in wave 2017 by participation in the follow-up survey. Col. (3) and (4) compare respondents who participated in the follow-up survey by treatment status in wave 2017. "Difference" displays the difference in means between the respective groups. Significance levels of "Difference" stem from linear regressions of the respective background variable on group dummies. Data source: ifo Education Survey 2017. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Table A6: Who supports tuition?

	Dependent variable: Support for tuition	
	Bivariate regressions (1)	Multivariate regression (2)
Sociodemographic characteristics		
Age	0.002*** *(0.000)*	0.002*** *(0.001)*
Female	-0.075*** *(0.015)*	-0.068*** *(0.016)*
Born in Germany	0.090*** *(0.033)*	0.049 *(0.034)*
Tuition state	0.000 *(0.016)*	0.001 *(0.016)*
Monthly household income (1000 €)	0.008 *(0.005)*	0.004 *(0.006)*
Partner in household	0.027* *(0.016)*	0.011 *(0.017)*
Has parent(s) with university degree	-0.022 *(0.017)*	0.015 *(0.018)*
Works in education sector	0.011 *(0.028)*	0.043 *(0.028)*
Full-time employed	0.065*** *(0.016)*	0.057*** *(0.020)*
Part-time employed	-0.033 *(0.021)*	0.020 *(0.024)*
Self-employed	-0.060* *(0.036)*	-0.033 *(0.038)*
Unemployed	-0.066** *(0.033)*	-0.034 *(0.035)*
Political activity and preferences		
Frequent voter	0.043** *(0.021)*	0.015 (0.022)
Education important for vote choice	-0.034 *(0.022)*	-0.018 *(0.023)*
CDU partisan	0.095*** *(0.018)*	0.079*** (0.018)
Interest groups		
Middle school degree	0.049*** *(0.016)*	-0.000 *(0.019)*
University entrance qualification	-0.104*** *(0.016)*	-0.096*** *(0.025)*
University degree	-0.046** *(0.020)*	-0.014 *(0.025)*
University student	-0.186*** *(0.040)*	-0.056 *(0.045)*
At least one child ≤ 18	-0.012 *(0.017)*	-0.025 *(0.021)*
All children > 18	0.033** *(0.016)*	-0.049** *(0.023)*
Survey wave dummies	Yes	Yes
Constant	–	0.251*** *(0.058)*
Observations	6,297	6,297
R^2	–	0.037

Notes: OLS regression. Col. (1): Each cell represents the coefficient of a separate OLS regression. Col. (2) depicts one multivariate regression. Sample: Control group in waves 2014-2017, 2020. Dependent variable: Dummy variables 1 = "strongly favor" or "somewhat favor" tuition, 0 otherwise. Missing values of covariates are imputed; regressions include imputation dummies. Data source: ifo Education Survey 2014-2017, and 2020. Regressions weighted by survey weights. Robust standard errors (clustered at the individual level) in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.