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Abstract

We show that the electorate's preferences for using tuition to finance higher education strongly depend on the design of the payment scheme. In representative surveys of the German electorate ($N > 18,000$), experimentally replacing regular upfront by deferred income-contingent payments increases public support for tuition by 18 percentage points. The treatment turns a plurality opposed to tuition into a strong majority of 62 percent in favor. Additional experiments reveal that the treatment effect similarly shows when framed as loan repayments, when answers carry political consequences, and in a survey of adolescents. Reduced fairness concerns and improved student situations act as strong mediators.

JEL-Codes: H520, I220, D720.

Keywords: tuition, higher education finance, income-contingent loans, voting.

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1. Introduction

A high level of human capital is essential for individuals' economic success, economic growth, and the sustainability of public finances (e.g., Hanushek and Woessmann, 2008; Stantcheva, 2017). Therefore, policymakers' choices among alternative financing systems for higher education, which differ in the extent to which they yield equitable and efficient access, carry particular policy importance. Deferred income-contingent payment schemes are an alternative to regular upfront tuition in financing higher education. In the income-contingent design, payments are due only after graduation and must be paid only if income exceeds a certain threshold. Economists have repeatedly argued that income-contingent financing schemes – which are in place, e.g., in Australia, England, and New Zealand – have attractive efficiency and equity properties (e.g., Friedman, 1955; Barr, 2004; Chapman, 2006; Jacobs and van der Ploeg, 2006; Chapman, Higgins, and Stiglitz, 2014; Dynarski, 2014; Diris and Ooghe, 2018; Barr et al., 2019). In particular, optimal dynamic tax theory shows that income-contingent repayment schemes can lead the joint system of education finance and taxation to optimality by providing incentives for human capital accumulation while insuring against income risk (Findeisen and Sachs, 2016; Stantcheva, 2017). In the end, however, whether income-contingent tuition is implemented in the real world depends on the political-economy question whether voters support it. By alleviating fairness concerns and restrictions on student choices, the income-contingent design may raise voters' preferences for charging tuition compared to the more standard upfront design.

In this paper, we conduct a series of randomized experiments to study how the choice of a regular vs. income-contingent design of the payment scheme affects the electorate's support to finance higher education through tuition. In the control group, we elicit public preferences for regular upfront tuition. In the baseline treatment group, we experimentally change the tuition payment scheme to a deferred income-contingent design.

We implement our analysis in a total of seven annual surveys with over 18,000 observations. Each survey is representative of the German voting-age population in terms of age, gender, parental status, education, and region. Fierce public debate surrounded the introduction and quick abandonment of tuition in Germany between 2006 and 2014, but income-contingent payment schemes barely entered the debate. Apart from studying the causal effect of payment schemes on public preferences for tuition, we implement additional experiments to explore issues of loan aversion, political consequentiality, and underlying mechanisms. Our various survey implementations also allow us to address replicability of the baseline experimental

results, robustness in a within-subject design, and extensive treatment-effect heterogeneities. In addition, we field a separate survey of over 1,000 adolescents to study preferences of potential future university students.

The results of our baseline experiment indicate that designing tuition as income-contingent payments substantially increases support for tuition in the electorate. In the control group, a slight public plurality of 45.1 percent opposes regular upfront tuition and 44.0 percent favor it (the remainder is indifferent), indicating that the German public is strongly divided over whether or not to charge upfront tuition. The treatment that replaces the regular upfront design by a deferred income-contingent design raises support by 18.3 percentage points and reduces opposition by 18.8 percentage points. In the treatment group, a strong majority of 62.4 percent of the electorate favors income-contingent tuition and only 26.3 percent oppose it. The baseline finding consistently replicates in five separate experimental surveys.

While the experimental design allows for clean causal identification, in two separate surveys we implement a within-subject design that allows us to observe preferences for the two payment schemes within individuals. The descriptive within-subject results are very consistent with the experimental results and suggest that a quarter of the population opposes regular tuition while at the same time supporting income-contingent tuition.

In a separate experiment, we show that the treatment effect is robust to framing the income-contingent payment scheme in the form of student loans. Debt aversion plays a role in many economic contexts including higher-education decisions (e.g., Loewenstein and Thaler, 1989; Oosterbeek and van den Broek, 2009; Field, 2009; Abraham et al., 2020). While our baseline treatment frames the financing scheme as deferred tuition payments, the literature often discusses upfront tuition payments combined with so-called income-contingent loans (ICLs) that involve the initial accumulation of debt. In an alternative experimental treatment, we frame the income-contingent form of tuition payoff-equivalently as tuition that is being paid in the form of income-contingent student loans, making it highly salient that the scheme involves the initial take-up of loans. The estimated treatment effect is virtually identical to the baseline treatment. This result indicates that the preferences for income-contingent tuition are not affected by loan aversion and that respondents understand the underlying payment schemes and the intertemporal deferral of payment obligations.

In another separate experiment, we show that the treatment effect carries through to a setting where we attach political consequences to the survey answers. Public-opinion surveys have immense policy relevance (e.g., Blinder and Krueger, 2004; Hager and Hilbig, 2020). Still, a general potential concern with the use of stated preferences is that survey responses may be

susceptible to reporting bias as they do not have immediate consequences (e.g., Carson, 2012; Kling et al., 2012). To validate our outcome measure, we experimentally inform respondents that average answers will be passed on to the responsible politicians in their state parliaments. Thus augmenting respondents' perceptions about the political consequentiality of their survey answers does not significantly change stated preferences for upfront tuition or deferred income-contingent tuition, preserving the large effect of the income-contingency treatment.

Subgroup analyses indicate that the treatment effect is particularly strong for groups who are likely to be represented in the political process. Politically active respondents (i.e., frequent voters and those who consider education topics important for their vote choice) and special interest groups (i.e., those with a university entrance qualification and parents) respond more strongly to the treatment, which provides additional relevance from a political-economy perspective. By contrast, treatment effects are quite homogeneous across various sociodemographic subgroups of the population.

The literature discusses various mechanisms why voters may prefer income-contingent payment schemes. If poor families are credit constrained, upfront tuition will deter their children from going to university (e.g., Carneiro and Heckman, 2002; Lochner and Monge-Naranjo, 2011). Deferred payment schemes that depend on students' future income streams alleviate such equity concerns. If future earnings streams are uncertain, income-contingent payment schemes also act as an insurance mechanism that encourages risky human capital investment (e.g., Findeisen and Sachs, 2016; Stantcheva, 2017). In addition, the uncertainty of earnings expectations may be larger in some occupations than in others, restricting students' choice of subjects. A potential concern about income-contingent financing schemes is that they may require more sophisticated administration (e.g., Chapman, 2016). Income-contingent schemes may also have fiscal disadvantages compared to upfront schemes if some expenses cannot be recouped. In another experimental setup, we devise a battery of statements that allow us to experimentally test these various mechanisms.

Results of our mechanism analysis suggest that equity concerns and eased student situations are important reasons why people prefer income-contingent over upfront tuition. By far the biggest treatment effect on a mediator is that income contingency raises the share of respondents who perceive that people from poor families can afford to go to university despite tuition by 32.2 percentage points compared to upfront tuition. In addition, respondents are less likely to perceive income-contingent tuition as (i) unfair, (ii) deterring people from studying, (iii) restricting students' choice of subject and occupation, and (iv) increasing risk of indebtedness. By contrast, administrative and fiscal reasons do not seem to play a role. In a mediation analysis,

about half of the overall income-contingency treatment effect on preferences for tuition can be attributed to the considered mediators, with altered fairness concerns accounting for more than one third.

Finally, we show that income contingency also has a strong treatment effect on adolescents. As stakeholders in the education system, future voters, and potential future university students whose higher-education decisions are directly affected by financing schemes, adolescents are a specific population group with strong self-interests that plays a particular role in shaping higher education policy. To test whether the design of the payment scheme affects their preferences for tuition, we conduct a special survey of adolescents aged 14-17 years. While adolescents have much higher baseline opposition against regular upfront tuition (62.9 percent), the income-contingency treatment reduces this opposition by 16.6 percentage points, doing away with the majority opposition. The treatment effect among adolescents is thus very similar to the voting-age population. It is particularly large for those adolescents who expect to go to university, who are much more likely to oppose upfront tuition but not income-contingent tuition.

Our paper contributes to the literature on financing schemes for higher education. Income-contingent payment schemes can increase both efficiency and equity by alleviating credit constraints and insuring against future income risk (e.g., Barr, 2004; Chapman, 2006; Jacobs and van der Ploeg, 2006; Chapman, Higgins, and Stiglitz, 2014; Dynarski, 2014; Findeisen and Sachs, 2016; Stantcheva, 2017; Diris and Ooghe, 2018; Barr et al., 2019). To date, however, there is no empirical evidence on how the design of tuition payment schemes affects the political feasibility of charging tuition. We advance the literature on the human capital, equity, and fiscal implications of tuition schemes with a political-economy perspective, stressing the large effect that financing schemes have on the electorate's preferences.

Thereby, we also contribute to the literature on the political economy of education. Political economy models study which population subgroups prefer public vs. private financing schemes (e.g., Fernandez and Rogerson, 1995; Epple and Romano, 1996; De Fraja, 2001; Glomm, Ravikumar, and Schiopu, 2011). Incorporating the choice among different financing schemes in political economy models, Borck and Wimbersky (2014) study theoretically the political support for income-contingent compared to other payment schemes. While these models tend to stress the opposing preferences of different population subgroups, our empirical results suggest that income-contingent payment schemes are preferred quite universally in the population. Quite generally, there is almost no empirical – and especially experimental – knowledge about the determinants of electoral majorities for tuition and the political economy of higher education finance. As an exception, our companion paper (Lergetporer and

Woessmann, 2021) studies experimentally whether information on the university earnings premium affects public preferences for regular tuition (but does not study deferred income-contingent tuition or tuition payment schemes more generally). With our focus on education finance policies (as well as the expansion from adults to adolescents), we also extend the experimental literature on the public's preferences in various policy areas (e.g., Cruces, Perez-Truglia, and Tetaz, 2013; Kuziemko et al., 2015; Bursztyn, 2016; Alesina, Stantcheva, and Teso, 2018; Lergertporer et al., 2018, 2020; Haaland and Roth, 2020, 2021; Settele, 2021; see Haaland, Roth, and Wohlfart, 2021 for a survey).

The paper is structured as follows. Section 2 describes the institutional background, experimental setup, and empirical strategy. Section 3 presents our baseline results and various extensions. Section 4 analyzes potential underlying mechanisms. Section 5 presents results for adolescents. Section 6 concludes.

2. Background, Study Setup, and Empirical Strategy

This section describes the institutional background (section 2.1), our opinion survey (section 2.2), the experimental design of the baseline experiment (section 2.3), the empirical model (section 2.4), and the balancing of treatment groups (section 2.5).

2.1 Institutional Background

Germany's higher education system is mostly made up of public universities that are funded by the states. After a federal constitutional ban on tuition had been lifted, seven of the sixteen states introduced tuition of mostly 500 Euro per semester in the mid-2000s (see Bietenbeck, Marcus, and Weinhardt, 2020). All seven states were run by a conservative government. The introduction of tuition was met by nationwide student protests and controversial legal and political debates with high media coverage (e.g., Dwenger, Storck, and Wrohlich, 2012). The topic played a prominent role in the campaigns of the subsequent election in all states.¹ In the face of major public opposition, all states abandoned tuition within a few years, often as the first reform of a new administration after the tuition-introducing government got voted out of office in the next election (e.g., Kauder and Potrafke, 2013).

¹ On 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 September 21, 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 September 21, 2021].

During the existence of tuition, students had to pay the tuition upfront while attending university. The concept of deferred income-contingent payment schemes did not play a major role in the public debate. The same is true for the experiences of prime examples of higher education finance systems where tuition is deferred through income-contingent loans such as Australia, England, and New Zealand (for details see, e.g., Chapman, 2016; Barr et al., 2019; Murphy, Scott-Clayton, and Wyness, 2019).²

2.2 The Opinion Survey

Our analyses are implemented in seven waves of the ifo Education Survey (2014-2020), an annual opinion survey on education policy that we conducted in Germany. Each wave was carried out between April and July of the respective year and covered a nationally representative sample of the German voting-age population (18 years and older).³ Each year, respondents were asked to answer about 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 (formerly TNS Infratest, waves 2014-2019) and Respondi (wave 2020) who have access to nationally representative panels of adults. In the first four waves, stratified sampling was administered in two steps 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). From wave 2018 on, the survey mode switched to fully online after extensive analysis revealed that representativeness for the entire population could be achieved through re-weighting the online sample accordingly (Grewenig et al., 2018).

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

² A related concept – income share agreements where tuition is paid as a percentage of later income – has been adopted, e.g., by Purdue University and an online learning start-up that raised major funding (New York Times, January 8, 2019, www.nytimes.com/2019/01/08/business/dealbook/education-student-loans-lambda-schools.html [accessed September 21, 2021]).

³ Wave 2020 covered the population aged 18 to 69 years.

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 wave included an item asking respondents about their preferences for university tuition. To experimentally study the effects of tuition payment schemes on participants' responses, respondents were randomly split into control and treatment groups. To ensure representativeness in each experimental group and sufficient power to detect economically relevant 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 15,590 observations in the treatment and controls groups of the randomized experiments in the adult population studied in this paper over the seven waves, plus 3,107 additional observations in the within-subject design. As item non-response is very low at around 1 percent on average,⁴ the overall sample size is 18,647 responses to the tuition questions.⁵

In wave 2018, we additionally conducted a separate adolescent survey with 1,085 respondents which we describe in greater detail in section 5.1 below.

2.3 Design of the Baseline Experiment

This section describes our baseline experimental design which implements a treatment about income contingency of tuition payments. In specific survey waves, we implement a series of additional analyses – a within-subject design, an additional experimental treatment on loan framing, an experimental validation with political consequentiality, and an analysis of mechanisms – which we describe in the respective sections below.

To test whether the design of the tuition scheme affects preferences for tuition, we devised a survey experiment that randomly assigns survey participants to a control group and a treatment group. 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.

In the control group, we elicited preferences for regular upfront tuition with the following question: “Do you favor or oppose that students at German universities cover a part of the costs

⁴ 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).

⁵ The 18,647 observations come from 16,080 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).

of their studies themselves by tuition?”⁶ Respondents could pick one of five answer categories: strongly favor, somewhat favor, neither favor nor oppose, somewhat oppose, and strongly oppose.⁷

In the treatment group, respondents were asked whether they favor or oppose downstream, income-contingent tuition. Specifically, the question reads: “In other countries, there is tuition that is due only after graduation, when the former students earn income. Tuition has to be paid only if their annual income exceeds a certain threshold. Do you favor or oppose that students at German universities cover a part of the costs of their studies themselves by this alternative form of tuition?”

The experimental setting allows us to investigate whether preferences for tuition depend on whether tuition is designed as regular upfront payments or as deferred income-contingent payments. In contrast to regular tuition, income-contingent tuition was never introduced in Germany, and there were no major public debates about it. To convey that income-contingent tuition is a realistic policy option, we referred respondents to the fact that this form of tuition is in place in other countries.⁸

We first implemented the baseline experiment in wave 2015. Acknowledging the importance of replication to foster credibility of economic research (e.g., Maniadis et al., 2014), we implemented the same design again in waves 2016 and 2018-2020.

2.4 Empirical Model

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

$$y_i = \alpha + \beta T_i + \lambda' Z_i + \varepsilon_i \quad (1)$$

⁶ To keep the questions on tuition as simple and general as possible, they did not specify the level of tuition. In Lergetporer and Woessmann (2021), we experimentally show that respondents have the level of 500 Euro per semester (i.e., the level charged in Germany before the abolition of tuition by 2014) in mind when they indicate their preferences for regular upfront tuition.

⁷ Appendix Table A1 shows the wording of the different survey items. 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).

⁸ Since we did not refer to other countries in the control group, a potential concern is that the effect of the income-contingency treatment might be driven by the reference to other countries. We consider this possibility unlikely for two reasons. First, the question did not name any specific country but simply indicated that “other countries” have this form of tuition. Second, this concern relies on the unrealistic assumption that respondents are not aware of the fact that regular tuition is charged in other countries.

where y_i is individual i 's preference for tuition, T_i is an indicator of whether individual i was in the treatment group, Z_i is a vector of control variables, and ε_i is an error term that is uncorrelated with all right-hand-side variables. The parameter of interest is β , which represents the average treatment effect on preferences for tuition. Because of random assignment to the experimental groups, additional control variables are not required to identify the causal treatment effect. Nevertheless, their inclusion may increase the precision of estimates.⁹

To analyze heterogeneity of the treatment effect across different subgroups of the population, we extend our basic regression model to:

$$y_i = \alpha + \beta_1 T_i + \beta_2 S_i + \beta_3 T_i S_i + \lambda' Z_i + \varepsilon_i \quad (2)$$

where S_i equals one if respondent i is member of the respective subgroup and zero 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.

2.5 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. Columns 1-7 of Appendix Table A2 present means of observable characteristics for the control groups in the different waves. Columns 8-15 report coefficients and significance levels of regressions of the form

$$C_i = \alpha + \gamma T_i + \varepsilon_i \quad (3)$$

for each covariate C_i and each experiment separately.

It is reassuring that only 11 out of 264 regressions (4.2 percent) yield a coefficient γ 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.

3. Results

This section presents our experimental results on how a deferred income-contingent design of the tuition payment scheme affects public support for tuition. We show our baseline results and their replicability (section 3.1), report analyses within individual subjects (section 3.2),

⁹ 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 observations with missing covariates are dropped (results available upon request).

study how support for income-contingent tuition depends on the absence or use of a loan framing (section 3.3), validate that stated preferences are not biased by lack of political consequentiality (section 3.4), and provide evidence on heterogeneous treatment effects (section 3.5). The subsequent sections 4 and 5 turn to analyses of mechanisms and preferences of adolescents, respectively.

3.1 Baseline Results and Replication

Our baseline experiment studies whether the public’s preferences for whether or not students should cover part of the university costs themselves depends on the regular vs. deferred income-contingent design of tuition payments. The control group is asked about their preferences for the regular form of tuition that is paid upfront when students attend university. The treatment group is asked about their preferences for income-contingent tuition where payments are deferred until the former students earn sufficient income.

Table 2 shows the estimated effects of designing tuition as deferred income-contingent payments on preferences for tuition based on equation (1). 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.”¹⁰ Estimates in columns 1 and 3 do not include covariates, whereas columns 2 and 4 include standard covariates as listed in the table notes.

Control-group results indicate that the German population is divided about charging upfront tuition, with a slight plurality against it. In the first experimental wave (2015), 43.8 percent of respondents in the uninformed control group favor tuition and 46.4 percent oppose tuition (see control mean in Table 2); the remaining 9.8 percent are undecided.

The experimental treatment shows that designing tuition as deferred income-contingent payments substantially increases public support, turning the plurality against tuition into a strong majority of the electorate in favor of tuition. The income-contingency treatment raises support for tuition by 15.3 percentage points in wave 2015 (column 1 of Table 2). Concurrently, opposition against tuition declines by 15.8 percentage points (column 3).

The results replicate very closely in four other representative samples in waves 2016, 2018, 2019, and 2020. By stacking the control and treatment groups of the five waves, Table 2 allows

¹⁰ 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).

for a direct comparison of results across waves. Support for regular tuition in the control group does not differ significantly across the waves. The income-contingency treatment effect is almost identical in the first three waves and (marginally) significantly larger in the final two waves. Baseline level and treatment effects on opposition against tuition are also similar across waves, with the treatment effect in the final three waves slightly (but not significantly) larger. The replicability indicates that the highly significant effect of the income-contingency treatment on preferences for tuition does not reflect a false-positive result but rather the true causal effect of the treatment on public preferences (see Maniadis et al., 2014).

Figure 1 shows the pooled results of the experiment across the five waves. On average, the income-contingent design increases support for tuition by 18.3 percentage points and reduces opposition by 18.8 percentage points. The treatment turns a plurality opposing tuition in the regular design into a strong majority favoring tuition in the income-contingent design. On average, 62.4 percent of participants are in favor of having tuition that is due only after graduation and only if the former students earn income above a certain threshold. Only 26.3 percent of the population oppose this form of tuition.

Inspection of treatment effect estimates on each of the five underlying answer categories indicates that the income-contingency treatment shifts strongly held preferences for and against tuition as well as less strongly held preferences. Results using the full preference elicitation on a five-point scale in Appendix Table A3 indicate that public opinion is shifted throughout the spectrum.

3.2 Within-Subject Design

To compare preferences for the two tuition payment schemes within individuals, in two other waves (2014 and 2017) we elicited preferences for upfront tuition and for income-contingent tuition in two separate consecutive questions. The question on income-contingent tuition is placed on a separate screen directly after eliciting preferences for regular tuition. Both questions are worded identically to the questions used in the experimental treatments of the other waves. While the experimental treatment in the five waves considered so far (2015, 2016, and 2018-2020) allows us to estimate treatment effects of the upfront vs. income-contingent tuition designs, the within-subject setup allows us to perform within-respondent comparisons of preferences for upfront and income-contingent tuition. As this consecutive and non-experimental elicitation could in principle bias responses on the second question, e.g., if there is preference for giving consistent answers (e.g., Falk and Zimmermann, 2013), the main analysis so far was restricted to the experimental elicitations in the other waves.

Table 3 shows the distribution of individuals' preference profiles for the two types of tuition. Overall, a majority of 64.2 percent of respondents favor income-contingent tuition in this setting, compared to 41.5 percent favoring regular tuition. The non-experimental elicitation of preferences for income-contingent tuition after eliciting preferences for regular tuition thus provides similarly large support for income-contingent tuition as in the experimental elicitation in the other five waves. In fact, support in the non-experimental setting is slightly higher, suggesting that prior consideration of regular tuition might induce a few participants to look more positively at income-contingent tuition (although wave effects may also play a role).

The main diagonal of Table 3 reveals that the majority of respondents (55.2 percent) has the same preferences for both types of tuition. The areas off the main diagonal indicate that only 9.2 percent are more supportive of regular than income-contingent tuition, whereas 35.7 percent are more supportive towards the latter. The biggest difference comes from 25.2 percent of respondents who oppose regular tuition but are in favor of income-contingent tuition.

Waves 2014 and 2017 also include an experiment that provides a treatment group with information on the university earnings premium (studied in our companion paper, Lergetporer and Woessmann, 2021). The earnings information is provided on the survey screen that elicits preferences for regular tuition, and preferences for income-contingent tuition are elicited on the next survey screen (the within-subject analysis in Table 3 is based on the control groups that did not receive any information). The consecutive elicitation of preferences for regular and income-contingent tuition allows us to estimate the causal effect of the earnings information treatment on preferences for income-contingent tuition.¹¹ Results shown in Appendix Table A4 do not suggest that the earnings information treatment has a noteworthy effect on preferences for income-contingent tuition. Preferences for income-contingent tuition thus seem less malleable to providing information on relative earnings than preferences for regular tuition.

3.3 Loan Framing

While the income-contingent version of tuition entails an intertemporal deferral of payments, the baseline formulation of the income-contingency treatment does not include an explicit reference to loans. Income-contingent tuition is characterized as a deferred payment, rather than as an upfront payment obligation combined with taking up an income-contingent

¹¹ The analysis requires the assumption that respondents memorize the information provided on the prior survey screen when answering the subsequent question on income-contingent tuition. This assumption seems reasonable because the effects of the earnings information treatment on knowledge of the earnings information and on preferences for regular tuition persist in a follow-up survey two weeks later (Lergetporer and Woessmann, 2021).

loan (ICL) with an equivalent repayment scheme (as implemented in Australia, England, and New Zealand). While these two characterizations refer to equivalent payment schemes, public preferences may differ between the two characterizations if people are subject to loan aversion (e.g., Loewenstein and Thaler, 1989; Oosterbeek and van den Broek, 2009; Field, 2009; Abraham et al., 2020). It is often suggested that Germans may have a particularly strong aversion to taking up loans.¹²

To test whether preferences for income-contingent tuition depend on loan aversion, we devised another experiment in wave 2018 that assigned participants to one of three experimental groups. The design of the control group and the first treatment group are the same as in the baseline experiment. Thus, respondents in the first treatment group were asked about income-contingent tuition using a wording that did not refer to loans but indicated a deferred payment of tuition. In the second treatment group, respondents were asked effectively the same question as in the first treatment group, but in a version that framed this form of tuition payoff-equivalently as tuition that is being paid in the form of income-contingent student loans: “In other countries, there is tuition that is being paid in the form of interest-free student loans. Loan repayments are due only after graduation, when the former students earn income. The student loans only have to be paid if their annual income exceeds a certain threshold.” By explicitly referring to “loans” three times, this alternative treatment aims to test whether loan aversion affects results.

Results indicate that the strong appeal of income-contingent tuition is unaffected by making its debt aspect salient through the loan framing that explicitly refers to loan repayment requirements. Table 4 shows that the loan-framing treatment has virtually the identical effect on public support for tuition as the baseline income-contingency treatment. Even across the five underlying answer categories, there are no statistically significant differences between the two treatment groups (results available upon request). Thus, the majority appeal of income-contingent tuition is unaffected by making its debt aspect salient through an explicit loan framing, indicating that respondents understand the underlying payment schemes and the intertemporal deferral of payment obligations. This finding is particularly interesting in light of the relevance that debt aversion seems to have for students’ preferences for income-contingent loan repayment schemes (see Abraham et al., 2020, for survey evidence from undergraduates at the University of Maryland).

¹² For examples, see BBC, February 13, 2015, www.bbc.com/news/business-31369185 [accessed September 21, 2021] or Handelsblatt, January 26, 2018, www.handelsblatt.com/today/opinion/germans-and-money-germanys-investment-culture-has-the-makings-of-a-social-and-financial-crisis/23580894.html [accessed September 21, 2021].

3.4 Political Consequentiality

Our baseline results are based on stated preferences for tuition. A general concern with using stated preferences as outcome measures is that they may be susceptible to reporting bias because they carry no immediate political consequences (e.g., Carson, 2012; Kling et al., 2012). Reassuringly, some papers in the literature have validated self-reported survey responses with actual political behavior such as donating money or signing petitions (e.g., Alesina, Miano, and Stantcheva, 2018; Grigorieff, Roth, and Ubfal, 2020; Haaland, Roth, and Wohlfart, 2021; Settele, 2021).

In the spirit of this strand of research, we conducted another experiment in wave 2020 to examine whether our experimental results on preferences for tuition hold when survey answers carry political consequences. We randomly assigned respondents to one of four experimental groups. The control group and the first treatment group answered the questions about preferences for regular and income-contingent tuition, respectively, in the same way as in the baseline experiment. In the other two experimental groups, respondents were first informed on a separate screen that their aggregate answers would be passed on to their state-parliament politicians. After receiving this information, they stated their preferences for regular and income-contingent tuition, respectively. This two-by-two experimental design does not only provide causal evidence on how increasing political consequentiality affects the *level* of stated preferences for regular and income-contingent tuition, respectively. It also reveals how political consequentiality affects the income-consistency treatment effect, i.e., the *difference* in public preferences for the two types of tuition. After the survey was completed, we informed each of the 157 education-policy spokespersons in all state parliaments by email about the share of survey respondents favoring regular and income-contingent tuition (details available upon request).

Table 5 shows that attaching political consequences to the survey responses does not affect stated preferences for regular and income-contingent tuition or the difference between the two. Among respondents asked about regular upfront tuition, the consequentiality treatment slightly increases preferences for regular tuition by an insignificant three percentage points. The income-contingency treatment effects without and with political consequentiality are very similar at 22.1 and 20.5 percentage points, respectively, and the difference is not statistically significant ($p > 0.48$, post-estimation Wald test). These results alleviate concerns that the lack of immediate political consequences of responses to the tuition questions in the baseline

experiment could lead to reporting biases and thereby produce a distorted picture of true underlying preferences for tuition.¹³

3.5 Subgroup Analysis: Sociodemographics, Political Activity, and Interest Groups

Next, we test whether the substantial average effect of the income-contingency treatment on preferences for tuition masks important heterogeneities across subgroups of respondents. We study the extent to which treatment effects vary by sociodemographic characteristics and then focus in particular on politically active respondents and members of interest groups, as their preferences may be especially relevant for the political feasibility of implementing tuition reforms.

To set the stage for the heterogeneity analysis, we first provide descriptive evidence on how preferences for tuition vary by background characteristics. Appendix Table A5 presents OLS regressions of support for regular and income-contingent tuition on respondents' characteristics using the stacked data of all waves. Each cell in columns 1 and 3 presents the coefficient of a bivariate regression of preferences for the respective form of tuition on the respective characteristic, and columns 2 and 4 each present a multivariate regression that includes all characteristics simultaneously. Starting with preferences for regular tuition as dependent variable in columns 1 and 2, partisans of the conservative party (CDU) which had introduced tuition in Germany are more likely to support tuition (see columns 1 and 2). Furthermore, individuals with a university entrance qualification (i.e., potential students), current university students, and to a lesser extent also university graduates and parents are less supportive, suggesting the relevance of pecuniary self-interest in explaining preferences for tuition. Furthermore, males, those working in the education sector, and full-time employees are more likely to support regular tuition.

The correlational patterns are rather similar when considering preferences for income-contingent tuition in columns 3 and 4, although some interesting differences stand out. Again, CDU partisans are more likely to prefer this form of tuition, and current university students and university graduates are less likely to support income-contingent tuition. The association between holding a university entrance qualification and support for tuition is much smaller for income-contingent than regular tuition. In contrast to regular tuition, frequent voters are more

¹³ Relatedly, recent research shows that experimenter-demand effects are largely absent in survey experiments (Mummolo and Peterson, 2019; Grewenig et al., 2021) and in experiments on economic preferences (de Quidt, Haushofer, and Roth, 2018).

likely to support income-contingent tuition. In addition, support for income-contingent tuition is positively associated with age and full-time employment.

To investigate treatment-effect heterogeneities across different subgroups, Table 6 reports regression results based on equation (2). Column 1 depicts the main treatment effects for the respective omitted subgroup (i.e., β_1 of equation (2)), and column 2 depicts the coefficients on the treatment-subgroup interaction (i.e., β_3 of equation (2)). Depending on the respective characteristic, the sample is split into two or three subgroups.

Treatment effects are positive and significant in each subgroup considered in column 1 of Table 6, and only six of the 19 interaction terms are statistically significant at the 5 percent level (see column 2). This pattern suggests that the income-contingency effect reported in the previous sections is rather general and not due to extreme reactions of subgroups with certain sociodemographic characteristics.

At the same time, the table reveals some interesting heterogeneities. From a political-economy perspective, it is noteworthy that treatment effects are significantly larger for respondents who are politically active, i.e., frequent voters and respondents who consider education topics important for their voting decision. As these subgroups are more likely to be represented in the political process, this result indicates the political feasibility of implementing income-contingent tuition.

Turning to special interest groups, we find that treatment effects are significantly larger for persons who hold a university entrance qualification and for parents with children aged above 18 years.¹⁴ Special interest groups like these may invest resources to influence voting outcomes in their favor (e.g., Grossman and Helpman, 2001), which implies that they may play a particular role in determining higher education finance (Glomm, Ravikumar, and Schioppa, 2011). Furthermore, younger respondents (below age 45) respond less strongly to the treatment, whereas women respond slightly more strongly.

The heterogeneity analysis supports the finding that replacing regular upfront payments with deferred income-contingent payments fosters the political feasibility of charging tuition. Beyond the higher average support for income-contingent tuition in the population, the treatment particularly affects the preferences of politically active subgroups that may play a crucial role in the policy-making process. Still, the heterogeneity analyses should be interpreted

¹⁴ There are relatively few current university students (who would have to pay tuition if it was introduced) in the sample, leading to very imprecise subgroup estimates.

with caution, as statistical power to identify subgroup heterogeneity is somewhat limited despite the large sample size.

4. Analysis of Mechanisms

This section studies *why* people prefer deferred income-contingent tuition to regular upfront tuition. We describe our experimental survey design to examine possible mechanisms through which the income-contingency treatment operates (section 4.1), present treatment effects on the mediator variables (section 4.2), and use a mediation analysis to decompose the overall income-contingency effect into shares attributed to different mediators (section 4.3).

4.1 Experimental Design

To explore possible reasons for the difference in support for the regular upfront tuition payment scheme and the deferred income-contingent scheme, we devised a battery of statements in wave 2019 to measure variables that might act as mediators. We again randomly divided respondents between a control group and the income-contingency treatment group. On a first survey screen, we elicited their preferences for tuition using the same design as in the baseline experiment. On a subsequent survey screen, respondents were asked to provide their assessment of a battery of nine different statements about tuition. Respondents in the control group assessed statements about regular upfront tuition; respondents in the treatment group assessed the same statements about deferred income-contingent tuition. Guided by the theoretical literature on differences between regular and income-contingent repayment schemes (e.g., Chapman, Higgins, and Stiglitz, 2014; Barr et al., 2019), we study three sets of possible mechanisms for why respondents may favor income-contingent tuition.

The first set of factors relates to fairness concerns. Upfront tuition may discourage children from poor families from attending university when credit constraints are binding (e.g., Carneiro and Heckman, 2002; Lochner and Monge-Naranjo, 2011). Because deferred income-contingent tuition depends on students' future income streams, it alleviates such concerns. To capture such types of fairness concerns, we elicited respondents' agreement with the following three statements: "Also people from poorer families can afford to study despite tuition." "Tuition is unjust." "Through tuition, future high earners contribute to the costs of studying." For each these (and the following) statements, respondents could pick one of five answer categories: fully true, rather true, neither nor, rather not true, and not true at all.

The second set of factors refers to concerns about tuition-induced distortions in (prospective) students' human-capital investment decisions. Income-contingent payment

schemes encourage human-capital investment because they act as an insurance mechanism against uncertainty of future earnings (e.g., Findeisen and Sachs, 2016; Stantcheva, 2017). In contrast, regular tuition can increase students' risk of debt, restrict their choices of study subject and careers to higher-paying occupations to repay tuition debt, or even discourage people from studying altogether. The three statements that measure concerns about (prospective) students' educational choices are as follows: "Tuition deters people from studying." "Tuition restricts students' choice of subject and profession." "Tuition increases the risk of students getting into debt."

The third set of factors refers to administrative and fiscal considerations. One potential criticism of income-contingent tuition is that it may be harder to administer (e.g., Chapman, 2016). In addition, there may be fiscal disadvantages compared to regular tuition if some expenses cannot be recouped (e.g., because graduates move abroad), which may also mitigate positive effects of tuition revenues on university quality. We measure these concerns by asking respondents to assess the following statements: "Tuition is difficult for the state to administer." "Through tuition, the state is relieved of financial burden." "Tuition income enables universities to improve their quality."¹⁵

4.2 Treatment Effects on Potential Mediators

A necessary condition for variables to act as mediators is that they must be significantly affected by the treatment. As a first step, we therefore study the extent to which the income-contingency treatment affects respondents' assessments of the battery of statements about tuition.

Results in Table 7 show that the public perceives income-contingent tuition as fairer and less detrimental for (prospective) students than regular tuition. Most strikingly, while only 33.0 percent in the control group think that people from poorer families can afford to study despite regular upfront tuition, this share increases by 32.2 percentage points in the treatment group that considers deferred income-contingent tuition (column 1). That is, a key difference in the perception between the regular and the income-contingent design of tuition is that the share of the public who expect that tuition makes studying impossible for the poor roughly doubles to

¹⁵ To shed some light on how the design of the repayment scheme affects preferred tuition levels – another determinant of the fiscal impact of charging tuition – we asked two additional randomly selected subgroups of respondents about their preferred maximum tuition level. Among those who do not oppose tuition in the first place, the median response in the control group is 300 Euro of regular upfront tuition per semester. In the treatment group, the median is significantly higher at 500 Euro of deferred income-contingent tuition per semester ($p < 0.01$; detailed results available upon request). This indicates that income-contingent payment schemes also raise the fiscal scope of tuition, as the public accepts higher levels of tuition in the deferred income-contingent design.

two thirds in the latter case. Asking directly about fairness, the share of those who consider tuition as unjust almost halves by 18.6 percentage points when considering income-contingent tuition (column 2). And while agreement that tuition makes future high earners contribute to the costs of their studies is already high for regular tuition at 70.4 percent, this increases even further by 6.2 percentage points when specifying income-contingent tuition (column 3).

Focusing on perceived tuition effects on (prospective) students, majorities of control-group respondents think that regular tuition deters people from studying (column 4), restricts students' choice of subject and profession (column 5), and increases the risk of student indebtedness (column 6). These shares are substantially reduced by 14.1 to 16.2 percentage points in the treatment group that considers income-contingent tuition.

By contrast, there are no marked differences in how the two types of tuition are perceived to affect the government. Perceptions about administrative difficulties (low at 26.5 percent, column 7) and relieve of government financial burden (high at 65.8 percent, column 8) are not statistically or economically significantly affected by the income-contingency treatment. Perceptions that tuition enables universities to improve their quality are somewhat higher by 7.8 percentage points for income-contingent than for regular tuition, but both are on a high level (column 9).

Overall, this analysis suggests that reduced concerns of adverse effects on fairness and (prospective) students may be important mechanisms by which the income-contingent design of the payment scheme increases public support for tuition.¹⁶ It is remarkable that respondents' perceived advantages of income-contingent tuition, such as lower risk of deterring (poor) students or of student indebtedness, are very much in line with early arguments in favor of income-contingent payment schemes (e.g., Friedman, 1955). At the same time, the public does not seem to share the concern that deferred repayment options are harder to administer (e.g., Barr et al., 2019).

4.3 Mediation Analysis

We can use these results on treatment effects on mediators to conduct a mediation analysis to quantify the share of the overall income-contingency treatment effect on preferences for tuition that can be attributed to these mediators. We follow the approach developed by Heckman, Pinto, and Savelyev (2013) and Heckman and Pinto (2015) which decomposes the

¹⁶ Appendix Table A6 shows that respondents' perceptions about tuition are meaningfully associated with their preferences for regular and income-contingent tuition.

overall treatment effect into a share explained by k observed mediator variables and a remaining share attributed to unobserved mediators.

Assuming that the outcome can be expressed as a linear combination of mediator variables and sociodemographic control variables, the approach extends the baseline estimation model from equation (1) to:

$$y_i = \alpha + \beta^{residual}T_i + \sum_k \theta^k M_i^k + \lambda'Z_i + \varepsilon_i \quad (4)$$

where $\beta^{residual}$ represents the treatment effect not explained by changes in the observed mediators. Thus, the share of the treatment effect that is explained by the combined changes in the observed mediators is given by $1 - \beta^{residual}/\beta$ (with β from equation (1)).¹⁷ To calculate the share of the overall treatment effect attributable to the k^{th} mediator, the approach multiplies the treatment effect on the respective mediator (reported in Table 7) by the mediator's association with the outcome θ^k and divides by the overall treatment effect β . The relevance of a mediator thus depends both on how strongly it is affected by the treatment and on how strongly it is related to the outcome.

Table 8 depicts the results of the mediation analysis, focusing on the seven mediators that are significantly affected by the income-contingency treatment. By far the most important set of mediators are fairness concerns. Panel A considers each mediator separately. Agreement with the statements (i) that people from poor families can afford to study despite tuition, (ii) that tuition is unjust, and (iii) that tuition makes future high earners contribute account for 36.0 percent, 21.8 percent, and 8.0 percent of the overall income-contingency treatment effect, respectively (columns 1-3). Perceived tuition effects on (prospective) students – whether it deters people from studying, restricts students' choices, or increases their debt risk – are also relatively important, accounting for 12.7 to 13.7 percent each (columns 4-6). In contrast, perceptions that tuition improves universities' quality are relatively less important, accounting for only 8.0 percent.

Considering all mediators jointly in Panel B shows that changes in fairness concerns account for 34.9 percent of the overall treatment effect, changes in concerns about (prospective) students for 11.7 percent, and changes in perceptions about the effects of tuition on university quality for 4.3 percent. All mediators together thus account for 50.9 percent of the income-contingency effect on preferences for tuition, which is a substantial share for a mediation analysis given limits to observing mediators.

¹⁷ The implicit assumption in this setup is that all potential unobserved mediators subsumed in the error term are orthogonal to the included mediator and control variables.

5. Experimental Investigation of Adolescents

While it is the adult population that votes for politicians who implement different policies, chosen payment schemes directly affect future university students. Therefore, the preferences of adolescents may be particularly relevant in shaping higher education policy not only because of their active role as current stakeholders in the education system, future voters, and potential protesters against tuition, but also because their decisions whether or not to pursue a higher education may be affected by the tuition design.

5.1 The Adolescent Survey and Experimental Design

To study the effect of tuition payment schemes on the political preferences of adolescents, we conducted a separate representative survey of adolescents. Fielded in 2018 as an online survey, it comprises 1,085 respondents who are representative of the German population aged 14 to 17 years. The recruitment of adolescents was operationalized in two ways. First, 318 adolescents who were registered at online-access panels were recruited directly. Second, 767 adolescents were recruited indirectly via their parents who were registered at online panels. These parents were first asked for their permission to survey their adolescent child, and, if accepted, received a survey link to be shared with their child.¹⁸ The adolescent survey contains 28 questions (see also Lergetporer, Werner, and Woessmann, 2021), and median response time was 14 minutes. The adolescent sample is weighted using official statistics on age, gender, region of residence, and municipality size.

There are two randomly chosen experimental groups in the adolescent survey. The control group received the same control-group question on regular tuition as in the adult sample. The treatment group received the question on income-contingent tuition with a slightly simplified wording to ease comprehension, describing income-contingent tuition as follows: “In other countries, there is tuition that has to be paid only after graduation – and only if the former students earn enough money.”

Appendix Table A7 presents descriptive statistics and shows that observable characteristics are balanced across experimental groups. Of the adolescents, 57 percent expect to earn a university entrance qualification and 52 percent expect to earn a university degree. These

¹⁸ We implemented plausibility checks of age and birth date to assure that children and not their parents answered the survey. In case of failure to provide consistent answers, respondents were exited from the survey. Reassuringly, our results do not differ qualitatively by recruitment mode, which suggests that our polling was successful (results available upon request).

majorities would be affected by higher education finance reforms, making adolescents a highly relevant focus group.

5.2 Results for Adolescents

Adolescents' baseline support for tuition is considerably lower than in the adult population. Table 9 shows that a clear majority of 62.9 percent of adolescents in the control group opposes regular tuition. Only 26.6 percent of adolescents favor regular tuition. Consistent with our finding that (potential) students are generally less supportive of tuition (see section 3.5), the low support for tuition in the adolescent control group again suggests the importance of potential students' pecuniary self-interest as a determinant of preferences for tuition.

Intriguingly, changing to an income-contingent payment design has almost the same treatment effect among adolescents as it has among adults. The income-contingency treatment increases support for tuition among adolescents by 14.0 percentage points (compared to 15.4 percentage points in the adult sample in the 2018 wave) and reduces opposition by 16.6 percentage points. This highly significant effect reduces the majority opposing regular tuition into a plurality of 46.3 percent opposing income-contingent tuition (40.6 percent in favor; 13.1 percent indifferent). The treatment effect is insensitive to the inclusion of covariates (column 2 and 4) and operates through shifting both strongly and weakly held preferences (see Panel B of Appendix Table A3).¹⁹

Subgroup analysis reveals that pecuniary self-interest, clearly visible for regular tuition, does not carry over to income-contingent tuition. Unsurprisingly, adolescents who expect to obtain a university degree are less likely to support tuition (see Appendix Table A8, columns 1 and 2). Interestingly, though, support for income-contingent tuition does not differ significantly across these adolescent subgroups (columns 3 and 4). By implication, estimates of treatment effect heterogeneity indicate that the income-contingency treatment is substantially larger for adolescents who expect to go to university (column 5). Additional treatment heterogeneities include a smaller effect for adolescents whose mother is employed and a larger effect (marginally significant) for adolescents who state that they are strongly interested in politics.

In sum, the overall pattern of preferences for regular versus income-contingent tuition in the adult population is also prevalent among adolescents. While – similar to university students in the adult sample – adolescents are much more opposed to regular tuition, the income-

¹⁹ The large income-contingency treatment effect on adolescents contrasts with the finding that providing information about the university earnings premium does not affect (potential) university students' support for regular tuition (see Lergetporer and Woessmann, 2021).

contingency treatment substantially increases their preferences for tuition, eliminating the majority opposition against tuition in the control group. Thus, the design of the tuition payment scheme is a key determinant of tuition preferences among the particularly important focus group of adolescents.

6. Conclusions

For more than six decades, economists have advocated deferred income-contingent financing schemes of higher education on efficiency and equity grounds (e.g., Friedman, 1955; Barr et al., 2019): Compared to regular upfront tuition, they do not deter children of credit-constrained families from going to university, act as insurance against income risk, and still ensure that graduates who reap the private financial benefits of their university degree repay part of the public costs of their studies.

In this paper, we add a political-economy dimension to the analysis by demonstrating that income-contingent schemes are strongly favored by the electorate and are therefore politically more feasible. Which payment schemes are implemented by policymakers ultimately depends on the electorate's preferences. We conduct randomized experiments in seven representative German adult surveys and an additional adolescent survey with a total of almost 20,000 observations to investigate how the design of the payment scheme shapes the electorate's preferences for tuition.

Our results provide robust evidence that designing tuition as deferred income-contingent rather than regular upfront payments has a profound effect on its public appeal. Public opinion on upfront tuition is divided, with a slight plurality opposed. Designing tuition instead as deferred payments that depend on future income has a large treatment effect of 18.3 percentage points. Thus, tuition has strong majority support of 62.4 percent if it is charged after graduation and only if future income exceeds a certain threshold. The large income-contingency treatment effect replicates in five representative adult survey waves as well as in an adolescent survey, and it materializes with the same magnitude even in a loan framing that makes loan repayment requirements highly salient and even if political consequences are attached to the answers.

The mechanisms behind the large treatment effect on public support lie in the very features of the income-contingent tuition scheme emphasized in recent economic research. Our mediation analysis suggests that a substantial part of the overall treatment effect on preferences for tuition can be attributed to the fact that respondents perceive income-contingent tuition as fairer than regular tuition, ensuring that also children from poor families can afford to go to

university. Perceptions that the income-contingent payment scheme is less detrimental to (prospective) students also play a role.

Many countries around the world struggle with soaring fiscal deficits, not least because of the economic challenges posed by the Covid-19 pandemic. Our results suggest that policymakers may have some room for reforming the financing of higher education – a major public expenditure item – *if* the tuition scheme is designed as deferred income-contingent repayments. The political and public controversies over charging university tuition in the past decades (see Lergetporer and Woessmann, 2021) make Germany particularly relevant for studying public preferences for tuition. Obviously, the generalizability of our findings to other country settings requires further research as they may depend on institutional and political circumstances. At the same time, our result that reductions in fairness concerns and in perceived adverse effects on students are potential mechanisms why the income-contingent design is politically more feasible than regular tuition provides some indication how results may generalize to other contexts.

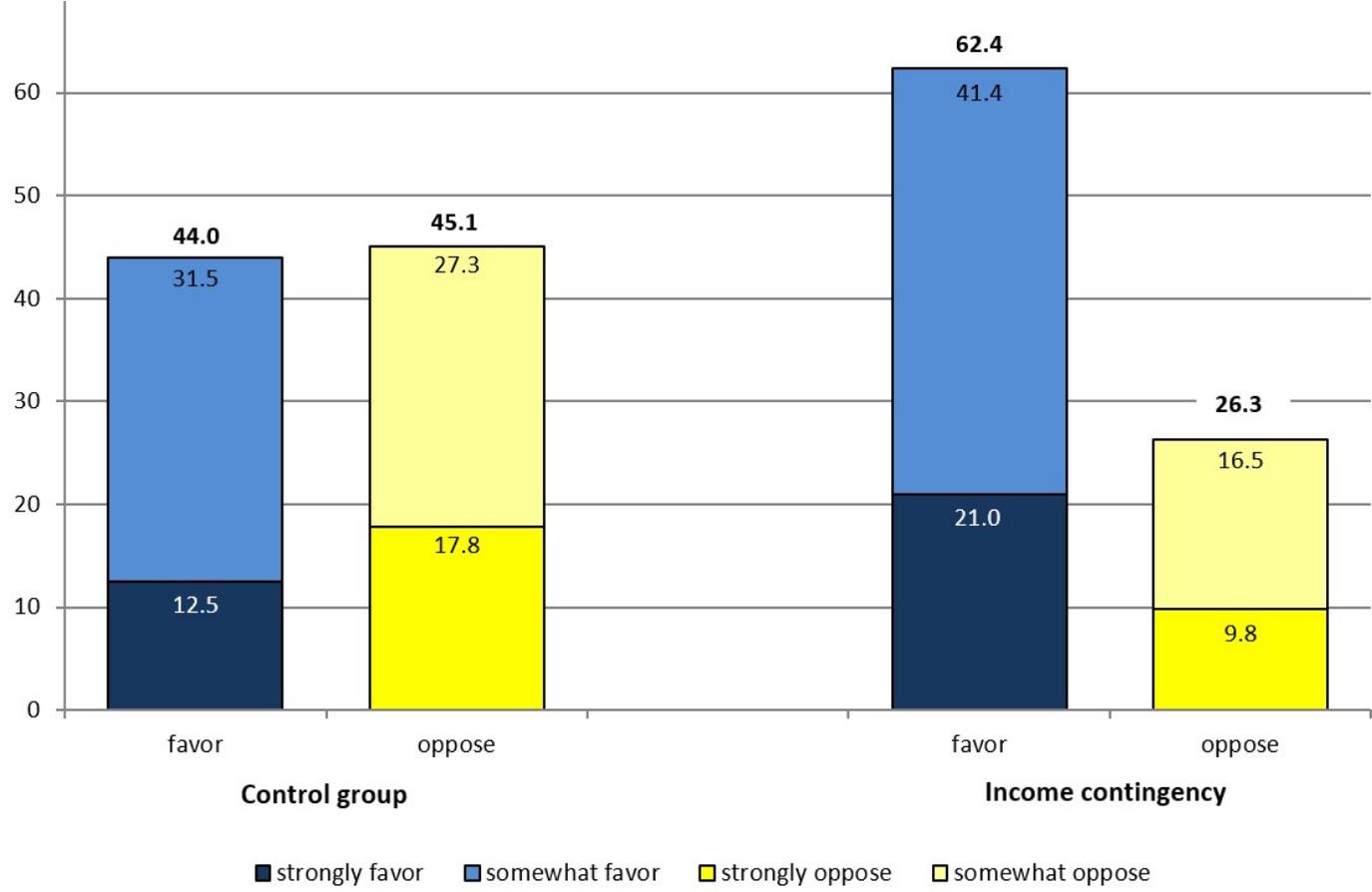
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Figure 1: The effect of deferred income-contingent payment schemes on public preferences for tuition



Notes: Control group: preferences for regular upfront tuition. Income-contingency treatment group: preferences for deferred income-contingent tuition (scheme of deferred payments charged only if future income exceeds a threshold). Residual category: “neither favor nor oppose.” Data source: ifo Education Survey 2015, 2016, and 2018-2020.

Table 1: Data structure

Analysis and wave	Control group (regular tuition) (1)	Treatment group (income contingency) (2)	Total (3)
<i>Baseline experiment</i>			
2015	1,390	1,360	2,750
2016	781	852	1,633
2018	1,036	1,005	2,041
2019 (incl. mechanism experiment)	2,013	1,996	4,009
2020	1,050	1,055	2,105
Total baseline experiment	6,270	6,268	12,538
<i>Within-subject design</i>			
2014	1,032		
2017	2,075		
Total	3,107		3,107
<i>Loan-framing experiment</i>			
2018		Loan framing: 970	970
<i>Consequentiality experiment</i>			
2020	Consequential: 1,024	Consequential: 1,058	2,082
Total adult sample			18,697
<i>Experiment in adolescent survey</i>			
2018	525	560	1,085
Total sample			19,782

Notes: Numbers of observations per experimental group. Numbers include participants with missing responses on the tuition question. The total number of responses on the tuition question is 19,732 observations (18,647 adult observations and 1,085 adolescent observations). See Appendix Table A2 for item non-response. Data source: ifo Education Survey 2014-2020.

Table 2: The effect of deferred income-contingent payment schemes on preferences for tuition

	Support for tuition		Opposition against tuition	
	(1)	(2)	(3)	(4)
Income contingency	0.153*** (0.026)	0.149*** (0.026)	-0.158*** (0.026)	-0.153*** (0.025)
Income contingency × Wave 2016	-0.000 (0.040)	0.004 (0.039)	-0.007 (0.039)	-0.013 (0.038)
Income contingency × Wave 2018	0.001 (0.042)	0.011 (0.041)	-0.033 (0.040)	-0.043 (0.040)
Income contingency × Wave 2019	0.062* (0.034)	0.068** (0.033)	-0.049 (0.032)	-0.059* (0.032)
Income contingency × Wave 2020	0.068* (0.035)	0.071** (0.034)	-0.048 (0.034)	-0.054 (0.033)
Wave 2016	-0.014 (0.028)	-0.008 (0.028)	-0.003 (0.028)	0.001 (0.028)
Wave 2018	0.033 (0.029)	0.021 (0.029)	-0.011 (0.029)	0.003 (0.029)
Wave 2019	0.007 (0.024)	0.000 (0.024)	-0.037 (0.024)	-0.026 (0.024)
Wave 2020	-0.026 (0.025)	-0.028 (0.025)	0.008 (0.025)	0.014 (0.025)
Covariates	No	Yes	No	Yes
Control mean	0.438	0.438	0.464	0.464
Observations	12,504	12,504	12,504	12,504
R ²	0.036	0.059	0.042	0.066

Notes: OLS regressions. *Income contingency*: experimental treatment in the survey experiment. Sample: control groups and income-contingency treatment groups in waves 2015, 2016, and 2018-2020. 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 2015. Covariates include age, income, and dummies for gender, born in Germany, living in a tuition state, 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 2015-2020. Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Table 3: Within-subject comparison of preferences for regular and income-contingent tuition

	Income-contingent tuition			Total (4)
	Support (1)	Neutral (2)	Oppose (3)	
Regular tuition				
Support	0.334	0.024	0.057	0.415
Neutral	0.057	0.071	0.011	0.139
Oppose	0.252	0.048	0.147	0.447
Total	0.642	0.143	0.215	1.000

Notes: Sample: control groups in waves 2014 and 2017. Shares of respondents who support, oppose, or are neutral towards tuition (weighted group means). Data source: ifo Education Survey 2014, 2017.

Table 4: The effect of loan framing on preferences for income-contingent tuition

	Support for tuition		Opposition against tuition	
	(1)	(2)	(3)	(4)
Income contingency	0.154*** (0.032)	0.160*** (0.032)	-0.191*** (0.031)	-0.191*** (0.030)
Loan framing	0.150*** (0.032)	0.146*** (0.031)	-0.197*** (0.030)	-0.192*** (0.029)
Covariates	No	Yes	No	Yes
Control mean	0.472	0.472	0.453	0.453
Observations	3,011	3,011	3,011	3,011
R^2	0.022	0.059	0.039	0.066

Notes: OLS regressions. *Income contingency* and *Loan framing*: experimental treatments in the survey experiment. Sample: wave 2018. 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, 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 2018. Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Table 5: Assigning political consequentiality to survey responses

	Support for tuition		Opposition against tuition	
	(1)	(2)	(3)	(4)
Consequential	0.029 (0.024)	0.033 (0.023)	-0.002 (0.024)	-0.005 (0.023)
Income contingency	0.221*** (0.023)	0.221*** (0.023)	-0.206*** (0.022)	-0.206*** (0.022)
Income contingency + Consequential	0.205*** (0.023)	0.211*** (0.023)	-0.184*** (0.022)	-0.191*** (0.022)
Covariates	No	Yes	No	Yes
Control mean	0.412	0.412	0.472	0.472
Observations	4,187	4,187	4,187	4,187
R^2	0.040	0.078	0.041	0.085

Notes: OLS regressions. *Consequential*, *Income contingency*, and *Income contingency + Consequential*: experimental treatments in the survey experiment. Sample: wave 2020. 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, and dummies for gender, born in Germany, living in a tuition state, 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 2020. Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Table 6: Subgroup analysis

	Treatment (omitted subgroup) (1)		Treatment-subgroup interaction (2)
<i>Sociodemographic characteristics</i>			
Age 45-65	0.217*** (0.015)	× Age under 45	-0.090*** (0.024)
		× Age over 65	0.009 (0.031)
Male	0.159*** (0.017)	× Female	0.045** (0.023)
Born in Germany	0.166*** (0.052)	× Not born in Germany	0.017 (0.053)
No tuition state	0.213*** (0.020)	× Tuition state	-0.044* (0.024)
Monthly household income below median	0.170*** (0.016)	× Income above median	0.026 (0.023)
No partner in household	0.170*** (0.019)	× Partner in household	0.022 (0.024)
Has parent(s) without university degree	0.188*** (0.014)	× Has parent(s) with university degree	-0.020 (0.025)
Not working in education sector	0.187*** (0.012)	× Works in education sector	-0.051 (0.038)
Not full-time employed	0.190*** (0.015)	× Full-time employed	-0.020 (0.023)
<i>Political activity and preferences</i>			
Frequent voter	0.194*** (0.013)	× No frequent voter	-0.066** (0.030)
Education important for vote choice	0.197*** (0.015)	× Education not important for vote choice	-0.080*** (0.029)
No CDU partisan	0.179*** (0.013)	× CDU partisan	0.009 (0.028)
<i>Interest groups</i>			
No school degree	0.149*** (0.020)	× Middle school degree	0.036 (0.028)
		× University entrance qualification	0.071*** (0.028)
No university degree	0.178*** (0.013)	× University degree	0.024 (0.029)
No university student	0.183*** (0.012)	× University student	-0.035 (0.068)
No children	0.146*** (0.019)	× At least one child < 18	0.018 (0.029)
		× All children > 18	0.091*** (0.027)

Notes: Each row represents a separate OLS regression according to equation (2) that includes the experimental income-contingency treatment 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 *Income contingency*, reflecting the treatment effect in the respective omitted subgroup. Col. (2): coefficient(s) on the interaction term(s) between *Income contingency* and the indicated subgroup indicator(s), reflecting the difference in the treatment effect between the omitted subgroup and the respective indicated subgroup. Data source: ifo Education Survey 2015-2020. 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.

Table 7: Potential mechanisms: Effects of income-contingent payment schemes on perceptions about tuition

	Agreement to statements relating to ...								
	... fairness concerns			... (prospective) students			... government and universities		
	Despite tuition, poor can afford to study (1)	Tuition is unjust (2)	Tuition makes high earners contribute (3)	Tuition deters people from studying (4)	Tuition restricts choice of subject (5)	Tuition increases debt risk (6)	Tuition is hard to administer (7)	Tuition relieves state finance (8)	Tuition improves university quality (9)
Income contingency	0.322*** (0.027)	-0.186*** (0.026)	0.062** (0.025)	-0.153*** (0.029)	-0.162*** (0.028)	-0.141*** (0.029)	0.017 (0.026)	-0.005 (0.028)	0.078*** (0.027)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control mean	0.330	0.418	0.704	0.532	0.508	0.595	0.265	0.658	0.609
Observations	1,991	1,991	1,991	1,991	1,991	1,991	1,991	1,991	1,991
R ²	0.148	0.075	0.061	0.061	0.089	0.057	0.049	0.031	0.051

Notes: OLS regressions. *Income contingency*: experimental treatment in the survey experiment. Sample: control group and income-contingency treatment group in wave 2019 (randomly chosen subsamples). Dependent variable: dummy variables 1 = respective statement is “fully true” or “rather true”, 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 2019. Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Table 8: Mediation analysis: Share of income-contingency treatment effect attributed to mediators

	Share of treatment effect attributed to ...							
	... fairness concerns			... (prospective) students			... universities	... all channels jointly
	Despite tuition, poor can afford to study (1)	Tuition is unjust (2)	Tuition makes high earners contribute (3)	Tuition deters people from studying (4)	Tuition restricts choice of subject (5)	Tuition increases debt risk (6)	Tuition improves university quality (7)	
Panel A: Entered separately								
Share attributed to observed factor	0.360	0.218	0.080	0.127	0.137	0.136	0.080	
Panel B: Entered jointly								
Share attributed to observed factor	0.191	0.106	0.052	0.021	0.030	0.067	0.043	
		0.349			0.117		0.043	0.509
Share left to unobserved factors								0.491

Notes: Share of the income-contingency treatment attributed to the respective mediator (using the mediation approach of Heckman, Pinto, and Savelyev, 2013). Panel A: contributions of the different mediators considered separately; Panel B: contributions of the different mediators considered jointly. Data source: ifo Education Survey 2019.

Table 9: Effects of income-contingent payment schemes on preferences for tuition among adolescents

	Support for tuition		Opposition against tuition	
	(1)	(2)	(3)	(4)
Income contingency	0.140*** (0.030)	0.138*** (0.030)	-0.166*** (0.032)	-0.167*** (0.031)
Covariates	No	Yes	No	Yes
Control mean	0.266	0.266	0.629	0.629
Observations	1,085	1,085	1,085	1,085
R ²	0.022	0.049	0.028	0.067

Notes: OLS regressions. *Income contingency*: experimental treatment in the survey experiment. Sample: adolescent survey, 2018. 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, patience, risk tolerance, and dummies for gender, born in Germany, living in a tuition state, city size, living with both parents in household, parents’ university degree, expected educational attainment, expected professional degree, parents’ employment status, having siblings (who study/studied), and political interest. Missing values of covariates are imputed; regressions with covariates include imputation dummies. Data source: ifo Education Survey 2018 (adolescent survey). Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Table A1: Wording of survey items

Item	English translation	German original
Control group	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?
Income contingency	In other countries, there is tuition that is due only after graduation, when the former students earn income. Tuition has to be paid only if their annual income exceeds a certain threshold. Do you favor or oppose that students at German universities cover a part of the costs of their studies themselves by this alternative form of tuition?	In anderen Ländern gibt es Studiengebühren, die erst nach dem Abschluss des Studiums erhoben werden, wenn die ehemaligen Studierenden Einkommen erzielen. Die Gebühren müssen nur dann zurückgezahlt werden, wenn ihr Jahreseinkommen über einem gewissen Schwellenwert liegt. Sind Sie dafür oder dagegen, dass Studierende, die an einer Universität oder Hochschule in Deutschland studieren, einen Teil der Studienkosten durch eine solche Form von Studiengebühren tragen?
Loan framing	In other countries, there is tuition that is being paid in the form of interest-free student loans. Loan repayments are due only after graduation, when the former students earn income. The student loans only have to be paid if their annual income exceeds a certain threshold. Do you favor or oppose that students at German universities cover a part of the costs of their studies themselves by this alternative form of tuition?	In anderen Ländern gibt es Studiengebühren, die in Form von zinsfreien Studienkrediten bezahlt werden. Die Kreditrückzahlungen sind erst nach dem Abschluss des Studiums fällig, wenn die ehemaligen Studierenden Einkommen erzielen. Die Studienkredite müssen nur dann zurückgezahlt werden, wenn ihr Jahreseinkommen über einem gewissen Schwellenwert liegt. Sind Sie dafür oder dagegen, dass Studierende, die an einer Universität oder Hochschule in Deutschland studieren, einen Teil der Studienkosten durch diese alternative Form von Studiengebühren tragen?
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. ...	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. ...
Mechanisms	In your view, to what extent do the following statements about tuition apply? Think of regular tuition that is charged at the beginning of each semester (half year). / ...of income-contingent tuition that is due only after graduation and only if the annual income of the former students exceeds a certain threshold. <ul style="list-style-type: none"> - Through tuition, the state is relieved of financial burden. - Through tuition, future high earners contribute to the cost of studying. - Tuition income enables universities to improve their quality. - Also people from poorer families can afford to study despite tuition. - Tuition deters people from studying. - Tuition is unjust. - Tuition increases the risk of students getting into debt. - Tuition restricts students' choice of subject and profession. - Tuition is difficult for the state to administer. 	Was denken Sie, inwieweit treffen folgende Aussagen zu Studiengebühren zu? Denken Sie dabei an reguläre Studiengebühren, die zu Beginn jedes Semesters (Halbjahrs) erhoben werden. / ...an nachgelagerte Studiengebühren, die erst nach dem Abschluss des Studiums erhoben werden und nur, wenn das Jahreseinkommen der ehemaligen Studierenden über einem gewissen Schwellenwert liegt. <ul style="list-style-type: none"> - Durch die Gebühren wird der Staat finanziell entlastet. - Durch die Gebühren tragen zukünftige Besserverdienende zu den Kosten des Studiums bei. - Die Gebühreneinnahmen ermöglichen den Universitäten, ihre Qualität zu verbessern. - Auch Personen aus ärmeren Familien können sich trotz Gebühren ein Studium leisten. - Die Gebühren halten Personen vom Studieren ab. - Die Gebühren sind ungerecht. - Die Gebühren erhöhen das Risiko, dass sich Studierende verschulden. - Die Gebühren schränken die Studienfach- und Berufswahl der Studierenden ein. - Die Gebühren sind für den Staat schwer zu verwalten.

Notes: 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). Answer categories for mechanisms: fully true; rather true; rather not true; not true at all; neither nor (Trifft voll zu; trifft eher zu; trifft eher nicht zu; trifft überhaupt nicht zu; weder noch). ^a Literal translation: "universities or universities of applied sciences."

Table A2: Summary statistics and balancing tests

	Mean in control group							Difference to treatment group								
	2014	2015	2016	2017	2018	2019	2020	2015	2016	2018	2018 ^a	2019	2020	2020 ^b	2020 ^c	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	
Age	51.00	49.40	50.11	49.57	51.51	50.77	44.08	1.68	2.44*	-1.39	-2.18	-0.74	0.74	0.19	0.83	
Female	0.50	0.53	0.51	0.51	0.51	0.51	0.49	-0.02	0.02	-0.00	-0.02	-0.01	0.00	0.04*	-0.01	
Born in Germany	0.94	0.95	0.96	0.95	0.95	0.95	0.95	-0.01	-0.00	0.02*	0.00	-0.01	-0.02	0.00	-0.01	
Tuition state	0.69	0.73	0.72	0.70	0.72	0.72	0.69	-0.06	-0.01	-0.03	0.00	-0.03	0.01	0.04*	0.04*	
City size \geq 100,000	0.33	0.32	0.31	0.32	0.32	0.33		0.00	-0.01	-0.01	-0.00	-0.02				
Monthly household income (€)	2,133	2,215	2,131	2,252	2,554	2,557	2,710	50.3	41.9	-189.8**	-140.2	-2.2	-49.9	28.9	151.8*	
Partner in household	0.58	0.59	0.54	0.55	0.60	0.62	0.59	0.03	0.01	-0.03	-0.03	-0.05**	0.01	0.03	0.02	
Parent(s) with univ. degree	0.24	0.27	0.23	0.28	0.30	0.26	0.31	0.00	0.01	-0.03	-0.02	0.03	0.01	0.00	0.03	
Works in education sector	0.06	0.11	0.08	0.08	0.10	0.11	0.13	0.00	-0.00	0.00	0.00	0.01	-0.00	-0.01	0.01	
Highest education attainment																
No degree/basic degree	0.40	0.39	0.38	0.37	0.37	0.40	0.32	0.03	0.02	-0.00	-0.00	-0.09***	0.01	0.01	-0.02	
Middle school degree	0.32	0.31	0.32	0.31	0.31	0.28	0.29	-0.01	-0.02	0.00	-0.03	0.05***	-0.00	-0.01	-0.01	
University entrance qualif.	0.28	0.30	0.30	0.32	0.32	0.32	0.39	-0.02	-0.01	0.00	0.03	0.04*	-0.00	0.00	0.03	
Professional degree																
No degree	0.10	0.13	0.14	0.09	0.06	0.09	0.10	-0.03*	-0.01	0.02	0.02	-0.01	0.01	-0.02	-0.01	
Vocational degree	0.72	0.70	0.70	0.71	0.75	0.71	0.66	0.02	-0.01	-0.03	-0.01	-0.02	0.00	0.03	0.00	
University degree	0.15	0.16	0.12	0.15	0.17	0.18	0.22	0.03	0.01	-0.01	0.01	0.01	-0.00	0.00	0.02	
In training	0.07	0.06	0.06	0.09	0.06	0.05	0.05	-0.02	0.01	0.02	-0.02	0.02	0.00	0.00	0.01	
University student	0.05	0.05	0.05	0.06	0.03	0.03	0.03	-0.03**	0.00	0.02*	0.00	0.01	0.00	0.00	0.01	
Employment status																
Full-time employed	0.37	0.33	0.34	0.37	0.38	0.40	0.50	0.05**	-0.02	0.01	0.01	0.00	0.00	-0.02	-0.01	
Part-time employed	0.09	0.13	0.15	0.12	0.13	0.15	0.15	0.00	-0.00	0.03	0.03	-0.00	0.00	0.00	0.01	
Self-employed	0.02	0.04	0.03	0.04	0.05	0.04	0.06	-0.01	-0.00	-0.01	0.01	0.02	-0.02	-0.03**	-0.02	
Unemployed	0.07	0.07	0.06	0.05	0.03	0.03	0.04	-0.03**	0.00	0.00	0.01	0.00	0.01	0.02	-0.00	

(continued on next page)

Table A2 (continued)

	Mean in control group							Difference to treatment group							
	2014 (1)	2015 (2)	2016 (3)	2017 (4)	2018 (5)	2019 (6)	2020 (7)	2015 (8)	2016 (9)	2018 (10)	2018 ^a (11)	2019 (12)	2020 (13)	2020 ^b (14)	2020 ^c (15)
Parent status															
No children	0.37	0.32	0.43	0.43	0.40	0.39	0.46	-0.00	-0.02	-0.00	0.00	0.05**	-0.02	-0.02	-0.01
At least one child < 18	0.23	0.31	0.20	0.208	0.23	0.21	0.25	-0.02	0.00	-0.03	-0.00	-0.01	-0.01	0.00	-0.03
All children > 18	0.40	0.37	0.37	0.37	0.37	0.40	0.29	0.02	0.02	0.04	0.00	-0.03	0.03	0.02	0.03
Political party preference															
CDU	0.26	0.26	0.21	0.25	0.21	0.19	0.22	-0.05**	0.00	-0.01	0.02	0.02	0.00	0.02	-0.02
SPD	0.22	0.22	0.17	0.20	0.20	0.18	0.12	0.02	0.02	-0.02	-0.02	-0.03**	0.02	-0.00	0.01
Linke	0.05	0.08	0.08	0.08	0.11	0.08	0.09	0.01	-0.01	-0.03	0.00	0.00	0.01	-0.01	-0.01
Grüne	0.09	0.07	0.08	0.06	0.07	0.11	0.13	0.02	-0.01	-0.01	0.01	0.01	-0.01	-0.00	-0.01
Other	0.06	0.05	0.15	0.14	0.18	0.20	0.17	-0.00	-0.01	0.02	-0.01	0.01	-0.02	0.01	0.01
None	0.33	0.33	0.32	0.29	0.23	0.24	0.29	0.01	0.01	0.04	0.01	-0.00	-0.01	-0.02	0.02
Patience (11-point scale)	6.86		5.79	6.04	6.15	6.40	7.40		0.18	0.17	0.13	0.03	-0.05	-0.04	-0.10
Altruism (11-point scale)	7.15														
Risk tolerance (11-point scale)			4.24	4.27	4.32	4.78	5.43		0.00	-0.12	0.23	0.06	-0.14	-0.23*	0.04
Frequent voter		0.77	0.77	0.82	0.85	0.85	0.82	0.02	0.03	-0.03	-0.00	0.01	-0.00	-0.00	-0.02
Education important vote		0.72	0.75	0.74	0.75	0.71		0.02	0.03	-0.04	-0.04	0.02			
Non-response	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Observations	1,032	1,390	781	2,075	1,036	2,013	1,050	1,360	852	1,005	970	1,996	1,055	1,024	1,058

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 2014-2020. Regressions weighted by survey weights. Significance levels: *** p<0.01, ** p<0.05, * p<0.10. ^a Loan framing. ^b Consequential. ^c Income contingency + Consequential.

Table A3: Detailed results by five answer categories

	Strongly favor (1)	Somewhat favor (2)	Neither favor nor oppose (3)	Somewhat oppose (4)	Strongly oppose (5)
Panel A: Adults (Specification of Table 2)					
Income contingency	0.070*** (0.019)	0.079*** (0.025)	0.003 (0.015)	-0.094*** (0.022)	-0.058*** (0.019)
Income contingency × Wave 2016	0.016 (0.027)	-0.012 (0.037)	0.010 (0.025)	-0.009 (0.034)	-0.005 (0.029)
Income contingency × Wave 2018	-0.020 (0.032)	0.030 (0.040)	0.032 (0.023)	0.005 (0.036)	-0.047* (0.028)
Income contingency × Wave 2019	0.044* (0.025)	0.024 (0.032)	-0.009 (0.021)	-0.037 (0.028)	-0.022 (0.023)
Income contingency × Wave 2020	0.025 (0.026)	0.046 (0.033)	-0.017 (0.021)	-0.008 (0.029)	-0.047* (0.026)
Wave 2016	-0.003 (0.018)	-0.006 (0.026)	0.008 (0.018)	0.002 (0.025)	-0.002 (0.021)
Wave 2018	0.048** (0.022)	-0.027 (0.027)	-0.025* (0.015)	0.000 (0.027)	0.003 (0.022)
Wave 2019	0.010 (0.016)	-0.009 (0.023)	0.025 (0.015)	-0.004 (0.021)	-0.022 (0.017)
Wave 2020	0.027 (0.018)	-0.054** (0.023)	0.014 (0.016)	-0.017 (0.022)	0.031 (0.019)
Control mean	0.110	0.329	0.098	0.279	0.185
Observations	12,504	12,504	12,504	12,504	12,504
R ²	0.026	0.023	0.027	0.026	0.043
Panel B: Adolescents (Specification of Table 9)					
Income contingency	0.071*** (0.018)	0.066** (0.027)	0.029 (0.021)	-0.036 (0.029)	-0.130*** (0.028)
Control mean	0.056	0.211	0.104	0.308	0.321
Observations	1,085	1,085	1,085	1,085	1,085
R ²	0.048	0.036	0.024	0.032	0.062

Notes: OLS regressions. Dependent variable: dummy variables 1 = answer category given in respective table header, 0 otherwise. All specifications include covariates. Control mean: mean of the outcome variable in the control group (Panel A: in wave 2015). See the respective tables for additional notes. Data source: ifo Education Survey 2015-2020. Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Table A4: Effects of earnings information on preferences for income-contingent tuition

	Support for income-contingent tuition		Opposition against income-contingent tuition	
	(1)	(2)	(3)	(4)
Earnings information	0.012 (0.023)	0.011 (0.023)	0.004 (0.020)	0.003 (0.020)
Wave 2017	0.025 (0.030)	0.021 (0.029)	-0.020 (0.025)	-0.017 (0.025)
Earnings information × Wave 2017	-0.023 (0.042)	-0.020 (0.042)	0.057 (0.038)	0.051 (0.037)
Covariates	No	Yes	No	Yes
Control mean	0.635	0.635	0.221	0.221
Observations	3,037	3,037	3,037	3,037
R^2	0.000	0.036	0.002	0.040

Notes: OLS regressions. *Earnings information*: experimental treatment in the survey experiment. Sample: waves 2014 and 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. 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, and political partisanship. Missing values of covariates are imputed; regressions with covariates include imputation dummies. Data source: ifo Education Survey 2014, 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 A5: Who supports tuition?

	Support for regular tuition				Support for income-contingent tuition			
	Bivariate regression		Multivariate regression		Bivariate regression		Multivariate regression	
	(1)		(2)	(3)		(4)		
<i>Sociodemographic characteristics</i>								
Age	0.001*** (0.000)		0.001* (0.001)		0.002*** (0.000)		0.002*** (0.001)	
Female	-0.071*** (0.013)		-0.066*** (0.014)		-0.027* (0.014)		-0.021 (0.015)	
Born in Germany	0.052* (0.031)		0.026 (0.031)		0.067** (0.032)		0.012 (0.033)	
Tuition state	0.002 (0.014)		-0.002 (0.015)		-0.024 (0.015)		-0.018 (0.015)	
Monthly household income (1000 €)	0.011** (0.005)		0.006 (0.005)		0.012** (0.005)		0.002 (0.006)	
Partner in household	0.042*** (0.014)		0.017 (0.016)		0.052*** (0.015)		0.021 (0.017)	
Has parent(s) with university degree	-0.001 (0.015)		0.034** (0.016)		-0.019 (0.016)		-0.009 (0.017)	
Works in education sector	0.047** (0.024)		0.072*** (0.024)		-0.002 (0.026)		0.022 (0.025)	
Full-time employed	0.059*** (0.014)		0.040** (0.018)		0.034** (0.014)		0.053*** (0.019)	
Part-time employed	-0.017 (0.018)		0.018 (0.021)		-0.023 (0.021)		0.019 (0.023)	
Self-employed	-0.045 (0.033)		-0.027 (0.034)		0.066** (0.031)		0.094*** (0.033)	
Unemployed	-0.072** (0.029)		-0.055* (0.031)		-0.077** (0.031)		-0.012 (0.034)	
<i>Political activity and preferences</i>								
Frequent voter	0.024 (0.019)		0.009 (0.019)		0.079*** (0.021)		0.047** (0.021)	
Education important for vote choice	-0.026 (0.018)		-0.022 (0.018)		0.035* (0.020)		0.034* (0.020)	
CDU partisan	0.090*** (0.016)		0.082*** (0.016)		0.076*** (0.017)		0.062*** (0.017)	
<i>Interest groups</i>								
Middle school degree	0.044*** (0.014)		-0.010 (0.017)		0.038** (0.015)		0.019 (0.018)	
University entrance qualification	-0.098*** (0.014)		-0.113*** (0.022)		-0.044*** (0.015)		0.018 (0.023)	
University degree	-0.041** (0.018)		-0.011 (0.022)		-0.034* (0.019)		-0.074*** (0.024)	
University student	-0.188*** (0.033)		-0.090** (0.039)		-0.196*** (0.039)		-0.106** (0.047)	
At least one child < 18	0.018 (0.015)		-0.009 (0.018)		0.012 (0.016)		0.024 (0.020)	
All children > 18	0.006 (0.014)		-0.041** (0.020)		0.071*** (0.015)		0.027 (0.020)	
Observations	9,346		9,346		7,775		7,775	
R ²			0.034				0.036	

Notes: OLS regressions. Col. (1) and (3): each cell represents the coefficient of a separate OLS regression. Col. (2) and 4 depict one multivariate regression each. Samples: col. (1)-(2): control groups in waves 2014-2020; col. (3)-(4): income-contingency treatment groups in waves 2014-2020. 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 2014-2020. 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.

Table A6: Associations between perceptions about tuition and preferences for tuition

	Support for regular tuition		Support for income-contingent tuition	
	Entered separately	Entered jointly	Entered separately	Entered jointly
	(1)	(2)	(3)	(4)
Despite tuition, poor can afford to study	0.238*** (0.042)	0.125*** (0.041)	0.306*** (0.039)	0.166*** (0.046)
Tuition is unjust	-0.360*** (0.037)	-0.208*** (0.045)	-0.212*** (0.049)	-0.081 (0.051)
Tuition makes high earners contribute	0.284*** (0.038)	0.148*** (0.040)	0.331*** (0.049)	0.202*** (0.056)
Tuition deters people from studying	-0.250*** (0.040)	-0.071 (0.048)	-0.158*** (0.041)	-0.011 (0.047)
Tuition restricts choice of subject	-0.242*** (0.040)	-0.047 (0.048)	-0.169*** (0.041)	-0.042 (0.052)
Tuition increases debt risk	-0.286*** (0.042)	-0.138*** (0.052)	-0.196*** (0.038)	-0.104** (0.050)
Tuition is hard to administer	0.056 (0.048)	0.128*** (0.041)	-0.018 (0.042)	-0.038 (0.041)
Tuition relieves state finance	0.184*** (0.041)	0.080** (0.039)	0.129*** (0.042)	0.005 (0.041)
Tuition improves university quality	0.253*** (0.039)	0.128*** (0.041)	0.243*** (0.041)	0.118*** (0.044)
Covariates	Yes	Yes	Yes	Yes
Control mean	0.445		0.660	
Observations	1,041	1,041	950	950
R ²	0.291		0.243	

Notes: OLS regressions. Col. (1) and (3): each cell represents the coefficient of a separate regression; col. (2) and (4): one regression each. Samples: col. (1) and (2): subsample of control group asked about indicated statements in wave 2019; col. (3) and (4): subsample of income-contingency treatment group asked about indicated statements in wave 2019. Dependent variable: Dummy variables 1 = “strongly favor” or “somewhat favor” regular/income-contingent tuition, 0 otherwise. Independent variables: dummy variables 1 = “fully applies” or “rather applies”, 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 2019. Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Table A7: Summary statistics and balancing tests: Adolescent survey

	Control group: Mean (1)	Income contingency: Difference (2)
Age	15.98	0.04
Female	0.47	0.01
Born in Germany	0.98	-0.01
Tuition state	0.73	0.02
City size $\geq 100,000$	0.28	0.01
Lives with both parents	0.74	-0.03
Has parent(s) with university degree	0.38	-0.04
Expected educational attainment		
No degree/basic degree	0.08	-0.01
Middle school degree	0.35	-0.02
University entrance qualification	0.57	0.04
Expected professional degree		
No degree	0.01	-0.01
Vocational degree	0.46	-0.02
University degree	0.52	0.03
Parents' employment status		
Mother full-time employed	0.38	0.01
Mother part-time employed	0.38	-0.01
Mother unemployed	0.04	0.01
Father full-time employed	0.85	-0.05*
Father part-time employed	0.03	0.01
Father unemployed	0.02	0.01
At least one sibling	0.80	-0.04
At least one sibling studies/studied	0.18	-0.04
Politically interested	0.33	0.02
Patience (11-point scale)	6.16	0.25
Risk tolerance (11-point scale)	5.26	-0.03
Observations	525	560

Notes: Sample: adolescent survey, 2018. Weighted group means. "Difference" displays the difference in means between the control group and the treatment group. Significance levels of "difference" stem from linear regressions of the respective background variable on treatment dummies. Data source: ifo Education Survey 2018 (adolescent survey). Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table A8: Correlates of preferences for tuition and heterogeneous treatment effects in the adolescent survey

	Support for regular tuition		Support for income-contingent tuition		Heterogeneous treatment effects
	Bivariate regression	Multivariate regression	Bivariate regression	Multivariate regression	
	(1)	(2)	(3)	(4)	
Age	-0.007 (0.019)	0.010 (0.020)	0.007 (0.020)	0.013 (0.020)	0.037 (0.061)
Female	-0.025 (0.041)	-0.005 (0.041)	-0.024 (0.045)	-0.006 (0.045)	0.002 (0.061)
Born in Germany	0.075 (0.126)	0.083 (0.129)	0.149 (0.117)	0.129 (0.125)	0.074 (0.172)
Tuition state	-0.012 (0.044)	-0.002 (0.044)	0.034 (0.048)	0.020 (0.048)	0.046 (0.065)
City size \geq 100,000	-0.005 (0.043)	-0.013 (0.043)	0.008 (0.046)	0.032 (0.047)	0.013 (0.063)
Lives with both parents	0.048 (0.045)	0.077 (0.047)	-0.005 (0.050)	-0.036 (0.053)	-0.053 (0.067)
Has parent(s) with university degree	0.048 (0.043)	0.097** (0.046)	-0.053 (0.046)	-0.058 (0.048)	-0.101 (0.062)
Expects middle school degree	0.099** (0.045)	0.047 (0.086)	-0.027 (0.048)	-0.029 (0.101)	-0.077 (0.131)
Expects university entrance qualif.	-0.096** (0.043)	-0.021 (0.089)	0.022 (0.046)	-0.030 (0.104)	0.055 (0.124)
Expects university degree	-0.111*** (0.041)	-0.116** (0.055)	0.048 (0.045)	0.044 (0.054)	0.159*** (0.061)
Full-time employed mother	0.038 (0.042)	0.125** (0.053)	-0.085* (0.045)	-0.054 (0.058)	-0.122** (0.062)
Part-time employed mother	0.046 (0.043)	0.122** (0.050)	0.093** (0.046)	0.057 (0.059)	0.047 (0.064)
Full-time employed father	0.043 (0.056)	-0.006 (0.062)	0.084 (0.055)	0.069 (0.067)	0.041 (0.078)
Part-time employed father	-0.087 (0.106)	-0.063 (0.112)	-0.165 (0.101)	-0.081 (0.115)	-0.090* (0.047)
At least one sibling	-0.011 (0.050)	0.003 (0.052)	-0.050 (0.052)	-0.059 (0.053)	-0.039 (0.072)
At least on sibling studies (studied)	-0.077 (0.052)	-0.077 (0.054)	-0.004 (0.063)	0.006 (0.067)	0.072 (0.082)
Politically interested	-0.031 (0.042)	-0.008 (0.046)	0.075 (0.047)	0.064 (0.049)	0.106* (0.063)
Constant		-0.071 (0.355)		0.065 (0.367)	
Observations		525		560	
R ²		0.055		0.036	

Notes: Sample: adolescent survey, 2018. OLS regressions. Dependent variable: dummy variables 1 = “strongly favor” or “somewhat favor” tuition, 0 otherwise. Samples: col. (1)-(2): control group; col. (3)-(4): respondents in income-contingency treatment group; col. (5): full adolescent sample. Col. (5) displays coefficients on the interaction term between income-contingency treatment and subgroup indicators from estimates based on equation (2). Missing values of covariates are imputed; regressions include imputation dummies. Data source: ifo Education Survey 2018 (adolescent survey). Regressions weighted by survey weights. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.