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Luck Or Effort: Perceptions of the Role of Circumstances in Education and Demand for Targeted Spending [*]

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Abstract

Perceptions about students' personal responsibility for their own success might have crucial implications for public approval of targeted financial support. Using a survey experiment among the German adult population, we find that information about the correlation of education outcomes and parental background strongly increases the perception that external circumstances determine educational success. These effects persist in a follow-up survey conducted two weeks later. Information also significantly increases private donations to charities supporting students from disadvantaged socio-economic backgrounds but does not affect demand for redistributive education spending by the government. This pattern of results is consistent with differences in the perceived opportunity costs of funds used in both spending decisions.

Keywords: circumstances, effort, information, survey experiment, charitable donations, equality of opportunity, policy preferences

JEL classification: I24, H52, H11, D83, D63, D64

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1. **Introduction**

It is well documented that students' success in school strongly correlates with parental background, leading to educational inequality by socio-economic status (SES) of parents (e.g., Schütz et al. 2008; Björklund and Salvanes 2011; Organization of Economic Cooperation and Development 2018). As better educational attainment is also rewarded with higher wages on the labor market (e.g., Card 1999), unequal chances of students from different parental backgrounds may have serious implications on economic inequality and inequality of opportunity (e.g., Nickell 2004; Corak 2013). Potential ways of improving the education outcomes of students from less advantaged backgrounds include targeted spending, either from (i) public sources, for example redistributive education spending or (ii) private sources, for example donations. The feasibility of implementing targeted support crucially depends on public endorsement for redistributive measures. While a large strand of research has explored preferences for governmental redistribution (e.g., Alesina et al. 2018; Hoy and Mager 2021), we contribute to the literature by providing evidence both on survey respondents' stated preferences for public redistributive education spending and revealed preferences for private donations. Measuring revealed preferences presents a clear advantage over conventional survey measures, since it addresses the common concern that survey measures of preferences for redistribution fail to capture actual behavior and are prone to experimenter demand effects (Haaland et al. 2023).

In this paper, we hypothesize that public preferences for targeted spending depend on the perception of the interplay between parental background and the education system. Therefore, we investigate how preferences for private donations and for redistributive education spending change when respondents receive information on the differences in education outcomes of students from more and less advantaged parental backgrounds. In addition, we also examine how these perceptions affect respondents' beliefs regarding to what extent external circumstances and effort are decisive for educational success: some may attribute success to effort, and poor outcomes to a failure to seize opportunities, while others may interpret low academic achievement as a result of bad luck or external circumstances. We use data from a large-scale survey experiment ($N > 2{,}000$) in a sample of the population aged 18 and older in Germany. At the start of the experiment, we randomly select treatment respondents who receive accurate information on the education outcomes of 15-year-old students in Germany. For the treatment information, we focus on the difference in the share of students from more and less advantaged families who attend academic-track secondary schools (*Gymnasium)*: 49 percent

of students from more advantaged families and 19 percent of students from less advantaged families attend an academic-track secondary school, resulting in a 30-percentage point SES gap in academic-track attendance.[1]

The information experiment enables us to investigate the effect of providing accurate information on academic-track attendance rates of students from more and less advantaged backgrounds on respondents' donation decisions and their preferences for governmental increases in redistributive education spending. Importantly, providing information on academic-track attendance of both more and less advantaged students allows us to study a more nuanced picture of redistribution: respondents might on average overestimate (underestimate) the share of students from less advantaged backgrounds who attend academic-track schools. This could translate into greater (lesser) demand for targeted spending by treated respondents. Alternatively, respondents might also overestimate (underestimate) the share of students from more advantaged backgrounds who attend academic-track schools, which could translate into reduced (increased) demand for targeted spending in the treatment group.

Similarly, it is ex-ante unclear whether treatment effects on private targeted spending, i.e., donations, will correspond to effects on public targeted spending, i.e., redistributive education spending. If the treatment information increases concerns for the education outcomes of students from less advantaged backgrounds, respondents might increase their preferences for targeted spending from both private and public sources. However, previous literature shows mixed results on whether information changes respondents' policy preferences (e.g., Kuziemko et al. 2015; Hoy and Mager 2021; Cruces et al. 2013). While inertia of public preferences might have a multitude of causes, a common explanation is that policy reforms are seen as ineffective if governmental capacity to implement well-designed spending programs is perceived as low. Our study extends the literature by investigating whether information changes preferences for targeted spending in a highly transparent donation environment. Respondents faced with a donation decision are well-informed about their own opportunity costs of the donated amount, while the opportunity costs of funds used for public targeted spending are likely to be less transparent: in particular, respondents may be unsure as to whether increased spending on students from less advantaged backgrounds would be diverted from other education spending at the detriment of other student groups, i.e. more advantaged children, or other public

[1] Attendance of academic-track secondary schools is an important education decision in the German context. Children typically choose the secondary school track after four to six years of primary school, depending on their federal state of residence. Academic-track secondary schools teach the most academically rigorous curriculum and are the most common way to obtain a university entrance qualification.

spending. Therefore, our experimental design offers additional insight into the political economy of targeted education spending.

We find that respondents predominantly assume that students' own effort determines their educational success. In the uninformed control group, merely 17 percent of respondents believe that a high educational degree depends on external circumstances, rather than own effort. Information on the differences in academic-track attendance by parental background strongly increases the perception that external circumstances determine educational success, with 29 percent of respondents in the treatment group stating this opinion; this demonstrates an increase by twelve percentage points or 71 percent. These results persist into a follow-up survey conducted two weeks after the main survey.

We find that the information treatment also increases private donations to charities supporting students from less advantaged backgrounds by 3.3 tokens on average, compared to 37.5 tokens at baseline. In the control group, 66 percent of respondents donate a positive amount of money. Information on the academic-track school attendance rates increases the share of donators by nine percentage points or 14 percent. Similarly, more respondents decide to donate amounts greater than the control group median. This indicates that the increase in the perceived role of external circumstances in determining educational success translates into greater demand for private targeted support.

In contrast, respondents' demand for redistributive education spending by the government does not change if respondents receive the information treatment. While a large share of respondents (75 percent) in the control group supports increased school spending to foster equality of opportunity, the treatment effect of information about academic-track attendance rates of more and less advantaged students is negligible.

Further analyses suggest that information effects are driven by large misperceptions for all pieces of information prior to the information experiment. On average, respondents estimate that 71 percent of students from more advantaged families attend academic-track schools (accurate value: 49 percent), while they estimate that 30 percent of students from less advantaged families do so (accurate value: 19 percent). This implies that on average respondents in the treatment group receive a downward information shock for less advantaged students' educational attainment, hypothesized to increase support for targeted spending, and more advantaged students, hypothesized to decrease support for targeted spending. Note that the downward information shock regarding the attendance rates of more advantaged students could curb respondents' demand for public targeted spending if the effects of such redistributive policies on more advantaged students are deemed to be unclear. In contrast,

increases in donations directly benefit less advantaged students without any implications on education spending for more advantaged students. This highlights a potential role of perceived uncertainty regarding the opportunity costs of additional spending in explaining inertia in public preferences, which we consider an important issue for further research.

To better understand whether the different components of the information treatment receive the same weight in respondents' considerations, we also test retention of the treatment information in a follow-up survey two weeks after information provision. Results show that while re-elicited beliefs are closer to the accurate values for both the attendance rates of more and less advantaged students, retention seems larger for the attendance rates of less advantaged students. Higher retention could imply that treated respondents particularly observe information on students from less advantaged backgrounds and might be most concerned with this part of the information treatment.

We find no evidence for five alternative reasons why the positive information treatment effects on the perceptions of the importance of circumstances and private donations do not translate into more support for redistributive education spending by the government. We show that respondents think that the concrete policy proposal – increased school spending – is well suited for fostering equality of opportunity. Explorative subgroup analyses also reveal that the information treatment does not differentially affect preferences for redistributive education spending among respondents with different educational attainment, political ideologies, or with different levels of trust in the government. This suggests that partisan biases or beliefs about government capability are unlikely to account for the absence of treatment effects. Finally, a more systematic approach using a causal forest algorithm similarly fails to detect heterogeneous treatment effects on demand for redistributive education spending along the previously mentioned dimensions as well as a large number of socio-economic characteristics. For private donations, we document suggestive evidence that respondents with lower educational attainment react more strongly to the information treatment.

The remainder of the paper is structured as follows. Section 2 introduces the hypotheses that we test in this paper and the related literature. Section 3 introduces the institutional background of the German education system. Section 4 presents the opinion survey, the experimental design, and the estimation strategy. Section 5 presents our results. Section 6 discusses belief updating, how respondents perceive the information treatment, and potential mechanisms. Section 7 concludes.

2. Conceptual Framework and Related Literature

In social sciences, there is a longstanding tradition of studying the relationship between inequality and preferences for redistribution (Piketty 1995; Bénabou and Ok 2001; Alesina and Giuliano 2011; Durante et al. 2014; Hvidberg et al. 2022; Almås et al. 2020).[2] Previous studies show that perceptions on the underlying sources of inequality are an important explanatory factor for determining whether redistribution is favored (Alesina and Glaeser 2004; Bénabou and Tirole 2006; Alesina and Angeletos 2005). On the one hand, individuals might believe that economic success results from effort, and poor outcomes could mainly be attributed to individual failures to exploit available opportunities. On the other hand, individuals might perceive the system as unfair and assume that economic disadvantage results from bad luck or external circumstances beyond someone's control. Owing to the different sources attributed to individual success, the two notions could have very different implications for redistribution preferences, with the latter view creating a greater demand for targeted spending for the disadvantaged than the former. Indeed, several papers have empirically corroborated the link between fairness views and distributional preferences using social survey data (e.g., Alesina and La Ferrara 2005; Fong 2001; Roth and Wohlfart 2018). Whether information on differences in economic outcomes between groups gives rise to demands for targeted spending may therefore depend on the degree to which individuals are seen as responsible for their own economic success, in the sense that success is a consequence of individual effort (e.g., Alesina and Angeletos 2005; Bénabou and Tirole 2006). As a result, we would expect demand for redistributive education spending targeted at less advantaged students to increase if unequal outcomes are seen as stemming more from external circumstances than from individuals' effort. In this paper, we test whether information about inequality in educational outcomes in terms of students' academic-track attendance rates by parental SES leads to a change in the perception on the role of circumstances or effort in determining educational success. We thereby extend the literature by providing information about differences in academic-track attendance rates by parental SES, whereas most previous literature has focused on inequality in terms of income. This allows us to understand to what extent respondents interpret the correlation between parental background and academic-track attendance of students as informative on students' individual responsibility for their educational success.

[2] One strand of this literature has investigated heterogeneities in redistributive preferences using incentivized lab experiments (e.g., Cappelen et al. 2007; Fisman et al. 2007; Cappelen et al. 2013; 2015; Jakiela 2015; Fisman et al. 2017) while another strand has focused on redistributive preferences in the general population (e.g., Bellemare et al. 2008; Edlund 1999; Falk et al. 2018; Fisman et al. 2015; Osberg and Smeeding 2006).

Since people often have misperceptions about the extent of inequality in society (e.g., Kluegel and Smith 1986; Norton and Ariely 2011), we expect the provided information to change average respondent beliefs about academic-track attendance rates among students from different backgrounds in the treatment group compared to the control group. However, it is ex ante unclear which part of the information treatment will be most relevant to respondents. The treatment group receives information on the share of students attending an academic track for students from more and less advantaged backgrounds, as well as the gap in attendance rates by parental SES. Respondents predominantly concerned about the overall number of students attaining high levels of education might be most interested in information on the *levels* of academic-track attendance. However, it is ex-ante unclear whether respondents are equally concerned about the academic-track attendance rates of students from more and less advantaged backgrounds. Respondents might also care about the *gap* in attendance rates by parental SES if they are mainly worried about social cohesion between groups or equality of opportunity.

Furthermore, the direction of the hypothesized effect of the information treatment will depend on respondents' prior beliefs. On the one hand, if respondents overestimate (underestimate) the level of students from more advantaged backgrounds who attend the academic-track schools, they may be surprised by the unexpected low (high) share of more advantaged students who attend an academic-track school and therefore adjust their perception on the importance of external circumstances for educational success downwards (upwards). Similarly, if respondents previously overestimate (underestimate) the levels of students from less advantaged backgrounds who attend an academic-track school, respondents may be surprised by the low (high) share of less advantaged students who attend an academic-track school and therefore adjust their view about the role of external circumstances for educational success upwards (downwards).

Given their prior beliefs on the academic track attendance of students from different backgrounds, respondents might also misperceive the gap in students' outcomes by parental background. If respondents overestimate (underestimate) the gap in attendance rates, they might adjust their perception on the importance of external circumstances for educational success downwards (upwards). In our paper, two analyses allow us to disentangle these mechanisms: (i) the direction of treatment effects on the perceived role of circumstances as decisive for educational success will indicate which parts of the information treatment respondents are most concerned with, and (ii) respondents' follow-up beliefs about the academic-track attendance levels of more and less advantaged students will indicate which

parts of the information treatment are retained. Thus, if respondents particularly remember information on students from less advantaged backgrounds in the follow-up survey, this suggests they care most about this part of the information treatment. In addition, if they overestimate the level of attendance of these students, we expect treated respondents to shift their answer towards reporting a greater importance of external circumstances.

Changes in people's perceptions about inequality could, in turn, affect their willingness to support disadvantaged groups, e.g., through donations to charities. Several papers have analyzed the relationship between inequality and charitable donations. Mostly focusing on income inequality, this strand of literature reveals ambiguous results: some studies, mainly conducted in the lab, find that increases in income inequality are associated with smaller amounts of charitable contributions (Chan et al. 1996; Buckley and Croson 2006; Coté et al. 2015; Duquette and Hargaden 2021). However, observational studies document that increases in income inequality can also lead to larger donations (e.g., Payne and Smith 2015). In contrast to these studies, we do not investigate the effects of changes in inequality per se but rather observe how information on the inequality in educational outcomes of students from different backgrounds affects private donations. In addition, we do not elicit preferences for donations in general but focus on charities aiming to create equality of opportunities for students from different backgrounds. Measuring respondents' preferences for private redistribution by their donation decision presents several advantages: it constitutes a one-time decision for respondents, is easy to understand and execute, and most importantly, the donation decision has a clear implication, where respondents' contributions are directed towards charities dedicated to helping less advantaged students. This incentivized measure is a good way to measure respondents' willingness to pay for support for these children as a "real stakes" question (Stantcheva 2022) and to reduce experimenter demand effects (Haaland et al. 2023; Stantcheva 2022). If respondents adapt their view that external circumstances are more decisive for educational success due to being informed about inequality in education outcomes by parental background, we are interested in whether this also translates into higher private donation decisions to charities aiming at equalizing opportunities of students from different family backgrounds. In particular, we would expect that donations increase in the treatment group if respondents who receive the information treatment change their perception that circumstances are more decisive than effort for education success. Especially if treated respondents perceive the sources of inequality in students' opportunities to lie beyond an individual's control, they are more inclined to donate (higher amounts) since they perceive the education system to be less fair.

It is ex-ante unclear whether treatment effects on public redistributive education spending will mirror the effects on private donations described above. Respondents' policy preferences could differ from their donation decisions for multiple reasons. While the counterfactual use of money is very clear to respondents if they choose to donate to a charity, how public funds would increase if respondents stated a preference for higher targeted spending to help disadvantaged students might be less certain. In particular, respondents may be unsure whether increased government spending on education targeted at disadvantaged students implicitly results in funds being diverted from other education spending, i.e. spending that benefits more advantaged students. If treated respondents become more concerned about education attainment overall, they might not favor more public spending targeted at less advantaged students. However, they might still favor higher education spending overall and therefore increase their support for charities working in education. Consequently, the sufficient condition for respondents to donate to a charity is that they increase their willingness to support less advantaged students at their own expense, while the sufficient condition for respondents to support a change in the funding formula is that they increase their willingness to support less advantaged students at the expense of other public spending.

Examining redistributive education spending, we most strongly relate to the experimental literature that investigates how changing people's perceptions about the extent of inequality affects their preferences for governmental redistribution (see also Ciani et al. 2021 for a survey on the literature).[3] The results of the literature show a mixed picture. While some studies identify a positive effect on respondents' preferences for redistribution (Cruces et al. 2013), the common takeaway from the experimental studies is that while information usually leads to greater concern about inequality, effects on peoples' redistributional preferences are often negligible: both towards policies aiming at equality of outcomes (e.g., Kuziemko et al. 2015; Hoy and Mager 2021) and towards many policies aiming at equality of opportunity (Alesina et al. 2018; Lergetporer et al. 2020). The mixed findings in the literature highlight the importance of examining both respondents' donation decisions and preferences for redistributive education spending.

[3] The literature distinguishes between two types of policies: namely policies aimed at equality of outcomes, such as progressive taxation or minimum wages (e.g., Alesina and La Ferrara 2005; Kuziemko et al. 2015) and policies aimed at equality of opportunity (e.g., Alesina et al. 2018; Fehr, Müller, et al. 2022; Lergetporer et al. 2020). Earlier work has provided survey respondents with information on their ranking in the national income distribution (Cruces et al. 2013; Kuziemko et al. 2015; Karadja et al. 2017; Bublitz 2022; Hoy and Mager 2021) or the global income distribution (Fehr, Mollerstrom, et al. 2022). Similarly, McCall et al. (2017) and Alesina et al. (2018) inform study participants about actual economic inequality in the U.S., and Lergetporer et al. (2020) and Fehr, Müller, et al. (2022) about the persistence of SES in Germany.

It has been argued that there could also be differences in treatment effects between private donations and policy preferences due to a lack of trust in the government (Kuziemko et al. 2015) or doubts about the effectiveness of the policy proposal to achieve the goal of equality of opportunity. Imagine respondents believe that increased education spending is not the most effective means of promoting equality of opportunity or that alternative policies may be more impactful. In this case, providing information about inequality in educational outcomes of students from different backgrounds could alter respondents' private donation decisions, but not their preferences for governmental redistributive education spending as elicited in our specific policy question (see also Lergetporer et al. (2020) for a detailed discussion). A similar channel could be that some respondents do not favor increased governmental redistribution owing to a lack of trust in the government (Kuziemko et al. 2015). Furthermore, how respondents perceive the role of circumstances or effort in achieving educational success could be influenced by their personal experience within the education system. For example, respondents who have achieved high educational degrees may attribute their success to diligence and effort. Conversely, respondents who did not attain higher qualifications may lean towards attributing their failure to adverse conditions or external circumstances. Similarly, the effect of our information treatment on support for governmental redistributive education spending could differ by respondents' political ideology or partisanship. Left-leaning respondents are likely to express greater support for equal-opportunity policies undertaken by the government. In contrast, right-leaning respondents could change their perception on the role of circumstances in education and their preferences for private donations. However, their inclination might not extend towards additional government intervention (see e.g., Alesina et al. (2018) on information about intergenerational mobility or Haaland and Roth (2023) on information about racial gaps). We test these hypotheses with our survey outlined in section 4. First, in the next section, we present some information about the institutional background in Germany.

3. Institutional Background

In Germany, compulsory schooling usually starts at the age of six and ends at 18 (see Appendix Figure A1 for an overview of the German school system). In most federal states, the comprehensive primary school takes four years (some states have six years of primary education) and provides basic education in mathematics, German, science, and social subjects. At the end of primary school, children are tracked into different school types. Some schools offer only basic and intermediate degrees that prepare for apprenticeship training or vocational

education and usually last until grade nine or ten, while other schools offer all tracks (Matthewes 2021). Over time, the majority of German states has reformed tracking to increase the number of school types. *Gymnasium*, which we refer to as academic-track school throughout this paper, is the only secondary school type still existing in all states and it has remained unchanged by recent education reforms (Matthewes 2021). This school type offers only an academic track which leads directly to an *Abitur*, the German university entrance qualification, after grade twelve or 13. Overall, academic-track school attendance is relatively common in Germany.

Tracking decisions depend on parental preferences and the child's academic achievement at the end of primary school. Primary school teachers usually summarize their experience of teaching a child and his/her grades in core subjects in a formal track recommendation. In 2015, in twelve of the 16 German states, this teacher's recommendation was not binding, and it is at the parents' discretion to decide where to enroll their child for secondary school. In the remaining states, parents can only send their child to a higher track than recommended by the teacher if their child passes entry tests or performs well in trial lessons (see Grewenig (2021) for more details).[4]

Students are more likely to attend higher tracks if their parents have a high SES. Parental background even remains predictive of academic-track school attendance when test scores in math and reading are taken into account (see, for example, Stubbe et al. 2023). As a result, in international comparison, Germany has been repeatedly criticized for the fact that family background is a very strong predictor for students' educational performances compared to other countries. For instance, the German mean achievement gap in PISA 2015 science test scores that is associated with a one-unit increase on the PISA index of economic, social and cultural status amounted to 42 score points, the equivalent of more than one year of schooling; this lies above the average OECD performance gap of 38 score points (Organization of Economic Cooperation and Development 2016). Similarly, while only 19 percent of 15-year-old children in the lowest 50 percent of families (in terms of their social background and family income) attend a *Gymnasium*, the respective share for children in the highest 50 percent of families amounts to 49 percent (own calculation based on data from PISA 2015, see Appendix A for

[4] In general, switching tracks or obtaining further qualifications after graduating from a lower track is possible, albeit rare. The annual rate of changing school types is low, typically ranging from 1.3 percent (Baden-Württemberg) to 6.1 (Bremen). Among those students who changed the school type in 2010/11, only about 27 percent switched to a higher track school (Bellenberg 2012). In addition, among all students who continue to pursue secondary education after grade ten, more than 90 percent have attended a *Gymnasium* in the grades before (Statistisches Bundesamt 2018). Therefore, the initial tracking decision following primary school is important in a child's educational career.

details). The resulting gap of 30 percentage points is striking, not least because individuals with a university entrance qualification – which is most often obtained at a *Gymnasium* – do not only experience a large wage premium on gross earnings of around 42 to 44 percent (see Dodin et al. (2024) and Schmillen and Stüber (2014) for corresponding estimates), but also exhibit a lower risk of unemployment (Hausner et al. 2015) and higher life expectancy (Gärtner 2002).

4. Data and Empirical Strategy

This section describes the data collection, the experimental design, sample characteristics, and the econometric model used for estimating the effects.

4.1. Data Collection and Sample

Our research is based on data from the ifo Education Survey 2019, a large opinion survey on education policy in Germany. Sampling and polling were conducted in May 2019 by Kantar Public, a renowned German survey company. Overall, the survey encompassed 37 questions related to education policy and respondents were also asked about a diverse set of socio-demographic background characteristics at the end of the survey. Median completion time was 30 minutes. Rates of item non-response are low, ranging between 0.0 percent and 0.2 percent for the questions used in this paper.

Respondents were sampled and surveyed via an online platform and answered the survey autonomously on their own digital devices. Respondents receive tokens by the online platform for their participation in the survey. In our survey, all respondents are incentivized with 75 tokens for survey completion. Subsequently, these tokens can be exchanged for items or gift vouchers of well-known online retailers. Thus, their exact value may differ between respondents depending on their personal preference for these items.[5]

To investigate belief-updating and the persistence of potential information effects, respondents were also asked to participate in a follow-up survey roughly two weeks following completion of the main survey. The follow-up survey re-elicits respondents' beliefs about academic-track attendance rates of students from more and less advantaged backgrounds as well as other outcome variables but does not contain information about these attendance rates

[5] Our compensation for survey participation corresponds to the standard rate offered by the polling firm. As an example, respondents may directly convert the 75 tokens into money, in which case they are worth about 0.75 Euro. This implies that the hourly wage equivalent of the compensation is relatively low, which already suggests that the collectable tokens may be (much) more valuable to the respondents than their pure monetary equivalent. Moreover, intrinsic motivation to state opinions or "gamification" – a phenomenon where respondents value tokens more than their monetary equivalent (Puleston 2011; Keusch and Zhang 2017) – might also increase survey participation.

(identical for control and treatment group respondents). Overall, 80 percent of the original participants took part in the follow-up survey. The median lag to the main survey was 15 days with a range from seven to 40 days.

For our preferred specification, we exclude respondents who did not pass an attention check posed half-way through the survey,[6] which leaves us with 2,094 respondents in the main survey and 1,671 respondents in the follow-up survey. As illustrated in Appendix Table A1, our sample is broadly representative of the German population in terms of gender, age, region, and household income. For instance, 79.6 percent of our respondents live in Western Germany, compared to 80.3 percent in administrative data from the 2018 Microcensus[7]. Similarly, 53 (51) percent of respondents in our sample (in the administrative data) are female. Respondents in our sample are also reasonably close to the population in terms of their average age of 53 (51), a share of 41 (34) percent of sample respondents with university entrance degrees (*Abitur*), and a share of 44 (48 percent) of respondents above the respective median household income. Overall, our sample represents a broad and diverse range of individuals from the German population.

4.2.Experimental Design

Information Treatment

We conduct a survey experiment that informs respondents about the academic-track attendance rates of students from more and less advantaged backgrounds in Germany, i.e., the correlation between parental background and educational success of adolescents. The control group receives no information. Appendix Figure A2 provides an overview of the experimental design. In Germany, there is a large educational inequality between students from different socio-economic backgrounds in international comparison (Organization of Economic Cooperation and Development 2020) and this manifests early during children's educational careers. In fourth grade, children from more disadvantaged families exhibit much lower skills in mathematics, science, and reading (Stanat et al. 2017). This is particularly noteworthy as

[6] The wording of the attention check is as follows: "It sometimes happens that survey participants do not read individual questions accurately. To ensure that you read the questions accurately, we ask you to ignore the following question and enter the number twenty-two in the text field. [line-beak] The German states are also responsible for universities and colleges. What do you think, how many currently have tuition fees?" 76.9 percent of respondents answered 22 and were left in the final sample.

[7] Research Data Centres of the Federal Statistical Office and the statistical offices of the Laender, Microcensus, census year 2018 (see also Forschungsdatenzentren der Statistischen Ämter des Bundes und der Länder 2018).

competencies achieved during primary school are decisive for students' transition to secondary school (see section 3 for institutional details).

We study inequality in educational outcomes arising from the relationship between children's academic-track school attendance and their parents' SES. Since tracking into different school types occurs at a relatively young age for most children in Germany (usually between ten and twelve years old), children's preferences for different school types are likely to be rather shortsighted, and their understanding of the consequences of educational decisions is probably very limited. This means parental influence on the tracking decision is very high. At the same time, initial track choice creates a clear default education outcome for students since changing school tracks at a later age is rare, academically difficult due to differences in teaching style and curriculum and often goes hand in hand with substantial social costs for students. Therefore, the decision whether a student attends an academic-track school after primary school is an important junction in the child's education journey that highly depends on parental initiative. Academic-track schools are the most popular school type through which students obtain a university entrance qualification (see section 3 for more institutional details) and they are positively associated with many favorable economic outcomes (e.g., Gärtner 2002; Schmillen and Stüber 2014; Hausner et al. 2015; Dodin et al. 2024). Differences in academic-track attendance thus capture a crucial aspect of equality of opportunity.

Our randomized information treatment informs respondents about the academic-track attendance rates of 15-year-old children in the lower and upper half of families by SES. The treatment informs respondents that 49 percent of students from the more advantaged half of all families (in terms of their social background and family income) attend an academic-track school. Treated respondents also learn that, among students from the less advantaged half of all families, 19 percent attend an academic-track school. This results in an SES gap of 30 percentage points (see Appendix A for details about the calculation of the information treatment from PISA data). In addition to the verbal description, respondents in the treatment group are shown a graphic illustration of these academic-track attendance rates among students with different family backgrounds (see Appendix Figure A3 for details).

Eliciting Prior and Posterior Beliefs

To assess respondents' information status at baseline, we first elicit prior beliefs about the academic-track attendance rates of students from more and less advantaged backgrounds. Respondents are asked to report their best guesses for the shares of students from the more advantaged half and less advantaged half of all families (in terms of their social background

and family income) who attend an academic-track school.[8] Based on their guesses, we can also calculate the within-respondent estimate for the SES gap in attendance rates.

To shed further light on the belief-updating process, we re-elicit respondents' beliefs about the academic-track attendance rates in the follow-up survey conducted two weeks after the main survey. The follow-up survey re-elicits respondents' beliefs in the same way as the main survey but does not include any reminder of information provision. For the control group, this captures any changes in their prior beliefs either due to priming, salience after participating in our survey, or through other news or events in this period. For respondents in the treatment group, the follow-up survey allows us to study how respondents updated their beliefs as a result of receiving the information treatment in the earlier survey.

Eliciting the Perceived Role of Circumstances

We are interested in whether our factual information treatment on the academic-track school attendance rates changes respondents' perception of the role of students' effort and the role of circumstances in determining educational and labor-market success. We therefore ask respondents the following question: "Some say that success in life primarily depends on your own effort. Others say that success in life primarily depends on external circumstances. In your opinion, what determines whether one achieves the following in life?" Respondents can then choose one of the following four answer categories "mainly own effort", "rather own effort", "rather external circumstances", or "mainly external circumstances". To analyze the extent to which respondents draw a connection between educational and economic success, we elicit these views for both the role of circumstances in achieving "a high educational degree" and "a high income".

Eliciting Private Donations

Next, we investigate whether information on academic-track attendance rates of students from more and less advantaged backgrounds changes respondents' desire to financially support students from disadvantaged backgrounds. We thus implement a donation experiment in which respondents can choose to donate directly to charities that work to improve equality of opportunity in education. First, every respondent receives 80 tokens in addition to their regular

[8] The corresponding belief elicitation question is posed to all respondents regardless of their treatment assignment and reads as follows: "Think of a comparison between children from the better and worse off half of all families (in terms of social background and family income). What do you think is the percentage of students from.... (i) the more advantaged half of all families who attend a *Gymnasium*?, (ii) the less advantaged half of all families who attend a *Gymnasium*?"

compensation of 75 tokens for survey participation (see section 4.1 for details on the survey). Respondents can then decide to donate any amount between zero tokens or the full amount of 80 tokens to one or both of two charities which aim to help students from disadvantaged families.[9]

Given that donations directly reduce the monetary payout for the survey participants, they reflect revealed preferences for respondents' willingness to pay to support students from disadvantaged backgrounds. In addition, they are suitable for mitigating concerns of experimenter demand effects (Quidt et al. 2018; Mummolo and Peterson 2019), as potential demand effects should be lower in tasks where real money is at stake (Haaland et al. 2023).

Eliciting Policy Preferences

We focus on respondents' policy preferences towards equality of opportunity, which is most directly relevant in the education context, and ask respondents whether they favor or oppose increased governmental redistributive education spending for children from less advantaged families to increase equality of opportunity.[10] Answers to this question are reported on a five-point Likert-scale ranging from "strongly favor" to "strongly oppose". The question also states that additional expenditure usually has to be financed through taxes.

4.3. Sample Balance

Appendix Table A2 presents results from a balancing test to check whether the randomization successfully balanced respondents' observable characteristics across the two groups of the main experiment. The first column shows the average characteristics in the control group. The subsequent columns present characteristics of the information treatment group together with the respective difference to the control group. With 31 comparisons, we would expect 1.55 to significantly differ from zero at the five percent level due to type I error. For our sample, two are significant at the five-percent level. Moreover, regressing treatment status simultaneously on all covariates gives a p-value for joint significance of 0.3. We thus

[9] The selected charities are *Deutsches Kinderhilfswerk e.V.* and *Die Chancenstiftung*. Upon request, respondents could choose to learn more about these two charities by clicking on a link that displayed additional information (overall, 13.8 percent chose to learn more about the charities). The additional information about *Deutsches Kinderhilfswerk e.V.* states that the foundation is committed to a child-friendly Germany and that donations are dedicated to the "*Chancengerechter Bildungsstart*" project; this, among others, provides school materials to children from low-income families. The additional information about *Die Chancenstiftung* states that the charity awards scholarships to children and young people from low-income families. The scholarship recipients usually receive professional tutoring.

[10] Measuring peoples' preferences for equality of opportunity policies by eliciting their view on education spending is a common approach (Alesina et al. 2018; Fehr, Müller, et al. 2022).

conclude that random assignment worked as intended. Nevertheless, we include a large set of control variables in most regressions to increase the efficiency of our estimates.

Next, Appendix Table A3 investigates whether participation in the follow-up survey is related to treatment assignment in the main survey. Regressing a dummy for follow-up-survey participation on the treatment indicator and covariates shows no evidence of differential attrition due to receiving the information treatment. Furthermore, the table reveals that respondents who are older, those who tend to vote for parties outside the mainstream, and respondents with a middle school or university entrance degree, are more likely to participate in the follow-up survey. Reassuringly, among follow-up survey participants, respondents' observable characteristics are still well-balanced across treatment arms (see Appendix Table A4). Therefore, treatment-effect estimates of the information treatment on outcomes measured in the follow-up survey continue to be unbiased.

4.4. The Econometric Model

We estimate the effects of the information treatment on outcomes with the following regression model:

$$y_i = \alpha_0 + \alpha_1 T_i + \delta' X_i + \varepsilon_i \qquad (1)$$

where y_i is the outcome variable of interest for respondent i, i.e., the perceived role of circumstances, private donations, and demand for redistributive education spending. T_i indicates whether respondent i received information on the relationship between academic-track attendance and parental background. X_i is a vector of control variables (see Table 1 notes for details), and ε_i is the error term. Since ε_i is uncorrelated with treatment status through randomization, the coefficient α_1 provides an unbiased estimate for the causal treatment effect of information provision. Since the inclusion of covariates may increase the precision of estimates, we often show results both with and without covariates.

5. Results

This section describes the experimental results. We first examine whether information about the differential academic-track attendance rates by parental background affects respondents' perceived role of circumstances (section 5.1). We then analyze whether this effect also translates into respondents' donation decisions (section 5.2) and their preferences for redistributive education spending (section 5.3).

5.1. Information Provision and Perceived Role of Circumstances

Figure 1 illustrates the treatment effect of providing information about the academic-track attendance rates of students from more and less advantaged students on respondents' perceived role of circumstances in achieving (i) a high educational degree (Panel A) and (ii) a high income (Panel B).

The information treatment has a large and significant effect on respondents' expressed view that educational attainment results from external circumstances (see Figure 1, Panel A). In the uninformed control group, a baseline share of 17.3 percent states that a high educational degree (mainly or rather) depends on external circumstances, and 82.7 percent state that it is (mainly or rather) due to own effort. In the treatment group, where respondents are informed about the academic-track attendance rates of students from more (49 percent) and less advantaged families (19 percent), the share that attributes educational attainment to external circumstances largely and significantly increases by 12.1 percentage points to 29.4 percent. This suggests that treated respondents update their views on the importance of students' circumstances in the German education system. As outlined in section 2, the hypothesized direction of the treatment effect also depends on whether the provided information is a downward or upward shock given respondents' prior beliefs, which we discuss in section 6.1.

The effects of information provision on the perceived role of circumstances in income inequality are similar but much smaller. Among respondents in the control group, 35.0 percent state that a high income is due to external circumstances (see Figure 1, Panel B). This share increases slightly to 38.8 percent, an increase which is nominally small and statistically insignificant at conventional levels. This suggests that respondents do not update their views on the labor market in line with their change in perceptions of the importance of external circumstances in the education system.

Table 1 reports experimental results based on equation (1) as elicited on the four-point scale, with higher values indicating a stronger role of external circumstances.[11] In line with Figure 1, information on academic-track attendance rates of students from more and less advantaged backgrounds significantly shifts respondents' answers towards reporting a greater importance of external circumstances in determining high educational attainment (column 1). The effect

[11] Results are robust to the coding and choice of specification. While all models in this paper are estimated as linear probability models, (ordered) probit models produce qualitatively similar results (results available upon request). Similarly, conclusions drawn from Table 1 remain unchanged if we regress the treatment indicator on a binary indicator of perceived role of circumstances (analogous to Figure 1) or if a separate coefficient is estimated for each answer category (see Appendix Table A5).

amounts to 0.3 points on a scale from one to four, which is an increase of 14.2 percent of the mean. Together with the finding of an increase in the share of those attributing educational success to external circumstances by 12.1 percentage points (69.4 percent), this is a rather sizeable effect. Column 3 corroborates that the information treatment hardly affects respondents' view on the role of external circumstances in determining income. Reassuringly, including covariates does not qualitatively affect our results (columns 2 and 4).

Table 2 shows that significant effects of information provision continue to persist in the follow-up survey two weeks after the provision of information.[12] It appears that the initial treatment effect on the perceived role of circumstances for a high educational degree is very similar for the sample of respondents participating in the follow-up survey, with an increase of 0.3 scale points (columns 1 and 2). The treatment effect of information provision on the same item in the follow-up survey is reduced by about two-thirds but is still positively significant. A smaller size of the coefficient in the follow-up survey would be expected and could be consistent with imperfect recall or information compliance. Nevertheless, the positive effect implies that respondents in the treatment group change their perception on the role of circumstances in education not only momentarily while information on academic-track attendance rates by parental SES is available on the screen, but over an extended time period. While both salience effects and belief-updating could drive immediate effects of information provision, this persistence implies that respondents are in fact able to understand and remember the information provided. Therefore, the treatment effect is unlikely to derive only from salience or experimenter-demand (Haaland et al. 2023) and at least partly reflects information updating.

In sum, providing information on the extent of inequality in academic-track attendance rates by parental background has a large and positive effect on the share of respondents who view a high educational degree as the result of external circumstances; this effect persists in a follow-up survey two weeks later. At the same time, the information treatment does not affect respondents' perception of the role of circumstances in determining income inequality, suggesting that respondents do not infer a strong link between circumstance-induced differences in educational outcomes and income differences. This counters an extensive literature documenting the importance of education outcomes for future earnings. An

[12] To analyze the effects of the information treatment on belief updating, we estimate the following model: $y_{it} = \beta_0 + \beta_1 T_i + \beta_2 T_i \times Time\ surveyed_t + \beta_3 Time\ surveyed_t + \theta' X_i + \epsilon_i$, where y_{it} is the outcome variable of interest for respondent *i* at time *t* with $t \in$ {main survey, follow-up survey}.

alternative interpretation would be in line with the literature on equality of opportunities, which conjectures that adults are responsible for their own education and career decisions, while children might not be (Roemer 2004). In this case, respondents could believe that inequality in earnings predominantly affects adults, whom they see as responsible for their labor market outcomes regardless of their parental circumstances.

5.2. Information Provision and Private Donations

In this section, we report estimates showing that information on academic-track attendance rates of students from different parental background increases donations to education charities supporting students from disadvantaged backgrounds.

In the control group, most respondents (66 percent) decide to donate a positive amount to charity, on average 37.5 out of 80 available tokens. Figure 2 shows that the treatment decreases small donations of up to ten tokens in favor of larger donations.

Table 3 regresses the donated amounts on the treatment indicator based on equation (1). Information on the difference in academic-track attendance rates by parental background significantly increases the share of respondents who decide to donate any positive amount by 9 percentage points (see column 1). Similarly, the average amount of donated tokens significantly increases by 3.3 tokens in the treatment group, or 9 percent (column 2). The share of respondents who decide to donate the full amount of 80 tokens (30 percent) does not change in the treatment group (column 3). We also find an increase in the share of respondents who donate more than the control group median (column 4), suggesting that our information treatment not only positively affects very small donations.[13]

These increases in donation behavior suggest that respondents in the treatment group are more likely to support students from disadvantaged families when they receive information on attendance rates by parental backgrounds. This is in line with our finding of increases in the perception that educational success depends on external circumstances for treated respondents.

[13] When making their donation decision, respondents had the opportunity to distribute their donations between two charities (see section 4.2 for details). In the control group, the majority of those who decide to donate a positive amount equally divided their donations between both charities (63.7 percent). 28.6 percent allocate the full amount of their donations to *Deutsches Kinderhilfswerk e.V*. The remaining 7.6 percent allocate the full amount to *Die Chancenstiftung*. While our information treatment significantly increases the size of the average donation, the allocation of donations between the charities remains largely unaffected (results available upon request).

5.3. Information Provision and Demand for Redistributive Education Spending

Next, we show that treatment effects of information on academic-track attendance rates on donations do not translate into increased demand for governmental redistributive education spending. Table 4 regresses respondents' policy preferences about redistributive education spending on the treatment indicator based on equation (1). Results show a 1.1 percentage points reduction in support (column 1) and a 1.5 percentage points increase in opposition (column 2) and are neither statistically nor economically significant. Further exploiting variation by measuring preferences on the continuous five-point measure of support for more redistributive education spending reveals very similar results. In this specification, the information treatment decreases demand for redistributive education spending by -0.005 points on the Likert scale, which is not statistically significant at conventional levels (column 3).

Descriptively, we find very high baseline support towards increased governmental spending for children from less advantaged families. In the control group, 75.1 percent of respondents (strongly) favor increased education spending to foster equality of opportunity. Only a small minority of 12.6 percent opposes higher spending for children from disadvantaged backgrounds. These effects are in line with a high share of respondents who decide to donate positive amounts to charities supporting students from less advantaged backgrounds.

Our findings imply that despite the considerable support among respondents for education spending aimed at fostering equality of opportunity, and the fact that information on academic-track attendance rates of students from more or less advantaged backgrounds changes the perception of the role of circumstances in education and private donation behavior, treated respondents do not show strong effects of the information on policy preferences. This difference could be due to multiple reasons. In particular, in our experimental setting respondents might face more uncertainty about the redistributive impact of increased public education spending compared to increased donations. The finding is also in line with previous literature, which shows that policy preferences for redistributive reforms can be unresponsive even if perceptions of inequality change (Alesina et al. 2018). Similarly, Luttmer and Singhal (2011) suggest that preferences for governmental redistribution have an important cultural component that is rather stable over time. Other studies argue that even if respondents update their factual beliefs, it remains unclear as to whether people use these facts when forming political opinions (Zhang 2022; Gaines et al. 2007; Khanna and Sood 2018).

In the next section, we discuss evidence on respondents' prior beliefs to shed further light on the mechanisms behind our treatment effects on perceptions, donations and policy preferences.

6. Mechanisms

In this section, we provide additional evidence on whether treatment effects are driven by belief updating (section 6.1), respondents' perceptions of students' academic achievement (section 6.2), the importance of components of external circumstances (section 6.3), and heterogeneities that might help characterize parts of the population that are susceptible to information (section 6.4). These results give further insight into the mechanisms behind the treatment effects documented in section 5.

6.1. Evidence on Misperceptions and Belief-Updating

As outlined in section 2, the expected effects of information on the academic-track attendance rates depend on respondents' previously held beliefs about attendance of students from different backgrounds. Therefore, we examine the extent to which information effects are related to previous misperceptions and which components of the information treatment drives respondents' answering behavior. We first show descriptive evidence on respondents' prior beliefs for the share of children from different parental backgrounds who attend an academic-track school before receiving information. We then provide experimental evidence on the effect of information provision on posterior beliefs from the follow-up survey about two weeks later.

Overall, respondents greatly overestimate both the levels and the SES gap of academic-track attendance in Germany. On average, respondents estimate that 71 percent of students (PISA value: 49 percent) from a more advantaged parental background attend the academic-track school (see Appendix Figure A4 for the full distribution of guesses). At the same time, they on average also estimate that 30 percent of students (PISA value: 19 percent) from a less advantaged parental background attend an academic-track school. Interestingly, these beliefs lead to an overestimation of the SES gap in academic-track attendance, which respondents expect to amount to 41 percentage points on average (PISA value: 30 percentage points). This would imply that the average treated respondent receives a downward information shock related to lower levels of attendance of academic-track schools compared to their prior belief (if they favor academic-track attendance for all students), but a positive information shock related to the smaller SES gap between groups (if they value small disparities between the education outcomes of these groups of students). Consequently, we would expect the aggregate

effects of the information treatment to differ depending on which consideration dominates. Our finding that information provision leads to an *increase* in the perception that circumstances are important for achieving a high educational outcome (see section 5.1) thus indicates that the average respondent is more concerned with the *levels* of academic-track attendance of students from less advantaged backgrounds than with the size of the difference between groups or with the levels of academic-track attendance of students from more advantaged backgrounds.

In line with this interpretation, results from the follow-up survey show the strongest evidence of belief updating for the estimates of academic-track attendance rates of students from less advantaged backgrounds. Table 5 regresses beliefs in the follow-up survey on the treatment indicator from the main survey based on equation (1). It shows that information provision persistently improves beliefs about academic-track attendance rates. Reported beliefs of respondents in the control group remain virtually the same between the main and the follow-up survey, with average estimates of academic-track attendance of 30 percent for less advantaged students (compared to 30 percent in the main survey) and 69 percent for more advantaged students (compared to 70 percent in the main survey). Treated respondents' beliefs about both these shares decrease, which is in line with factual lower academic-track school attendance rates for both groups. Respondents' beliefs about the academic-track attendance rates of students from less advantaged backgrounds decrease by 1.9 percentage points or 6 percent, while beliefs for students from more advantaged backgrounds decrease by 0.8 percentage points or 1 percent. While directions of effects are as expected for both guesses, the effect of the information treatment only reaches statistical significance for the guess of the share of students from less advantaged backgrounds. Together, these findings suggest that respondents care most about the level of academic-track attendance, as opposed to the difference in attendance levels between groups and are most concerned about students from less advantaged backgrounds. This result is in line with the finding that treated respondents are more willing to donate to charities helping disadvantaged students. In the case of charitable donations, funds are clearly sourced from the respondents' individual accounts and seamlessly channeled to the designated cause, leaving no ambiguity about the funds' origins or potential trade-offs. The pattern of findings also substantiates the interpretation that preferences for redistributive education spending do not increase in the treatment group. In the context of redistributive education spending, respondents may be uncertain about whether increased governmental education spending on the education of disadvantaged students could entail a reduction in resources allocated to more advantaged students. Therefore, upon learning about the inequality in educational outcomes by parental background, respondents may demonstrate

a greater willingness to contribute to charities that address the needs of less advantaged students. Nevertheless, this increased inclination towards charitable giving does not necessarily translate into parallel support for altering the existing public funding allocation formula.

6.2. Role of Academic Achievement

Parental background influences children's education success through a multitude of channels. One important channel is the effect of parental background on academic achievement of students (Skopek and Passaretta 2021). Since differences in academic achievement between groups are a salient factor in the German public debate on the transition to secondary education, we study how perceptions of academic achievement drive our results. In a meritocratic school system, it is often expected that educational success, including attendance of an academic-track school, should depend on ability and academic achievement rather than directly on circumstances or effort. Therefore, respondents could expect more advantaged children to be more likely to attend academic-track schools because they are better in school, and the resulting SES gap in academic-track attendance to purely reflect higher academic achievement of students from more advantaged parental backgrounds.

In order to understand respondents' perceptions of differences in academic achievement between more and less advantaged students, we extend our experimental framework by providing a third experimental group with an extended information treatment. Respondents in this group receive the same information as the main treatment group (see section 4.2) but also receive information on the residual SES gap in academic-track school attendance after controlling for students' academic achievement; this is equal to 16 percentage points (see Appendix A). This extended treatment enables us to investigate the extent to which perceived differences in academic achievement drive any treatment effects of information provision on our outcome measures. If respondents assume that the SES gap in academic-track attendance rates is primarily driven by differences in academic achievement (i.e., if they underestimate the residual SES gap), receiving information on the residual SES gap could induce respondents to think that students from different backgrounds do not differ as much as expected in terms of their academic achievement. In that case, the extended treatment is likely to produce larger treatment effects than the main treatment, as respondents would receive a downward shock on the perceived importance of academic achievement for academic-track school attendance. Conversely, if respondents assume differences in academic achievement between groups are small, learning that the difference in attendance rates conditional on achievement is 16 percentage points might lead respondents to conclude that a larger than anticipated proportion

of the gap can be attributed to differences in academic achievement. This could limit their view that circumstances are the most decisive factor and treatment effects might be smaller.

Treatment effects on the perceived role of circumstances of the extended information treatment are, in fact, smaller than those of the main treatment, which does not include information on the residual gap in academic-track attendance rates (see Appendix Table A6). This suggests that respondents underestimate differences in academic achievement for students from different parental backgrounds if this information is not included. The difference between the two treatment effects on the perceived role of circumstances for a high educational degree is statistically significant (Appendix Table A6, column 1).

Interestingly, treatment effects of the extended treatment on the average amount of donated tokens (2.9 tokens) are not significantly different from the main treatment, even though the point estimate is slightly lower (column 3).[14] This suggests that respondents' support for targeted spending is not diminished by information on differences in academic achievement between groups. This is in line with the interpretation that respondents are concerned with the levels of academic-track school attendance of students from less advantaged backgrounds (see section 6.1) and remain so if they receive information that academic achievement differences are larger than expected.

6.3. Perceptions of Components of Circumstances, Talent and Preferences

While section 5 documents respondents' perceptions on whether circumstances or effort are more decisive for education success, this section studies whether these views might be driven by perceptions of different components of external circumstances that respondents deem important for transition decisions of students and families. In addition, respondents might perceive differences in attendance rates to reflect parental preferences for vocational education (Lergetporer et al. 2021) or behavioral, informational, or institutional barriers (see, for example, Olczyk and Will 2019).

To explore this potential mechanism, we study treatment effects on the stated importance of different aspects related to the transition from primary to secondary schools. We ask respondents to rate how important the following five aspects are in determining whether a student transitions to an academic-track school on a five-point scale from "very important" to "very unimportant": (i) "educational attainment of parents", (ii) "financial situation of parents",

[14] In line with the findings on the main treatment effect, we do not find a treatment effect on preferences for redistribution (column 4).

(iii) "effort and diligence of students", (iv) "talent of students", and (v) "preferences of students and parents".

In the control group, 63 percent of respondents state that the educational background of parents is very or rather important for the transition to the academic-track schools, and 56 percent express the same belief for the financial situation of parents. Regressing the importance of the different aspects on the treatment indicator reveals that information on academic-track attendance rates by parental background increases the importance assigned by respondents to the educational background and financial situation of parents (see Table 6).[15] We find effect sizes of 0.1 standard deviations for both aspects. This finding is consistent with respondents' increased perception of external circumstances beyond an individual's control as the decisive factor for educational success or outcomes.

For the third item, the importance of effort, a very high share of respondents in the control group (93 percent) believe that students' effort and diligence is important for the transition from primary to secondary school. Interestingly, respondents' stated importance of students' effort and diligence is scarcely affected by the information treatment, suggesting that respondents do not revise their view on the importance of effort when they update their beliefs about the importance of external circumstances. Thus, while respondents were more likely to believe that external circumstances were decisive for determining educational success, this result indicates that they may continue to regard effort as a necessary precondition in line with the literature on skill acquisition.

Only half of the control group respondents consider the preferences of students and parents to be important for the transition from primary to secondary schools, while 91 percent think that students' talent is important. We do not find effects of information provision on the perceived importance of students' talent or students' and parents' preferences for an academic-track school. This implies that respondents do not update their perceptions of parental preferences when receiving the information treatment.

Together, results on the perceived importance of these different aspects suggest that treated respondents especially change their view regarding the importance of external circumstances, i.e., parental education and financial situation, in determining students' track choice at the transition from primary to secondary school. Thus, our finding of an increase in the share of respondents attributing educational success to external circumstances seems to be driven by an increase in the perceived role of circumstances, rather than a decrease in the perceived

[15] For the regressions, we z-standardize the five-point scale outcomes.

importance of effort. This observation also corroborates the interpretation that donation behavior is driven by respondents' increased perception of more institutional barriers to academic-track school attendance than expected, which cannot be overcome by students' effort alone.

6.4. Policy Effectiveness and Heterogeneity of Treatment Effects[16]

In this last section we show that our patterns of results, in particular the absence of treatment effects on support for redistributive education spending, is not driven by offsetting effects in particular subgroups or concerns regarding the political process.

First, we explore whether doubts about policy effectiveness can explain our limited treatment effects on policy preferences. If respondents were to believe that targeted support by charities might benefit less advantaged students, while public redistributive education spending is not suitable for fostering equality of opportunity, information provision on academic-track attendance rates by parental background may induce respondents to increase private donations. However, it might not change their preferences for redistributive education spending by the government as elicited in our specific policy question.

To test this hypothesis, we asked a subset of respondents whether, in their opinion, a variety of potential policy interventions are suitable for fostering equality of opportunity. Appendix Figure A5 reveals that the vast majority of respondents (84 percent) states that increasing governmental expenditure to schools mostly serving children from a disadvantaged family background is very or rather suitable for decreasing educational inequality in Germany (Panel A). In fact, this share is among the highest compared to other policy proposals frequently discussed in the context of reducing educational inequality in the German public debate. We therefore conclude that perceived ineffectiveness of public targeted spending as a means to achieve the policy goal is an unlikely driver of our results.

Similarly, treatment effects could be limited if respondents expect increased education spending to jeopardize other important education policy goals. In particular, respondents may perceive a trade-off between increasing equality and increasing efficiency of the education system. We do not find evidence of this belief in our sample: as Appendix Figure A5 reveals,

[16] In the preregistration for this experiment, we committed to performing heterogeneity by prior beliefs, respondents' own educational attainment, and respondents' trust in government. This section additionally reports explorative results on political ideology. The analysis of prior beliefs reveals that differences in treatment effects between over-estimators, under-estimators, and those whose guesses are roughly correct are not statistically significant, albeit sizes of point estimates are non-negligible (results available on request).

the vast majority (80 percent) states that increased governmental spending for schools is also highly suitable for enhancing the performance of the German education system (Panel B).

Next, we explore the role of respondents' sociodemographic characteristics. Respondents' perception of the role of circumstances and effort in achieving educational success could be partly based on their personal experience in the education system. For example, respondents with high educational degrees might believe their success was due to their diligence and effort. In contrast, respondents who did not obtain higher qualifications may be more likely to attribute their failure to adverse conditions or external circumstances. Therefore, the information could lead to asymmetric updating for respondents with different education degrees. Appendix Table A7 reports heterogeneity of the treatment effects by whether respondents obtained a university entrance qualification (*Abitur*, which is usually obtained at academic-track schools, see section 3). The information effect on private donations is predominantly driven by respondents without a university entrance qualification. Treatment effects on the perceived role of circumstances and demand for redistributive education spending do not differ between groups. These findings are in line with the interpretation that donation behavior is driven by a concern for the academic-track school attendance of students from less advantaged backgrounds and does not suggest that information updating differs between respondents with different education backgrounds.

Moreover, the null effect of our information treatment on support for redistributive education spending by the government could conceal important heterogeneities by respondents' political ideology or partisanship. Left-wing respondents might be more supportive of equal-opportunity policies by the government. In contrast, right-wing respondents may change their views on the role of circumstances in education and preferences for private donations, but not favor additional governmental intervention (see e.g., Alesina et al. (2018) on information about intergenerational mobility or Haaland and Roth (2023) on information about racial gaps). We test this hypothesis using data on respondents' long-term party attachment[17] and distinguish between the following three subgroups: (i) left-leaning partisans, i.e., respondents who report that they support SPD, LINKE, or GRÜNE, (ii) right-leaning partisans, i.e., respondents who report that they support CDU/CSU, FDP, or AfD and (iii) non-partisans, i.e., respondents who report that they have no particular long-term party attachment. Appendix Table A8 reports results on the perceived role of circumstances, private donations, and demand for redistributive

[17] We focus on long-term party attachment because it reflects fundamental political values rather than short-term considerations guiding intended voting behavior.

education spending. Columns 1, 4, and 7 report information effects for left-leaning respondents, columns 2, 5, and 8 for right-leaning respondents and the remaining columns for respondents with no particular party attachment. The information treatment effect on the perceived role of external circumstances is stronger for left-leaning respondents than those from the right. Similarly, treatment effects on private donations are larger, albeit not statistically significant, for respondents with any party affiliation compared to those who are non-partisans. However, treatment effects on preferences for redistributive education spending do not significantly differ between respondents with different political ideologies; even though left-leaning respondents report more demand for increases in redistributive education spending at baseline than right-leaning respondents and non-partisans (see columns 7 and 8). Overall, differences by political ideology appear too small to explain our overall pattern of results.

A similar channel could be that some respondents do not favor increases in governmental redistribution due to a lack of trust in government (Kuziemko et al. 2015). In fact, 68 percent of respondents report that they have little or no trust in the German government. We find no evidence of significant treatment differences for the perceived role of circumstances and demand for redistributive education spending (see Appendix Table A9). The treatment effect on private donations is substantially larger for respondents reporting high levels of trust in the German government, but power of the subgroup analysis is limited (see column 3, p-value = 0.09). Thus, a lack of trust in government is again unlikely to explain our results.

Overall, we find some evidence of heterogeneity on private donations, especially by respondents' own educational background, but no indication of heterogeneous treatment effects on demand for redistributive education spending. To further decrease the probability of undetected heterogeneous effects in subgroups that could change the interpretation of our main findings, we implement a data-driven machine learning approach, the Causal Forest algorithm (Bertrand et al. 2017; Athey and Imbens 2016; Wager and Athey 2018; Athey et al. 2019; Breiman 2001). This approach also allows us to capture more complex, high-dimensional combinations of covariates that may be otherwise undetected (see Appendix B for more details on the method). Appendix Figure A6 visualizes the distribution of the predicted conditional average treatment effects (CATEs) on demand for redistributive education spending. Overall, the predicted treatment effects do not indicate treatment heterogeneity. The majority of the predicted CATEs lie between -0.10 and 0.10, which is relatively small compared to the scale from one to five. This impression is corroborated when dividing the sample into four subgroups according to the size of their predicted CATE and calculating the average treatment effect within these four groups (Appendix Figure A7). Appendix Table A10 illustrates the differences

between the four groups in respondents' characteristics. We see differences between respondents with the lowest predicted CATE and respondents with the highest predicted CATE in most dimensions, although the magnitudes are often economically unimportant. Finally, Appendix Table A11 shows the ranking of the covariates in terms of the variable importance. The variable importance captures the relative frequency with which a forest splits on the covariates across all grown trees (Farbmacher et al. 2021). Interestingly, whether respondents hold a university entrance qualification is one of the most important variables, even though effect heterogeneities were confirmed to be small in Appendix Table A7.

In sum, we observe limited heterogeneity of treatment effects. For private donations, treatment effects show some heterogeneity by respondents' own educational background. But more importantly, we rule out several explanations for the muted treatment effect on respondents' demand for redistributive educational spending: Lack of trust in government, partisan biases, doubts about policy effectiveness and own educational attainment cannot explain the difference in effects between private donations and policy preferences. This leaves differences between the opportunity costs of funds as a likely explanation: the opportunity costs of funds used for public targeted spending are likely to be less transparent compared to those of the donated amount. While respondents may be unsure as to whether increased spending on students from less advantaged backgrounds would be diverted from other education spending at the detriment of other student groups, i.e. more advantaged children, or other public spending, they are well-informed about the trade-offs of making a private donation.

7. Conclusion

Educational inequality is a major concern for policymakers worldwide and could play a crucial role in determining demand for targeted spending in favor of less advantaged students. By conducting a large-scale experiment, we study how information about academic-track school attendance rates by parental background in Germany affects individuals' perception of the role of circumstances, their preferences for private donations, and their demand for governmental redistributive education spending. The information provided consists of three pieces: the absolute academic-track attendance rates between students from more and less advantaged backgrounds as well as the difference in the attendance rates of those two groups. We find that most respondents think that educational success is determined by effort rather than external circumstances. We then show that information about academic-track attendance rates of more and less advantaged students in Germany affects these views: when information

on attendance rates is provided, the share of respondents who believe that educational success is determined by circumstances significantly increases. Similarly, respondents in the treatment group increase their donations to charities that support students from less advantaged backgrounds, while demand for public targeted spending remains unchanged.

We document how respondents underestimate the academic-track school attendance rates of students from both less and more advantaged backgrounds. This would suggest positive effects on support for targeted spending, whereas they are overly pessimistic regarding the size of the difference between groups, which could mean that information on the true gap reduces support for less advantaged students. Our finding of positive treatment effects on donation behavior thus suggests that respondents are predominantly concerned with the levels of academic-track attendance in Germany, as opposed to differences between groups of students. We also document that information retention is highest regarding information on the academic-track attendance rates of less advantaged students, indicating that this is the information that respondents might find most relevant. Differences in treatment effects for donation behavior, i.e., private targeted spending, and public redistributive spending are in line with the interpretation that respondents support targeted spending if such funding is not redirected for more advantaged students or other areas of the education system. While redistribution in the donation setting takes places between respondents themselves and charities that support students from less advantaged backgrounds, the opportunity costs of funds redirected through public spending formulas are less clear. Since respondents also *overestimate* the educational achievements of students from more advantaged backgrounds, this suggests they might be reluctant to support public redistributive policies upon learning about both groups' academic-track attendance rates.

Our results are relevant for the political economy of education finance in Germany. Individuals demonstrate a strong willingness to support students from less advantaged backgrounds through private or public targeted spending and increase their private support upon receiving information on education outcomes of different groups of students. Whether information on the education prospects of disadvantaged students can also create a politically feasible pathway to more targeted education spending on a large scale continues to be an issue for further research. More research is needed to explore whether transparency regarding the source and opportunity costs of governmental spending is the missing link between respondents' concerns and support for targeted public spending.

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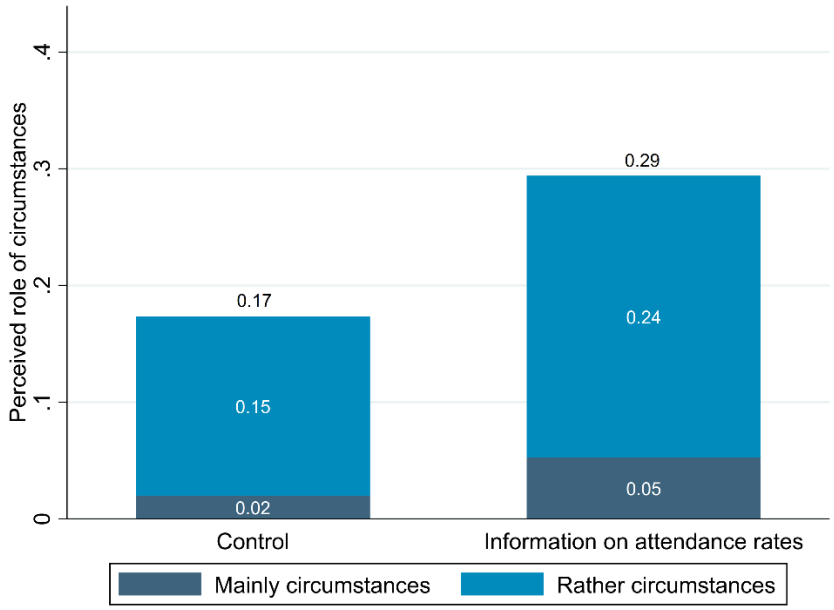
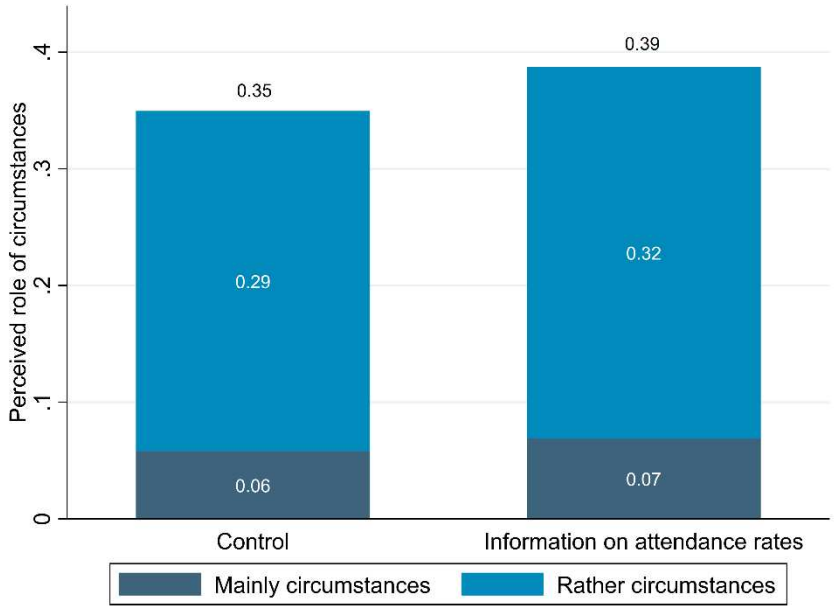
Figures & Tables

Figure 1: Effect of Information Treatment on Perceived Role of Circumstances

Panel A: Perceived role of circumstances (high educational degree)

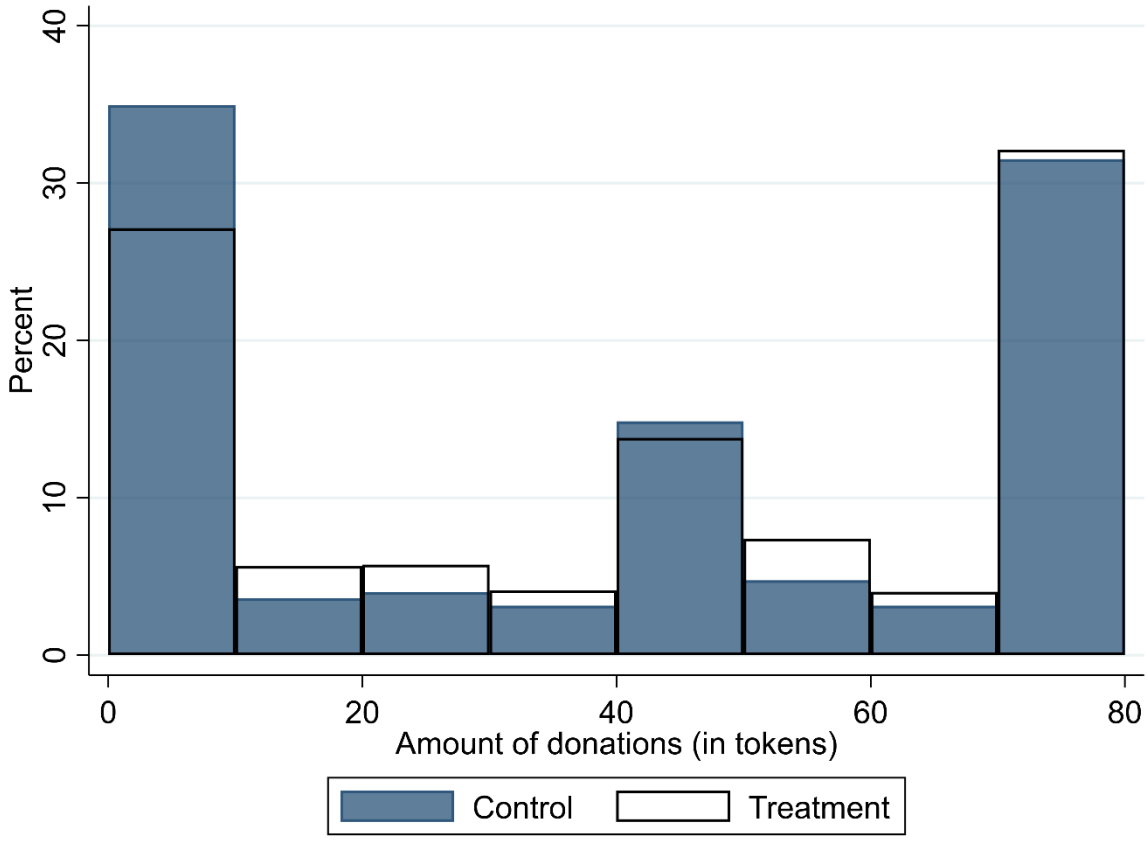


Panel B: Perceived role of circumstances (high income)



Notes: Responses to the question "Some say that success in life depends primarily on one's own effort. Others say that success in life depends primarily on external circumstances. In your opinion, what determines whether one achieves the following in life? a high educational degree (Panel A), a high income (Panel B)". Randomized experimental treatment "information on attendance rates": Respondents informed about differences in academic-track attendance rates by parental background. Data source: ifo Education Survey 2019.

Figure 2: Distribution of Private Donations across Experimental Groups



Notes: Distribution of respondents' private donations to charities that aim at supporting students from less advantaged backgrounds to foster equality of opportunity (divided in eight bins) by treatment and control group. Randomized experimental treatment "information on attendance rates": Respondents informed about differences in academic-track attendance rates by parental background. Data source: ifo Education Survey 2019.

Table 1: Effect of Information Treatment on Perceived Role of Circumstances

	Perceived role of circumstances (High educational degree)		Perceived role of circumstances (High income)	
	(1)	(2)	(3)	(4)
Information on attendance rates	0.255***	0.257***	0.048	0.048
	(0.036)	*(0.035)*	*(0.038)*	*(0.037)*
Covariates	No	Yes	No	Yes
Control mean	1.802	1.802	2.181	2.181
Observations	2,094	2,094	2,093	2,093
R-squared	0.024	0.073	0.001	0.042

Notes: OLS regressions. Dependent variables: (1) - (2) Perception that circumstances, not effort, are decisive for high educational attainment on a four-point scale, with higher values indicating more importance of circumstances ("mainly external circumstances", "rather external circumstances", "rather own effort", "mainly own effort"), (3) – (4) Perception that circumstances, not effort, are decisive for high income on a four-point scale, with higher values indicating more importance of circumstances ("mainly external circumstances", "rather external circumstances", "rather own effort", "mainly own effort"). Randomized experimental treatment "information on attendance rates": respondents informed about differences in academic-track attendance rates by parental background. Control mean: mean of the outcome variable in the control group. Covariates include: age, female, born in Germany, West Germany, living in large city, risk, patience, parents with university education, income, current employment status, middle school degree, high school degree, partner living in household, parental status, work in education sector and imputation dummies. Data source: ifo Education Survey 2019. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Table 2: Persistence of Information Treatment Effect on Perceived Role of Circumstances

	Perceived role of circumstances (High educational degree)		Perceived role of circumstances (High income)	
	(1)	(2)	(3)	(4)
Information on attendance rates	0.262***	0.256***	0.054	0.052
	(0.040)	*(0.039)*	*(0.042)*	*(0.042)*
Information on attendance rates x follow-up	-0.183***	-0.183***	-0.036	-0.036
	(0.040)	*(0.040)*	*(0.043)*	*(0.043)*
Follow-up	-0.017	-0.017	-0.049*	-0.049*
	(0.028)	*(0.029)*	*(0.030)*	*(0.030)*
Information on attendance rates in follow-up	0.079**	0.074**	0.018	0.016
	(0.036)	*(0.035)*	*(0.041)*	*(0.040)*
Covariates	No	Yes	No	Yes
Observations	1,671	1,671	1,671	1,671
R-squared	0.020	0.063	0.002	0.042

Notes: OLS regressions. See equation (2). Dependent variables: (1) - (2) Perception that circumstances, not effort, are decisive for high educational attainment on a four-point scale, with higher values indicating more importance of circumstances, (3) - (4) Perception that circumstances, not effort, are decisive for high education attainment on a four-point scale, with higher values indicating more importance of circumstances. Randomized experimental treatment "information on attendance rates": respondents informed about differences in academic-track attendance rates by parental background. See Table 1 for included covariates. Data source: ifo Education Survey 2019. Sample: Respondents who participated in the follow-up survey. Robust standard errors in parentheses, adjusted for clustering at the respondent level * p<0.1, ** p<0.05, *** p<0.01.

Table 3: Effect of Information Treatment on Private Donations

	Any positive donation	Average donations	Full donation	Donation above median
	(1)	(2)	(3)	(4)
Information on attendance rates	0.093***	3.267**	0.004	0.046**
	(0.020)	*(1.401)*	*(0.020)*	*(0.021)*
Covariates	Yes	Yes	Yes	Yes
Control mean	0.662	37.499	0.303	0.396
Observations	2,093	2,093	2,093	2,093
R-squared	0.056	0.061	0.046	0.041

Notes: OLS regressions. Dependent variables: (1) Dummy variable coded one if amount of donations is positive, (2) Amount of donations stated by respondents (in tokens), (3) Dummy variable coded one if amount of donations is 80 (maximum possible donation), (4) Dummy variable coded one if amount of donation is above the control group median donation. Randomized experimental treatment "information on attendance rates": respondents informed about differences in academic-track attendance rates by parental background. Control mean: mean of the outcome variable in the control group. See Table 1 for included covariates. Data source: ifo Education Survey 2019. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Table 4: Effect of Information Treatment on Demand for Redistributive Education Spending

	In favor of increased redistributive education spending	Opposition to increased redistributive education spending	Demand for redistributive education spending
	(1)	(2)	(3)
Information on attendance rates	-0.011	0.015	-0.005
	(0.019)	*(0.015)*	*(0.043)*
Covariates	Yes	Yes	Yes
Control mean	0.751	0.126	3.823
Observations	2,094	2,094	2,094
R-squared	0.034	0.023	0.040

Notes: OLS regressions. Dependent variables: (1) Dummy variable coded one if respondent is mainly/rather in favor of redistributive education spending, (2) Dummy variable coded one if respondent is rather not/not at all in favor of redistributive education spending, (3) Demand for redistributive education spending on five-point scale, with higher values indicating more demand for redistributive education spending. Randomized experimental treatment "information on attendance rates": respondents informed about differences in academic-track attendance rates by parental background. Control mean: mean of the outcome variable in the control group. See Table 1 for included covariates. Data source: ifo Education Survey 2019. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Table 5: Effect of Information Treatment on Posterior Beliefs Elicited in the Follow-Up Survey

	Belief: Academic-track attendance (SES gap)		Belief: Academic-track attendance (high SES)		Belief: Academic-track attendance (low SES)	
	(1)	(2)	(3)	(4)	(5)	(6)
Information on attendance rates	0.942	1.154	-0.869	-0.784	-1.811***	-1.938***
	(1.033)	*(1.032)*	*(0.813)*	*(0.808)*	*(0.668)*	*(0.671)*
Covariates	No	Yes	No	Yes	No	Yes
Control mean	38.689	38.689	68.957	68.957	30.268	30.268
Observations	1,671	1,671	1,671	1,671	1,671	1,671
R-squared	0.000	0.040	0.001	0.042	0.004	0.028

Notes: OLS regressions. Dependent variables: (1) - (6) Respondents' stated posterior belief as indicated in the table header. Randomized experimental treatment "information on attendance rates": respondents informed about differences in academic-track attendance rates by parental background. Control mean: mean of the outcome variable in the control group. See Table 1 for included covariates. Data source: ifo Education Survey 2019. Sample: Respondents in the follow-up survey. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Table 6: Effect of Information Treatment on Aspects Important for Academic School Attendance

	Parental education	Financial situation	Effort	Talent	Preferences
	(1)	(2)	(3)	(4)	(5)
Information on attendance rates	0.134***	0.124***	-0.015	-0.017	0.070
	(0.043)	(0.043)	(0.040)	(0.040)	(0.044)
Covariates	Yes	Yes	Yes	Yes	Yes
Control importance	0.625	0.557	0.933	0.907	0.500
Observations	2,094	2,094	2,094	2,094	2,094
R-squared	0.047	0.037	0.050	0.075	0.015

Notes: OLS regressions. Dependent variables: Respondents' stated importance that the following aspects are important for transition to *Gymnasium* elicited on five-point scale, 1 = not important at all, 5 = very important, standardized mean zero, standard deviation one; (1) parental education, (2) financial situation, (3) effort, (4) talent, (5) preferences. Randomized experimental treatment "information on attendance rates": respondents informed about differences in academic-track attendance rates by parental background. Control importance: share of those who state that respective aspect is very/rather important in the control group. See Table 1 for included covariates. Data source: ifo Education Survey 2019. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Appendix A: Derivation of Information Treatments

Our randomized information treatment informs respondents about the gaps in academic-track school (*Gymnasium*) attendance rates of 15-year-old children in the lowest and highest 50 percent of family SES status. The main treatment informs participants that 49 percent of students from the more advantaged half of all families (in terms of their social background and family income) attend a *Gymnasium* while only 19 percent of students from the less advantaged half of all families do so. This yields an unconditional SES gap of 30 percentage points.

The information on the SES gap provided in the treatment could, for instance, reflect the fact that low SES students perform worse in school and are therefore less likely to attend the *Gymnasium*. Alternatively, it could reflect SES differences in behavioral barriers (e.g., institutional knowledge of parents) that are unrelated to student achievement.

The treatment uses the connection between children's school attendance and their parents' socioeconomic status as a measure for educational inequality. The focus on academic-track school attendance captures an important dimension of equality of opportunity since *Gymnasium* attendance is a crucial step towards obtaining the university entrance degree and, thus, also important for later life income (e.g., Dodin et al. 2024).

To calculate the gap in academic school attendance rates, we use data from the Programme for International Student Assessment (PISA) conducted by the OECD in 2015. For the SES split, we use the PISA index of economic, social, and cultural status (ESCS), a composite measure of home possessions including books at home, the highest parental occupation, and the highest parental education. We first rank German children according to their points in this index and then perform a median split of students. We calculate that 19 percent children with an SES index score below the median and 49 percent of children with an index score above the median attend a *Gymnasium*.

As mentioned in section 6.2, we also provide a third experimental group with an additional information treatment. Respondents in this group receive the same information as the main treatment group (see section 3.2), as well as information on the residual SES gap in academic-track school attendance when controlling for students' academic achievement. Thus, this treatment further informs respondents that if we compare only students who are equally good in math and reading, the SES gap amounts to 16 percentage. To obtain the residual SES gap, we regress *Gymnasium* attendance on a dummy indicating whether the student is above or below the median of the SES index alongside controls for the students' math and reading test scores in PISA. We then use the coefficient on the SES indicator to report a conditional gap of 16 percentage points.

Measuring educational inequality as socioeconomic differences in *Gymnasium* attendance has a major advantage. In contrast to achievement measures, e.g., PISA test scores as used, for instance, by Lergetporer et al. (2020), *Gymnasium* attendance rates are easily interpretable for the general population. In the public debate, differences in academic school attendance rates are frequently used by the media to report on the extent of educational inequality. For instance, the newspaper ZEIT has several reports on the so-called *Bildungstrichter* ("education hopper") with an essential component of this hopper constituting the difference in *Gymnasium* attendance between high and low SES students (see, e.g., Die Zeit, 9 May 2018, https://www.zeit.de/gesellschaft/2018-05/chancengleichheit-herkunft-elternhaus-universitaet-akademikerfamilie [accessed 25 January 2022]).

Appendix B: Causal Forest Algorithm

Causal Forest Algorithm - Theory

We use the Causal Forest algorithm, proposed by Wager and Athey (2018), and Athey et al. (2019), to estimate the Conditional Average Treatment Effects (CATE):

$$\tau(x) = E[Y_i(1) - Y_i(0)|X_i = x\ ]. \quad (3)$$

This method is based on a standard regression tree: the algorithm starts with the whole (training) dataset, takes a covariate, and splits the data into two leaves. The split is chosen such that it minimizes the goodness-of-fit criterion. The algorithm repeats this process until it reaches a terminal leaf. Within these terminal leaves, everyone shares values of certain covariates. Out-of-sample predictions are then made by determining which terminal leaf an observation belongs to, based on the covariates (Davis and Heller 2017). The CATE is obtained as the difference in the mean outcomes between a treatment and control observation within a terminal leaf (Davis and Heller 2017). In other words, the CATE is the predicted treatment effect for out-of-sample observations that belong to a terminal leaf with specific values of a covariate.

When estimating the CATEs, we apply the so-called "honest" approach and grow so-called "honest trees" to obtain unbiased estimates and to ensure correct inference (Athey and Imbens 2016; Wager and Athey 2018): One part of the training data is used for building and growing the best fitting tree, i.e., it is used to estimate the model parameters and to determine the splits in the tree. The other part is used to estimate the treatment effects within each leaf of the tree using the estimated parameters. Hence, we fit two separate regressions.

Wager and Athey (2018) expand the idea of a causal tree to many trees: The Causal Forest, similar to the Random Forest algorithm proposed by Breiman (2001). Each tree is grown using greedy recursive partitioning on a random subset of the training data. A random split selection restricts the variables that are used at each split. Athey et al. (2019) preserve these elements in their Generalized Random Forest algorithm, but instead of averaging the estimates from each tree, they use a version of adaptive nearest neighbor estimator where "close" observations obtain more weight similar as in k-nearest neighbor estimations. More specifically, they use forest-based weights: in that case, a "close" observation is one which often ends up in the same leaf as the target value (Wager and Athey 2018; Athey et al. 2020). In this case, the split criterion is to maximize the estimated treatment effect heterogeneity.

Causal Forest Algorithm - Implementation

We include the following baseline characteristics in the estimation: age, female, born in Germany, West Germany, living in large city, risk, patience, parents with university education, income, current employment status (full time, part time, self-employed, unemployed, retired/ill/etc.), middle school degree, university entrance degree, partner living in household, parental status, work in education sector, trust in government, education important for vote, general voting behavior.

We split the data set into 80 percent training and 20 percent test observations and evaluate the results on the test set.[1] We set the number of trees equal to 2,000 (according to the rule of thumb: number of observations). The number of variables that the algorithm examines at each split is set to five (square root covariates).

[1] Honesty fraction = 0.5; min node size = 8

Appendix Tables

Appendix Table A1: Comparison of Analysis Sample to Microcensus Data

	Microcensus 2018 (1)	Analysis sample (2)
Age	50.941 *(0.029)*	53.067 *(0.327)*
Female	0.509 *(0.001)*	0.531 *(0.011)*
Living in West Germany (excl. Berlin)	0.803 *(0.001)*	0.796 *(0.009)*
Net household income above median	0.482 *(0.001)*	0.438 *(0.011)*
Educational attainment		
…University entrance degree (*Fachabitur/Abitur*)	0.341 *(0.001)*	0.413 *(0.011)*
…Middle school degree (*Mittlere Reife*)	0.305 *(0.001)*	0.352 *(0.010)*
…No degree / basic degree	0.354 *(0.001)*	0.234 *(0.009)*
Working full-time	0.438 *(0.001)*	0.323 *(0.010)*
Observations	445,867	2,094

Notes: Means; standard errors in parentheses. Column (1): all people aged 18 or older in the Microcensus 2018 (representative of the German population). Column (2): our analysis sample. Data sources: Microcensus 2018 and ifo Education Survey 2019.

Appendix Table A2: **Respondent Characteristics Across Treatment Arms**

	Control Mean (1)	Treatment Mean (2)	Diff. (3)	p-value (4)
Age	53.18	52.95	-0.24	0.72
Female	0.52	0.55	0.03	0.20
Born in Germany	0.95	0.96	0.01	0.54
City size ≥ 100,000	0.34	0.39	0.05	0.03
Partner in household	0.59	0.58	-0.01	0.64
Parent(s) with university degree	0.28	0.30	0.03	0.18
Highest educational attainment				
No degree/basic degree	0.23	0.24	0.01	0.71
Middle school degree	0.37	0.34	-0.03	0.15
Univ. entrance degree	0.40	0.42	0.02	0.29
Employment status				
Full-time	0.33	0.32	-0.01	0.78
Part-time	0.12	0.14	0.02	0.22
Self-employed	0.05	0.06	0.01	0.61
Unemployed	0.05	0.04	-0.01	0.32
Retired/Ill/etc.	0.45	0.44	-0.01	0.72
Parent status	0.61	0.59	-0.02	0.44
Party preference				
CDU	0.17	0.19	0.01	0.46
SPD	0.18	0.15	-0.04	0.03
Grüne	0.14	0.16	0.01	0.47
Linke	0.10	0.10	0.00	0.86
FDP	0.06	0.05	-0.01	0.17
AfD	0.09	0.11	0.02	0.16
None	0.22	0.23	0.00	0.94
Other	0.02	0.02	0.01	0.22
Educ. Important for vote	0.70	0.72	0.02	0.26
General Voting	0.87	0.87	0.00	0.94
Patience	6.51	6.35	-0.16	0.10
Risk tolerance	4.60	4.74	0.14	0.22
Monthly household income (€)	2,556.21	2,567.73	11.52	0.86
West Germany	0.79	0.80	0.01	0.52
Work in education sector	0.10	0.10	0.00	0.92
Trust in government	0.32	0.32	0.00	0.93

Notes: Group means. 'Diff.' displays the difference in means between the control group and the treatment group who received the information about the attendance rates. Data source: ifo education survey 2019.

Appendix Table A3: Participation in the Follow-Up Survey

	Respondent participated in follow-up survey	
	(1)	(2)
Treatment		
Information on attendance rates	0.020	*(0.017)*
Covariates		
Age	0.005***	*(0.001)*
Female	0.013	*(0.018)*
Born in Germany	0.067	*(0.049)*
City size ≥ 100,000	-0.036*	*(0.019)*
Partner in household	-0.014	*(0.021)*
Parent(s) with university degree	0.009	*(0.020)*
Highest educational attainment		
No degree/basic degree (base category)		
Middle school degree	0.109***	*(0.025)*
Univ. entrance degree	0.103***	*(0.027)*
Employment status		
Full-time	0.016	*(0.047)*
Part-time	-0.001	*(0.050)*
Self-employed	0.014	*(0.057)*
Unemployed (base category)		
Retired/Ill/etc.	-0.015	*(0.045)*
Parent status	0.011	*(0.021)*
Party preference		
CDU/CSU (base category)		
SPD	-0.009	*(0.029)*
Grüne	0.002	*(0.030)*
Linke	-0.070*	*(0.038)*
FDP	0.024	*(0.040)*
AfD	-0.003	*(0.037)*
None	-0.011	*(0.031)*
Other	0.138***	*(0.048)*
Educ. Important for vote	-0.014	*(0.020)*
General voting	0.004	*(0.030)*
Patience	-0.003	*(0.004)*
Risk tolerance	-0.004	*(0.003)*
Monthly household income (€)	0.000	*(0.000)*
West Germany	-0.022	*(0.022)*
Working in education sector	-0.042	*(0.030)*
Trust in government	0.015	*(0.020)*
Observations	2,088	
R-squared	0.054	

Notes: Dependent variable: Dummy variable coded one if respondent participated in the follow-up survey. Data source: ifo education survey 2019. Robust standard errors in parentheses, * p<0.1, ** p<0.05, *** p<0.01.

Appendix Table A4: **Respondent Characteristics Across Treatment Arms in the Follow-Up Sample**

	Control Mean (1)	Treatment Mean (2)	Diff. (3)	p-value (4)
Age	54.70	53.94	-0.76	0.27
Female	0.52	0.54	0.03	0.30
Born in Germany	0.96	0.96	0.00	0.85
City size ≥ 100,000	0.33	0.37	0.04	0.06
Partner in household	0.60	0.58	-0.02	0.50
Parent(s) with university degree	0.28	0.31	0.04	0.10
Highest educational attainment				
No degree/basic degree	0.21	0.22	0.01	0.47
Middle school degree	0.38	0.36	-0.02	0.29
Univ. entrance degree	0.41	0.42	0.01	0.67
Employment				
Full-time	0.33	0.31	-0.01	0.56
Part-time	0.12	0.13	0.02	0.33
Self-employed	0.05	0.06	0.01	0.38
Unemployed	0.05	0.04	-0.01	0.59
Retired/Ill/etc.	0.46	0.45	-0.01	0.77
Parent	0.63	0.61	-0.02	0.42
Political preference				
CDU	0.18	0.19	0.01	0.77
SPD	0.18	0.15	-0.03	0.10
Grüne	0.15	0.15	0.00	0.84
Linke	0.09	0.10	0.01	0.36
FDP	0.07	0.05	-0.01	0.27
AfD	0.10	0.11	0.01	0.54
None	0.21	0.22	0.01	0.71
Other	0.02	0.03	0.01	0.12
Educ. Important for vote	0.69	0.72	0.03	0.14
General Voting	0.88	0.87	-0.01	0.63
Patience	6.44	6.37	-0.08	0.47
Risk tolerance	4.51	4.74	0.24	0.07
Monthly household income (€)	2613.71	2582.28	-31.43	0.68
West Germany	0.79	0.79	0.01	0.69
Work in education sector	0.09	0.09	0.00	0.99
Trust in government	0.33	0.32	-0.02	0.49

Notes: Group means. 'Diff.' displays the difference in means between the control group and the treatment group. Sample: Follow-up survey participants. Data source: ifo education survey 2019.

Appendix Table A5: Effect of Information Treatment on Role of Circumstances and Effort: Robustness of Outcome Coding

	Circumstances decisive	Mainly circumstances	Rather circumstances	Rather effort	Mainly effort
	(1)	(2)	(3)	(4)	(5)
Panel A: High Educational Degree					
Information on attendance rates	0.123***	0.033***	0.090***	-0.023	-0.100***
	(0.018)	(0.008)	(0.017)	(0.022)	(0.020)
Covariates	Yes	Yes	Yes	Yes	Yes
Control mean	0.173	0.020	0.153	0.435	0.391
Observations	2,094	2,094	2,094	2,094	2,094
R-squared	0.060	0.019	0.048	0.014	0.053
Panel B: High Income					
Information on attendance rates	0.036*	0.011	0.025	-0.036*	-0.000
	(0.021)	(0.011)	(0.020)	(0.021)	(0.018)
Covariates	Yes	Yes	Yes	Yes	Yes
Control mean	0.350	0.058	0.291	0.424	0.227
Observations	2,093	2,093	2,093	2,093	2,093
R-squared	0.040	0.018	0.026	0.021	0.029

Notes: OLS regressions. Dependent variables: (1) Dummy variable coded one if respondent thinks that mainly/rather external circumstances are decisive, (2) - (5) Dummy variable coded 1=answer category given in respective table header, 0 otherwise. Randomized experimental treatment "information on attendance rates": respondents informed about differences in academic-track attendance rates by parental background. Control mean: mean of the outcome variable in the control group. See Table 1 for included covariates. Data source: ifo Education Survey 2019. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Appendix Table A6: Effect of Information Treatment on Perceived Role of Circumstances, Private Donations, and Demand for Redistributive Education Spending (Two Treatment Groups)

	Perceived role of circumstances (high educational degree)	Perceived role of circumstances (high income)	Average donations	Support for increased redistributive education spending
	(1)	(2)	(3)	(4)
Information on attendance rates (1st treatment group)	0.258***	0.052	3.213**	-0.010
	(0.035)	*(0.037)*	*(1.400)*	*(0.019)*
Information on attendance rates (2nd treatment group)	0.158***	0.050	2.906**	-0.018
	(0.034)	*(0.038)*	*(1.420)*	*(0.019)*
Covariates	Yes	Yes	Yes	Yes
Control mean	1.802	2.181	37.499	0.751
Observations	3082	3081	3076	3082
R-squared	0.055	0.036	0.047	0.032
Wald test for the equality of treatment effects [1st treatment group = 2nd treatment group]				
P-values	0.006	0.957	0.826	0.690

Notes: OLS regressions. Dependent variables: (1) Perception that circumstances, not effort, are decisive for high educational attainment on a four-point scale, with higher values indicating more importance of circumstances, (2) Perception that circumstances, not effort, are decisive for high income on a four-point scale, with higher values indicating more importance of circumstances, (3) Amount of donations stated by respondents (in tokens), (4) Dummy variable coded one if respondent is mainly/rather in favor of redistributive education spending. Randomized experimental treatment "information on attendance rates (1st treatment group)": respondents informed about differences in academic-track attendance rates by parental background. Randomized experimental treatment "information on attendance rates (2nd treatment group)": respondents informed about differences in academic-track attendance rates by parental background conditional on math and reading achievement. Control mean: mean of the dummy variable in the control group. See Table 1 for included covariates. Data source: ifo Education Survey 2019. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Appendix Table A7: Effect of Information Treatment on Perceived Role of Circumstances, Private Donations, and Demand for Redistributive Education Spending by Own Educational Attainment

	Perceived role of circumstances (high educational degree)		Average donations		Support for increased redistributive education spending	
	No academic-track school degree	Academic-track school degree	No academic-track school degree	Academic-track school degree	No academic-track school degree	Academic-track school degree
	(1)	(2)	(3)	(4)	(5)	(6)
Information on attendance rates	0.231***	0.279***	4.981***	-0.801	-0.012	-0.019
	(0.047)	*(0.054)*	*(1.856)*	*(2.240)*	*(0.025)*	*(0.030)*
Covariates	No	No	No	No	No	No
Difference b/w groups	0.048		-5.782**		0.007	
Control mean	1.752	1.876	34.739	41.622	0.749	0.755
Observations	1,230	864	1,229	864	1,230	864
R-squared	0.019	0.030	0.006	0.000	0.000	0.000

Notes: OLS regressions. Dependent variables: (1) – (2) Perception that circumstances, not effort, are decisive for high educational attainment on a four-point scale, with higher values indicating more importance of circumstances, (3) - (4) Amount of donations stated by respondents (in tokens), (5) - (6) Dummy variable coded one if respondent is mainly/rather in favor of redistributive education spending. Randomized experimental treatment "information on attendance rates": respondents informed about differences in academic-track attendance rates by parental background. Control mean: mean of the dummy variable for the control group. See Table 1 for included covariates. Difference b/w groups: difference between the two groups (no academic-track school degree vs. academic-track school degree). Data source: ifo Education Survey 2019. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Appendix Table A8: Effect of Information Treatment on Perceived Role of Circumstances, Private Donations, and Demand for Redistributive Education Spending by Political Ideology

	Perceived role of circumstances (high educational degree)			Average donations			Support for increased redistributive education spending		
	Left-leaning	Right-leaning	No attachment	Left-leaning	Right-leaning	No attachment	Left-leaning	Right-leaning	No attachment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Information on attendance rates	0.333***	0.180***	0.258***	3.424	2.847	1.453	-0.010	-0.014	0.013
	(0.057)	(0.057)	(0.074)	(2.218)	(2.444)	(2.983)	(0.024)	(0.035)	(0.044)
Covariates	No	No	No	No	No	No	No	No	No
Difference left vs right		0.153*			0.577			-0.004	
Difference left vs no attachm.		0.075			1.971			0.023	
Difference right vs no attachm.		-0.078			1.394			0.027	
Control mean	1.880	1.718	1.750	41.390	35.161	33.428	0.862	0.692	0.627
Observations	868	710	472	867	710	472	868	710	472
R-squared	0.038	0.014	0.025	0.003	0.002	0.001	0.000	0.000	0.000

Notes: OLS regressions. Dependent variables: (1) - (3) Perception that circumstances, not effort, are decisive for high educational attainment on a four-point scale, with higher values indicating more importance of circumstances, (4) - (6) Amount of donations stated by respondents (in tokens), (7) - (9) Dummy variable coded one if respondent is mainly/rather in favor of redistributive education spending. Randomized experimental treatment "information on attendance rates": respondents informed about differences in academic-track attendance rates by parental background. Control mean: mean of the dummy variable for the control group. See Table 1 for included covariates. Difference b/w groups: difference between the three groups (left-leaning vs. right-leaning vs. no attachment). Data source: ifo Education Survey 2019. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Appendix Table A9: Effect of Information Treatment on Perceived Role of Circumstances, Private Donations, and Demand for Redistributive Education Spending by Trust in Government

	Perceived role of circumstances (high educational degree)		Average donations		Support for increased redistributive education spending	
	Low trust in government	High trust in government	Low trust in government	High trust in government	Low trust in government	High trust in government
	(1)	(2)	(3)	(4)	(5)	(6)
Information on attendance rates	0.285***	0.190***	1.965	4.164*	-0.021	-0.003
	(0.044)	*(0.060)*	*(1.739)*	*(2.470)*	*(0.024)*	*(0.031)*
Covariates	No	No	No	No	No	No
Difference b/w groups	-0.095		2.199		0.018	
Control mean	1.789	1.830	35.150	42.491	0.730	0.798
Observations	1,422	672	1,421	672	1,422	672
R-squared	0.029	0.015	0.001	0.004	0.001	0.000

Notes: OLS regressions. Dependent variables: (1) - (2) Perception that circumstances, not effort, are decisive for high educational attainment on a four-point scale, with higher values indicating more importance of circumstances, (3) - (4) Amount of donations stated by respondents (in tokens), (5) - (6) Dummy variable coded one if respondent is mainly/rather in favor of redistributive education spending. Randomized experimental treatment "information on attendance rates": respondents informed about differences in academic-track attendance rates by parental background. Control mean: mean of the dummy variable for the control group. See Table 1 for included covariates. Difference b/w groups: difference between the two groups (low vs. high trust in government). Data source: ifo Education Survey 2019. Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Appendix Table A10: Covariates by ntiles (Demand for Redistributive Education Spending)

Covariates	ntile1	ntile2	ntile3	ntile4	p-value
Middle school degree	0.33	0.43	0.39	0.26	0.02
Univ. entrance degree	0.50	0.34	0.36	0.50	0.97
Age	48.81	56.24	54.83	52.64	0.00
Monthly Household Income (€)	2.38	2.47	2.50	2.94	0.00
Female	0.58	0.60	0.53	0.41	0.00
Born in Germany	0.93	0.96	0.95	0.99	0.00
Partner in household	0.58	0.58	0.54	0.67	0.01
West Germany	0.91	0.81	0.77	0.71	0.00
City size ≥ 100,000	0.30	0.33	0.38	0.39	0.00
Parent status	0.54	0.64	0.59	0.64	0.01
Parent(s) with university degree	0.35	0.26	0.30	0.28	0.02
Retired/Ill/etc.	0.16	0.23	0.33	0.57	0.00
Full-time employed	0.17	0.16	0.10	0.05	0.00
Part-time employed	0.02	0.04	0.06	0.09	0.00
Self-employed	0.03	0.03	0.06	0.07	0.01
Unemployed	0.62	0.54	0.45	0.23	0.00
Work in education sector	0.08	0.09	0.10	0.11	0.12
Risk tolerance	4.91	4.82	4.70	4.30	0.00
Patience	7.36	6.90	6.34	5.14	0.00
Left leaning party	0.16	0.27	0.33	0.31	0.00
No party preference	0.11	0.19	0.29	0.32	0.00
Right leaning party	0.53	0.38	0.23	0.23	0.00
Trust in government	0.39	0.34	0.28	0.28	0.00
Educ. Important for vote	0.70	0.72	0.71	0.69	0.80
General voting	0.89	0.88	0.87	0.85	0.08
No degree	0.00	0.00	0.00	0.00	1.00

Notes: Variables included in the causal forest estimations (outcome: demand for redistributive education spending). Mean value of variables for four groups split according to the predicted Conditional Average Treatment Effect. P-value for difference between first and fourth group. Data source: ifo education survey 2019.

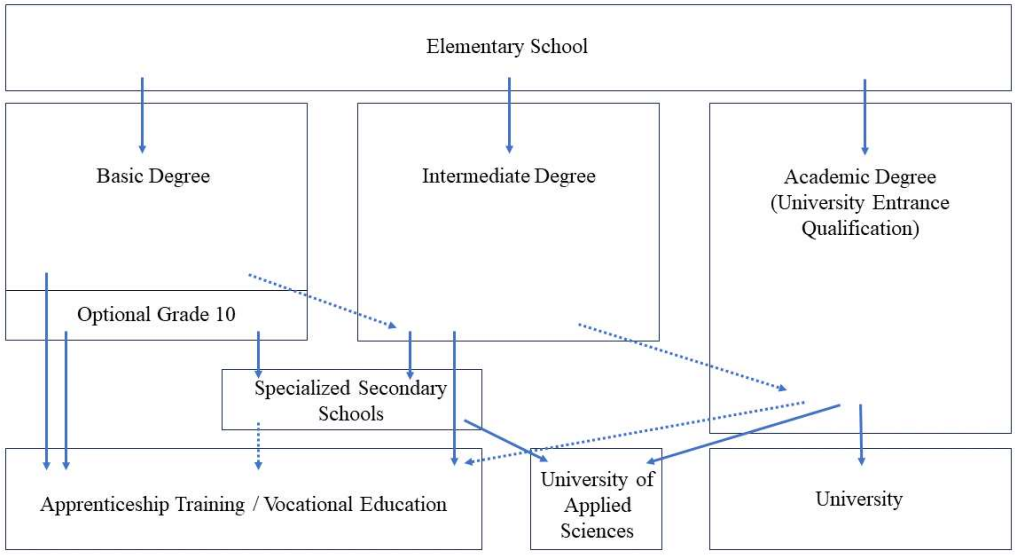
Appendix Table A11: Variable Importance (Demand for Redistributive Education Spending)

Covariates	
Continuous variables	
Age	0.13
Patience	0.10
Monthly household Income (€)	0.10
Risk tolerance	0.08
Binary variables	
West Germany	0.04
Unemployed	0.04
Educ. important for vote	0.04
Female	0.03
Retired/Ill/etc.	0.03
Full-time employed	0.03
Middle school degree	0.03
Parent(s) with university degree	0.03
City size ≥ 100,000	0.03
Parent status	0.03
Right leaning party	0.03
Partner in household	0.03
No party preference	0.03
Left leaning party	0.03
Univ. entrance degree	0.03
General voting	0.02
Part-time employed	0.02
Trust in government	0.02
Work in education sector	0.02
Born in Germany	0.01
Self-employed	0.01
No degree	0.00

Notes: Variable importance measure from the Causal Forest (demand for redistributive education spending). The maximum tree depth when calculating the variable importance is 4. Data source: ifo education survey 2019.

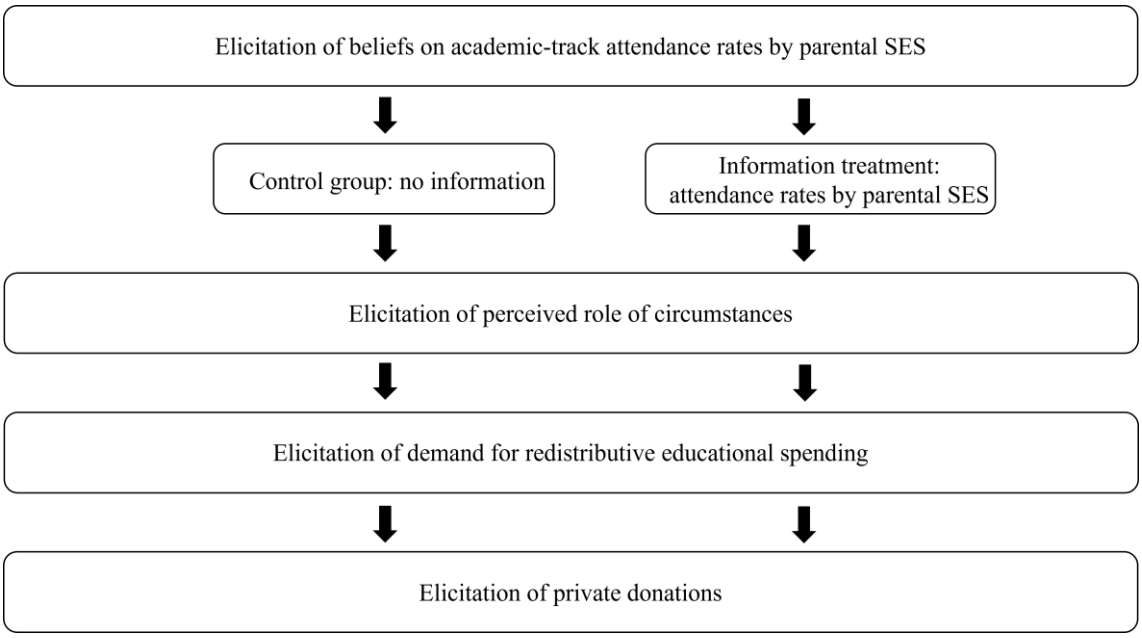
Appendix Figures

Appendix Figure A1: The German Schooling System



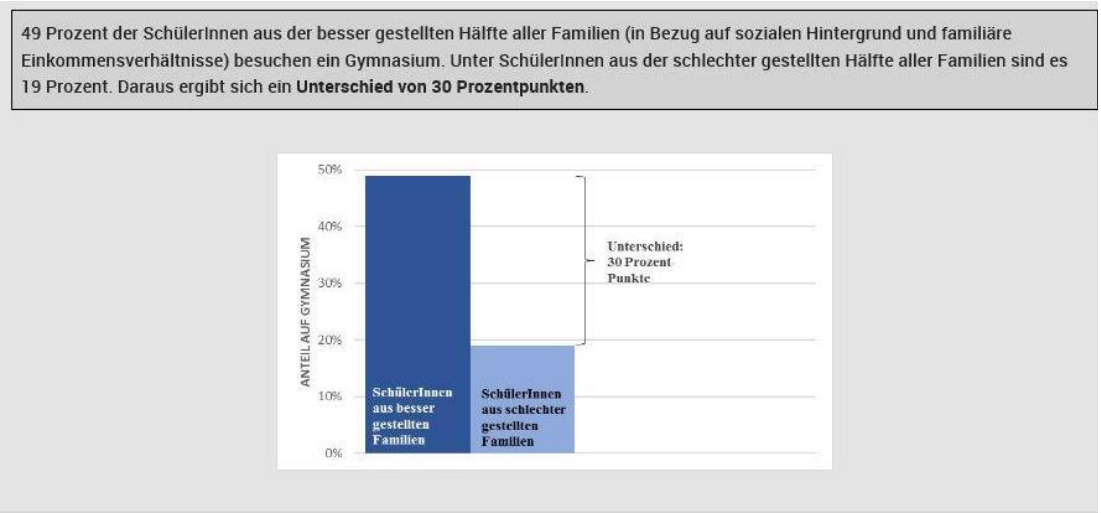
Notes: The figure gives a schematic overview of the school system and degrees in Germany. After elementary school which takes four years (only in a few states six years), students are tracked into different school types where students can obtain the basic and intermediate degrees after grades 9 and 10, respectively. These degrees allow students to start apprenticeship training or other forms of vocational education. Students can also obtain the university entrance qualification after grade 13 (or 12). Switching tracks is, in principle, possible, enabling graduates from the basic and intermediate track to continue to the next higher track, respectively, and/or obtaining their university entrance qualification via the specialized high track. Overview based on Grewenig (2021).

Appendix Figure A2: Experimental Design



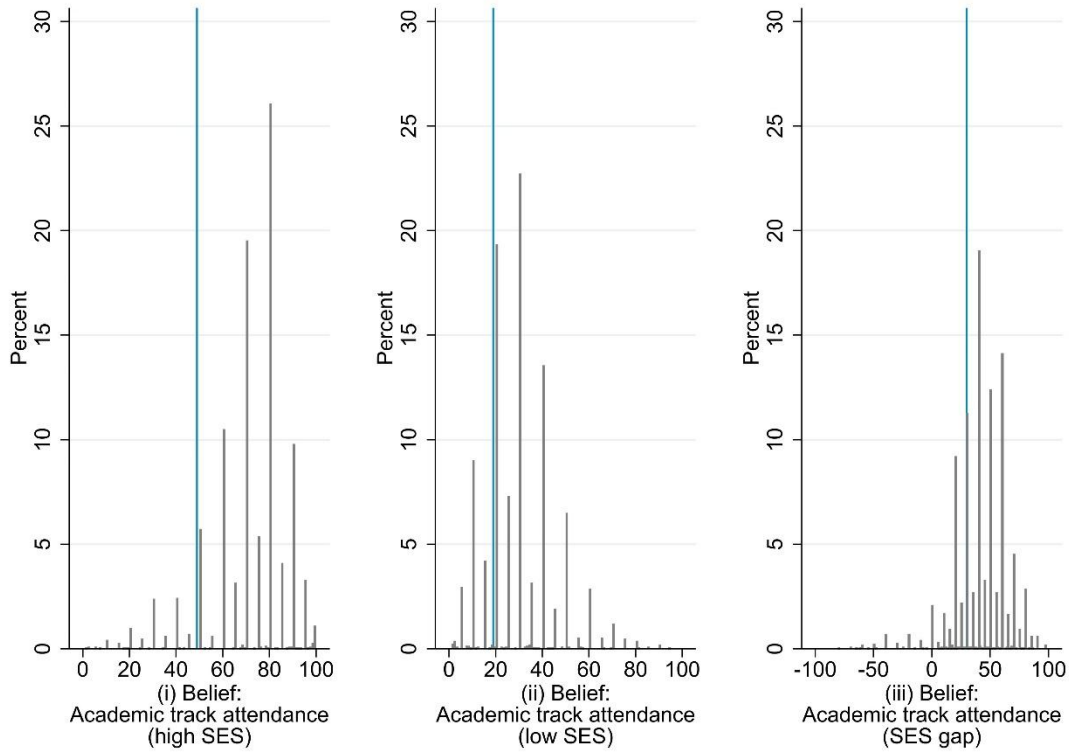
Notes: The figure gives an overview of the experimental design. First, we elicit prior beliefs about the academic-track attendance rates of students from more and less advantaged backgrounds. Second, the treatment group is provided with the information while the control group is not. Third, we elicit three outcomes: the perceived role of circumstances for success (high educational degree and high income), the demand for redistributive education spending and the private donation decision.

Appendix Figure A3: Illustration of the Information Treatment



Notes: The figure shows the information that respondents in the treatment group were provided with. The information is provided in German. The English translation is the following: *49 percent of students from the better-off half of all families (in terms of social background and family income) attend a Gymnasium. Among students from the worse-off half of all families, the figure is 19 percent. This results in a difference of 30 percentage points*. Source: ifo Education Survey 2019.

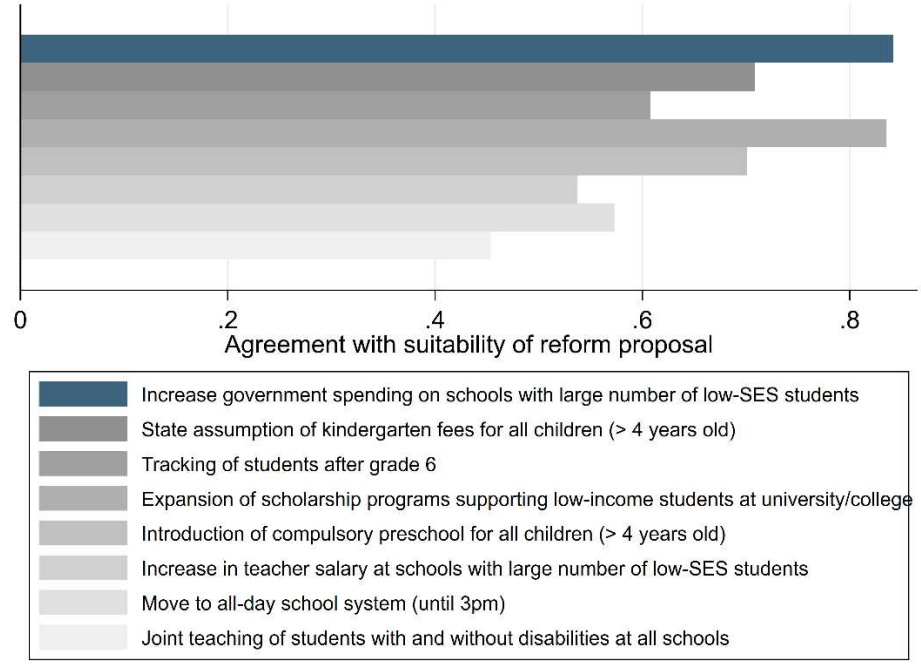
Appendix Figure A4: Distribution of Prior Beliefs about Academic-Track Attendance by Parental Background



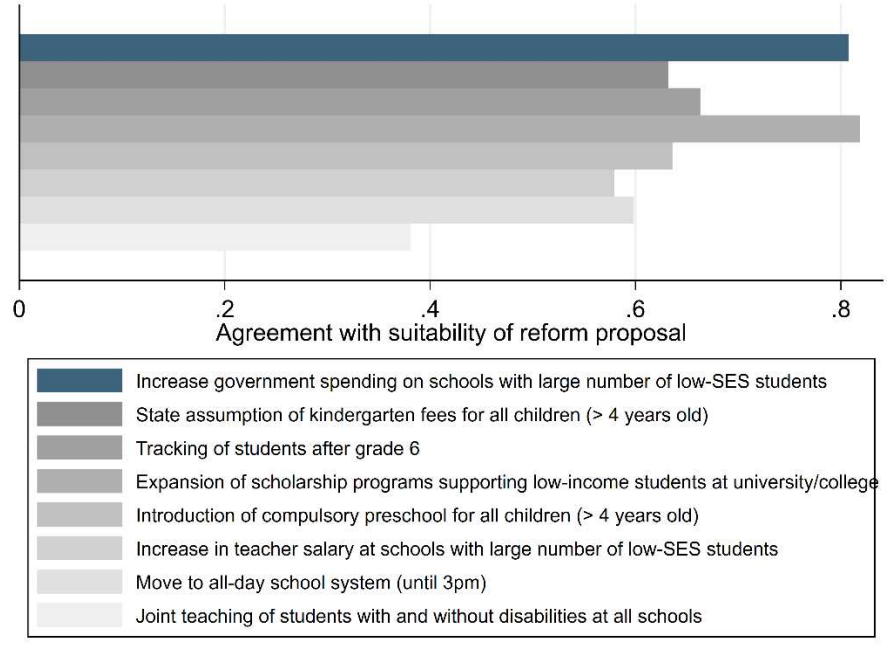
Notes: Histogram of the distribution of beliefs about academic-track attendance (*Gymnasium*) rates for students with different family background. Question wording: "Think of a comparison between children from the better and worse-off half of all families (in terms of social background and family income). What do you think is the percentage of students from.... (i) the more advantaged half of all families who attend a *Gymnasium*?, (ii) the less advantaged half of all families who attend a *Gymnasium*?" The blue vertical line indicates what would have been the correct answers. Data source: ifo Education Survey 2019.

Appendix Figure A5: Educational Reform Proposals in Germany

Panel A: Suitability of reform proposal to increase equality of opportunity

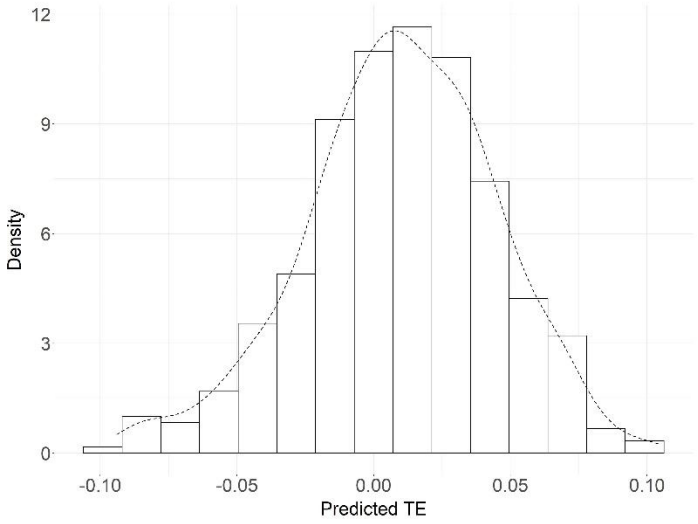


Panel B: Suitability of reform proposal to increase average student performance



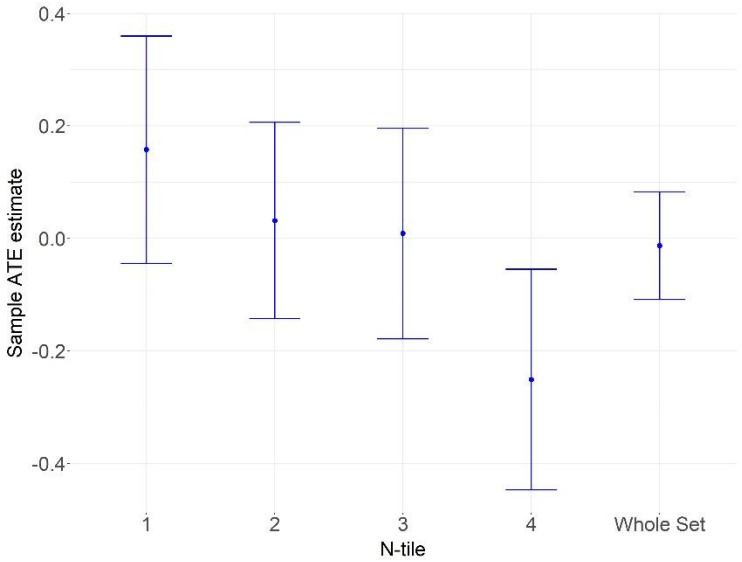
Notes: Question wording: "And how suitable do you think the reform proposals are for increasing equal opportunities in the German education system?" (Panel A); "And how suitable do you think the reform proposals are for raising the performance level in the German education system?" (Panel B). Data source: ifo Education Survey 2019.

Appendix Figure A6: Distribution of Conditional Average Treatment Effects (Demand for Redistributive Education Spending)



Notes: Distribution of the Conditional Average Treatment Effects ("predicted TEs") for demand for redistributive education spending (on five-point scale). Data source: ifo Education Survey 2019.

Appendix Figure A7: Average Treatment Effects by ntile (Demand for Redistributive Education Spending)



Notes: Observations are split into four groups according to their predicted Conditional Average Treatment Effects. The figure shows the average treatment effect (ATE) within these four groups and the whole sample for demand for redistributive education spending on five-point scale. Data source: ifo Education Survey 2019.