

Pocketbook Voting, Social Preferences, and Expressive Motives in Referenda*

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Abstract

We develop and test a theory of voting and turnout decisions that integrates self-interest, social preferences, and expressive motives. Our empirical analysis studies referenda among university students about whether to collectively purchase deeply discounted flat rate tickets for public transportation and cultural amenities. Individual usage data allow quantifying the monetary benefits associated with each ticket. We find that monetary benefits strongly influence participation and voting. However, social or expressive motives such as stated altruism are decisive for a significant minority. Based on our theory, empirical results rule out purely expressive voting.

Keywords: pocketbook voting, altruism, expressive voting, instrumental voting, referendum

JEL classification: D72, H41, D64

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1 Introduction

Referenda are an integral part of democracy in several jurisdictions, such as California and Switzerland. A prominent example is Proposition 13 in 1978 which decisively shaped local public finances in California by bounding the property tax rate (see California State Board of Equalization, 2012, p. 1). Referenda are also commonly used to decide on major infrastructure projects, such as the Gotthard train tunnel in Switzerland in 1992. In recent years, other countries such as Germany, Italy, and the United Kingdom have also increasingly held referenda.

Despite their growing popularity, referenda are controversial. Proponents welcome the broad public debate and the democratic legitimacy of decisions ensured by referenda. In this spirit, Rousseau (2012 [1762], p. 65) argued 250 years ago that “Every law the people has not ratified in person is null and void – is, in fact, not a law.” Opponents fear that uninformed or ideologically biased citizens either do not bother to vote or make inefficient or inequitable decisions. Schumpeter (1994 [1942], p. 261) was convinced that “[the private citizen] expends less disciplined effort on mastering a political problem than he expends on a game of bridge.”

We contribute to this debate by theoretically and empirically analyzing the motives for participating in a referendum and for voting against or in favor of a proposal. Our set-up is particularly tailored to public policy decisions at the local level, where referenda are especially frequent. Already De Tocqueville (1981 [1835], p. 124-127) emphasized the benefits of local direct democracy. In the same spirit, Tiebout (1956) shows that independent local jurisdictions make efficient decisions on local public goods as long as there are no external effects. By analyzing voters’ motives in such decisions, we contribute to the understanding of local democracy.

We first propose a simple theoretical model describing the decisions of whether and how to vote on a tax-financed provision of a public good. We then test our theory with the help of referenda on flat rate tickets for students at the University of Goettingen in Germany. If passed, these tickets give all students the right to unlimited use of a facility, such as public transportation or cultural amenities. As buying a ticket becomes compulsory for every student if the majority vote in favor, these tickets share essential features with tax-financed public projects or local public goods. We conducted two surveys on individual voting decisions and motives behind these. Investigating these referenda is promising because they involve easy-to-understand public policy decisions. In our setting, the voters knew exactly what a ticket

would cost, and the benefits were clearly defined. In contrast, if the vote had involved, for example, a large infrastructure project, then the costs and benefits would have been more widespread and uncertain. Different voting decisions could also then reflect different subjective expectations and differences in risk attitudes.

The motives we consider are ‘pocketbook voting’, social preferences, and expressive concerns. Pocketbook voting refers to voting along own monetary interests. The latter two motives both capture how the issue voted upon is seen related to others, but differ in one crucial aspect. Agents with social preferences want to affect the outcome of the vote, for example because they have altruistic or paternalistic feelings towards other members of society, or because they care for the common good. In this sense, social preferences, like pocketbook motives, are instrumental. In contrast, expressive voters derive utility from the act of voting in accordance with what they think is socially good or morally just, independently of whether their vote affects the actual outcome.

Pocketbook voting is the starting point in models of income redistribution that build on Meltzer and Richard (1981) and in the theory of probabilistic voting (Lindbeck and Weibull, 1993; Dixit and Londregan, 1996), but its empirical relevance is still debated. While economists have tended to find support for pocketbook voting (see Deacon and Shapiro, 1975; Levitt and Snyder, 1997; Vlachos, 2004; Manacorda et al., 2011; Elinder et al., 2015), the political science community has been more skeptical. Lewis-Beck and Stegmaier (2007) review more than 400 studies, without finding much evidence for pocketbook voting. Notable exceptions include Richter (2006) and Healy et al. (2017). We contribute to this literature by providing the first analysis of individual level voting in referenda using an objective measure of monetary benefits and costs.

Pocketbook and social motivations may coexist, as shown by Fiorina (1978) and Dimick et al. (2016) for the United States and by Carlsson and Johansson-Stenman (2010) for Sweden. In laboratory voting, Tyran and Sausgruber (2006) and Balafoutas et al. (2013) find evidence for various types of social preferences.

The instrumental perspective on voting has been challenged by the theory of expressive voting, proposed by Tullock (1971) and further developed by Hillman (2010). This theory maintains that voters perceive their probability of being pivotal to be negligible, and that they derive utility from voting in a particular way irrespective of the outcome. Empirical evidence on the relative importance of instrumental and expressive voting is mixed. Cox (1994) and Fujiwara (2011) find

support for instrumental voting, while Coate et al. (2008), Shayo and Harel (2012), and Pons and Tricaud (2018) provide evidence for expressive voting. Tyran (2004) rejects expressive voting, and Barton and Rodet (2015) present evidence that both instrumental and expressive concerns motivate political communication. Spenkuch (2018) concludes that a theory in which a particular voter is either instrumental or expressive cannot explain voting patterns in German parliamentary elections. We take up this challenge by, to our knowledge, being the first to propose a theory where individual voters trade off pocketbook motives, social and expressive concerns according to the electoral circumstances. Our theory highlights which kind of evidence allows to empirically distinguish social and expressive concerns, and when these motives are observationally equivalent. On the empirical side, we contribute to the literature on expressive voting by estimating the relative importance of well-defined pocketbook benefits and social or expressive concerns for the voting decision.

We also contribute to the literature on voter turnout. Downs (1957) as well as Riker and Ordeshook (1968) already presented the idea that the more that is at stake, the more likely an individual is to vote. Indeed, Andersen et al. (2014) observe that turnout in Norwegian local elections is higher in jurisdictions with high hydropower income. Alternative explanations suggest that voting is driven by ethical concerns (Harsanyi, 1980), social pressure (Gerber et al., 2008; Funk, 2010), expressive motivations (Brennan and Buchanan, 1984; Hillman, 2010), or social identity (Akerlof and Kranton, 2000).

We characterize the individual voting and turnout decisions as a function of the size of monetary gains or losses conferred by the public good, the strength of social or expressive motives, and the perceived probability of changing the referendum outcome. The model implies that expressive voting can be shown to exist, in a way that is not observationally equivalent to social preferences, only in the case where pocketbook voting is not observed: if voters do not react to pocketbook benefits, they must believe that their influence on the outcome of the vote is negligible, and any concern for common goods or benefits of others must therefore be expressive.¹ We further show that when expressive motives are relevant, abstention can be a rational choice even when voting is costless, as abstaining is a cheaper way of satisfying expressive motives than voting against one's own pocketbook interest.

¹This does not mean that expressive voting could not exist also if pocketbook voting is observed, but just that in that case, social preferences and expressive motives are observationally equivalent.

Our first dataset is on a referendum regarding a ticket for regional trains held in 2010. This dataset was collected online. It also contains students who did not participate in the referendum, allowing for an analysis of the decision whether to vote. The second dataset covers votes on tickets for regional trains, cultural facilities, and local buses held in 2013. It was collected with a paper-based exit poll, therefore being restricted to voters.

Each dataset contains detailed information on over a thousand respondents, including their voting decisions. Pocketbook benefits are derived from information on usage behavior. To capture social preferences and expressive motives, we asked students to what extent the interests of others or common good considerations shaped their voting decisions. Examples for the latter are promoting local cultural life, protecting the environment, and protesting against the pricing policy of the railway company. We also collected information on political preferences, fields of study, and other characteristics.

In the first dataset, we measure individual monetary benefits conferred by the ticket by multiplying the number of trips to visit parents with the regular ticket price per trip that we derive from parental address data. Subtracting the price of the flat rate ticket yields a measure of the net savings an individual student obtains from the ticket. As the ticket in question covered only rail tracks served by one company, while tracks served by other operators were not included, residence of parents on either subset of tracks induces a variation which is unrelated to the variation created by distance to the university. In the second dataset, usage is reported in categorical variables.

Our primary focus is on the probability of voting in favor of these tickets. We find that most students vote in line with their monetary interests. In the first dataset, we estimate that among students with positive net savings, a 10 percent increase in net savings raises the probability of voting in favor by 0.6 percentage points. While this effect might appear small, it translates into widely differing voting predictions because of the large variation in savings. As an illustration, we calculate the predicted probability of a positive vote as a function of net savings for a student who has no social or expressive motives. This probability rises from 32% if the student has zero net savings, meaning that his or her savings only cover the ticket price, to 71% if net savings are 255 euros, the average in the sample. In the second dataset, a student who uses the train, bus, or cultural offers very often is 76, 73, or 52 percentage points more likely to vote in favor of the corresponding

ticket than a student who never uses it.

Monetary self-interest is not the entire story. Variables capturing social preferences or expressive motives show highly significant and economically relevant effects. For example, in the first dataset, a student who states that he or she considered the interest of others in his or her voting decision and estimates that students on average benefit from the ticket is 28 percentage points more likely to vote in favor of the ticket. In the descriptive analysis, we observe a sizable share of students who do not stand to gain from a ticket in monetary terms but nevertheless vote in favor. Social or expressive motives can explain this behavior for almost all these students. The analysis suggests that these motives were likely pivotal in one of the four referenda and close to being pivotal in another. Together with pocketbook voting, they can rationalize almost all votes cast. In contrast, party preferences are mostly not relevant to the voting decision.

In the last part of the paper, the dependent variable is participation in the referendum. We find that among those who gain from the ticket, the probability of taking part increases with net savings. Stated altruism is also found to affect the participation decision, albeit in a specific way. Students who expect that their preferred outcome would cause losses to others and, at the same time, mention concern for others are less likely to participate. This is in line with our theoretical prediction that abstaining is an attractive compromise when own monetary gains and expressive concerns for others call for different voting decisions.

To sum up, research so far has identified pocketbook voting, social preferences, and expressive motives in separate contexts. Our paper extends knowledge by providing a unified theoretical framework and an empirical analysis to jointly study the relative importance of these motives in a real-world referendum with individual data.

The rest of the paper is structured as follows. Section 2 contains the theoretical model on which we base our empirical work. Section 3 presents the data and some background information. In Section 4, we provide a descriptive analysis of voting and turnout motives. Econometric results on voting and participation decisions are presented in Sections 5 and 6, respectively. Section 7 concludes the paper.

2 Theoretical framework

We present a simple theoretical framework on how voters decide whether to vote in a referendum, and then how to vote, provided that they decide to vote. We solve the model backwards, analyzing first the decision on how to vote, conditional on voting. Voting takes place on whether to collectively purchase a public good with variable use. If the proposal is passed, all members of society get access to a non-rival service at zero marginal cost and have to pay a fee to finance it. We denote the case in which the public good is passed by superscript 1, and the case in which the public good is not passed by superscript 0.

2.1 How to vote if voting

In the context of the collectively purchased tickets we analyze, providing the public good amounts to granting free and unlimited use of some facility, financed by a compulsory fee t collected from every member of society. In contrast, if the public good is not provided, individuals have to pay a price $\tau > 0$ per use of the facility.² Once the decision on the public good is taken, voter i will choose the intensity of use h_i , which is non-negative and varies continuously. He or she maximizes a quasi-linear benefit $b_i = w_i(h_i) + m_i - T_i$. In this expression, m_i is voter i 's income and T_i is voter i 's payment for the use of the facility. The function w_i is strictly increasing and strictly concave up to some satiation point, where the marginal benefit w_i' is zero, and the marginal benefit stays zero for higher intensities of use. Since some agents may have no preference at all for using the facility, we allow the satiation point to be zero.

If the public good is (is not) provided, we have $T_i = t$ ($T_i = \tau h_i$), and the resulting optimal use is denoted by h_i^1 (h_i^0). Since any additional use is costless once the public good is provided, h_i^1 is the satiation point, i.e., $w_i'(h_i^1) = 0$. The optimal value h_i^0 is given by the solution to the first order condition $w_i'(h_i^0) = \tau$ if $w_i'(0) > \tau$, and is $h_i^0 = 0$ if $w_i'(0) \leq \tau$. Using these values in the benefit b_i , we find the indirect utility of individual i in case the public good is provided, $b_i^1 = w_i(h_i^1) + m_i - t$, and in case it is not provided, $b_i^0 = w_i(h_i^0) + m_i - \tau h_i^0$. The equivalent variation $b_i^1 - b_i^0 = w_i(h_i^1) - w_i(h_i^0) + \tau h_i^0 - t$ measures the pocketbook benefit individual i

²Alternatively, providing the public good can be interpreted as a public investment replacing a constant marginal cost production technology by one with fixed cost but zero marginal cost.

obtains if the public good is provided.

We capture the other characteristics influencing the vote by a vector \mathbf{a}_i for voter i . This vector has K components labelled $k = 1, 2, \dots, K$. Components a_{ki}^1 (a_{ki}^0), $k = 1, 2, \dots, K$, describe, for example, voter i 's valuation of other voters' individual utility from the service and the numeraire good, the situation of local culture, environmental quality, or the supply and the quality of local transportation, if the public good is passed (is not passed). These aspects of the vote may give rise to social preferences or to expressive utility. Voting based on social preferences is instrumental, i.e., the voter wants to and expects to influence the outcome in a socially desirable way with some probability larger than zero. In the expressive case, utility is derived from the act of voting in a particular way, irrespective of the actual outcome of the referendum.³

We assume that voter i has linear preferences over pocketbook and other considerations. Monetary benefits yield a marginal utility of $\lambda_i > 0$, the weights of instrumental social concerns are given by the vector $\boldsymbol{\zeta}_i$, and the weights of expressive motives are given by the vector $\boldsymbol{\psi}_i$, with $\zeta_{ki}\psi_{ki} \geq 0$. This means that people do not have expressive benefits from voting against the outcome they find socially desirable. Moreover, we adopt the notational convention that $a_{ki}^1 - a_{ki}^0 \geq 0$ for all $k = 1, 2, \dots, K$. This is without loss of generality since, if voter i has a negative social or expressive valuation of component k , this is expressed by weights $\zeta_{ki} \leq 0$ and $\psi_{ki} \leq 0$. Furthermore, if a variable such as savings to others can take on positive and negative values, we can always split it in two non-negative variables.

Voter i anticipates that by voting in favor of the public good rather than abstaining he or she increases the probability that the public good passes by p_i^1 . Similarly, by voting against the public good rather than abstaining he or she decreases the probability that the public good passes by p_i^0 . Then, switching the vote from no to yes increases the probability that the public good passes by $p_i = p_i^1 + p_i^0$. These subjective probabilities may but need not coincide with objective probabilities. The change in expected utility procured by switching from voting 'no' to voting 'yes' is⁴ $y_i = p_i [\lambda_i (b_i^1 - b_i^0) + \boldsymbol{\zeta}_i \cdot (\mathbf{a}_i^1 - \mathbf{a}_i^0)] + \boldsymbol{\psi}_i \cdot (\mathbf{a}_i^1 - \mathbf{a}_i^0)$, or, equivalently,

$$y_i = p_i \lambda_i (b_i^1 - b_i^0) + (p_i \boldsymbol{\zeta}_i + \boldsymbol{\psi}_i) \cdot (\mathbf{a}_i^1 - \mathbf{a}_i^0) . \quad (1)$$

³From the perspective of expressive voting, voting for any social concern could be argued to be expressive. Therefore, we include the same components in the vector for social preferences and in the vector for expressive utility.

⁴We discuss abstention in Section 2.2.

Individual i votes for the public good if and only if $y_i \geq 0$.

An econometric investigation of equation (1) will deliver estimates for the coefficient $\beta_i := p_i \lambda_i$, which measures the impact of pocketbook motives, and the coefficients $\alpha_i := p_i \zeta_i + \psi_i$, which measure the joint impact of social and expressive concerns. We formulate two null-hypotheses:

$$H_0^\beta : \beta_i = 0,$$

$$H_0^\alpha : \alpha_i = 0.$$

The corresponding alternative hypotheses are $H_1^\beta : \beta_i > 0$ and $H_1^\alpha : \alpha_i \neq 0$.

Rejecting Hypothesis H_0^β establishes the relevance of pocketbook considerations for voting. Rejecting Hypothesis H_0^α shows that expressive motives, social preferences, or both affect the voting decision, but does not allow discriminating between these alternatives. However, hypothesis H_0^β helps to do so. If hypothesis H_0^β is not rejected (see the upper right cell in Table 1), this suggests that voters consider the probability p_i of affecting the outcome to be negligible, since the marginal utility of money λ_i is positive. Then, also instrumental social preferences have only a negligible impact. In this case, rejecting hypothesis H_0^α must be due to expressive motives. If, on the other hand, hypothesis H_0^β is rejected (see the lower right cell in Table 1), we see from (1) that voters consider their probability of affecting the outcome p_i to be non-negligible unless $\psi_i = 0$, in which case this probability cancels out. Therefore, if we reject both hypotheses, either expressive motives are absent, or voters consider their probability of affecting the referendum result to be non-negligible. This can be interpreted as ruling out purely expressive voting, since this theory maintains that both the probability p_i is negligible (see for example Hillman, 2010, p. 415) and expressive motives are present, $\psi_i \neq 0$. If we reject only hypothesis H_0^β (see the lower left cell of Table 1), there is no evidence for either social or expressive motives, and voting is purely based on monetary considerations. Finally, it may turn out that we cannot reject either of the two null-hypotheses (see the upper left cell in Table 1). This would invalidate the model since $\lambda_i > 0$.

2.2 Participation decision

We now turn to the decision whether to vote. If the individual abstains, the variables describing expressive motives take on values \mathbf{a}_i^- , which in general may differ from the values \mathbf{a}_i^0 taken on if i votes against and \mathbf{a}_i^1 taken on if i votes in favor of the

Table 1: Implications of hypothesis testing

		$\mathbf{H}_0^\alpha: \alpha_i = 0$	
		fail to reject	reject
$\mathbf{H}_0^\beta: \beta_i = 0$	fail to reject	fail to reject model invalid	expressive voting
	reject	pure pocketbook voting	pocketbook voting and social preferences (or expressive voting that is observationally equivalent to social preferences); pure expressive voting ruled out

Implications of possible outcomes of testing Hypotheses \mathbf{H}_0^β and \mathbf{H}_0^α .

public good. In addition, participation may induce costs and benefits unrelated to how the individual votes, which we denote by c_i and d_i , respectively. Examples for costs c_i are the time needed to cast one's ballot or the effort to make up one's mind on how to vote. Examples for benefits d_i are a civic duty motive for voting or the utility conferred by adhering to a social norm which advocates participation. We assume that the voter does not obtain the benefit d_i if he or she casts an empty or spoiled ballot but that he or she still incurs the cost c_i of voting. Therefore, casting an empty ballot is dominated by not turning out.

When calculating his or her utility, the voter anticipates that he or she will vote in favor of (against) providing the public good if $y_i \geq 0$ ($y_i < 0$). When $y_i \geq 0$, the difference between the expected utilities derived from participation and from abstention is given by

$$z_i = p_i^1 [\lambda_i (b_i^1 - b_i^0) + \zeta_i \cdot (\mathbf{a}_i^1 - \mathbf{a}_i^0)] + \psi_i \cdot (\mathbf{a}_i^1 - \mathbf{a}_i^-) + d_i - c_i. \quad (2)$$

Similarly, we find for $y_i < 0$:

$$z_i = p_i^0 [\lambda_i (b_i^0 - b_i^1) + \zeta_i \cdot (\mathbf{a}_i^0 - \mathbf{a}_i^1)] + \psi_i \cdot (\mathbf{a}_i^0 - \mathbf{a}_i^-) + d_i - c_i. \quad (3)$$

Using the indicators

$$I_i^1 = \begin{cases} 1 & \text{if } y_i \geq 0 \\ 0 & \text{otherwise} \end{cases} \quad \text{and} \quad I_i^0 = \begin{cases} 1 & \text{if } y_i < 0 \\ 0 & \text{otherwise} \end{cases}$$

for the expected vote, equations (2) and (3) can be presented as

$$z_i = (p_i^1 I_i^1 - p_i^0 I_i^0) [\lambda_i (b_i^1 - b_i^0) + \zeta_i \cdot (\mathbf{a}_i^1 - \mathbf{a}_i^0)] \\ + \psi_i \cdot [I_i^1 (\mathbf{a}_i^1 - \mathbf{a}_i^-) + I_i^0 (\mathbf{a}_i^0 - \mathbf{a}_i^-)] + d_i - c_i. \quad (4)$$

Individual i will participate in the vote if $z_i \geq 0$.

Equation (4) takes a particularly simple form if one makes the additional assumption that expressive feelings created from abstention are the same as those created from voting against one's preferences, that is, $\mathbf{a}_i^- = \mathbf{a}_i^0$ if $y_i \geq 0$ and $\mathbf{a}_i^- = \mathbf{a}_i^1$ if $y_i < 0$. Using this, equation (4) becomes

$$z_i = (p_i^1 I_i^1 - p_i^0 I_i^0) \lambda_i (b_i^1 - b_i^0) \\ + [(p_i^1 \zeta_i + \psi_i) I_i^1 - (p_i^0 \zeta_i + \psi_i) I_i^0] \cdot (\mathbf{a}_i^1 - \mathbf{a}_i^0) + d_i - c_i. \quad (5)$$

Equations (1) and (5) imply that sufficiently large monetary gains guarantee participation and voting in favor of the public good, and sufficiently large monetary losses guarantee participation and voting against. Similarly, if social or expressive concerns are sufficiently strong, the individual will participate and vote in line with his or her evaluation of this concern.

If $c_i - d_i > 0$, implying a net cost of voting, participation requires either a sufficiently strong expressive motivation, or sufficiently different valuations of outcomes combined with a sufficiently large subjective probability of affecting the outcome. If one finds that pocketbook motives play a role in determining participation, then this suggests that the subjective probability of changing the outcome is not negligible. Consequently, in this case, it is not possible to disentangle instrumental social preferences and expressive motives. If, instead, pocketbook considerations are not found to affect the participation decision, then it is plausible that the joint effect of instrumental social concerns and expressive motives is driven by the latter.

Even when $c_i - d_i = 0$, the individual may abstain. To see this, consider an individual whose expressive concerns are in favor of the public good, $\psi_i \cdot (\mathbf{a}_i^1 - \mathbf{a}_i^0) > 0$, but who suffers a monetary loss $b_i^0 - b_i^1 > 0$. Then, conditional on voting, from (1), this individual will vote 'no' if $[\zeta_i/\lambda_i + \psi_i/(p_i \lambda_i)] \cdot (\mathbf{a}_i^1 - \mathbf{a}_i^0) < b_i^0 - b_i^1$. From (5), anticipating a no vote in case of voting, he or she will abstain if $b_i^0 - b_i^1 < [\zeta_i/\lambda_i + \psi_i/(p_i^0 \lambda_i)] \cdot (\mathbf{a}_i^1 - \mathbf{a}_i^0)$. Since $p_i = p_i^1 + p_i^0$, there is an intermediate range for the monetary loss where rational abstention may occur. This is because we assume that expressive feelings from abstention are the same as expressive feelings from

voting differently than one would have actually done. Therefore, when there is a conflict between pocketbook and expressive concerns, abstaining is a cheaper way of obtaining the expressive benefit than voting against one’s pocketbook interest.

3 Data

3.1 Institutional background

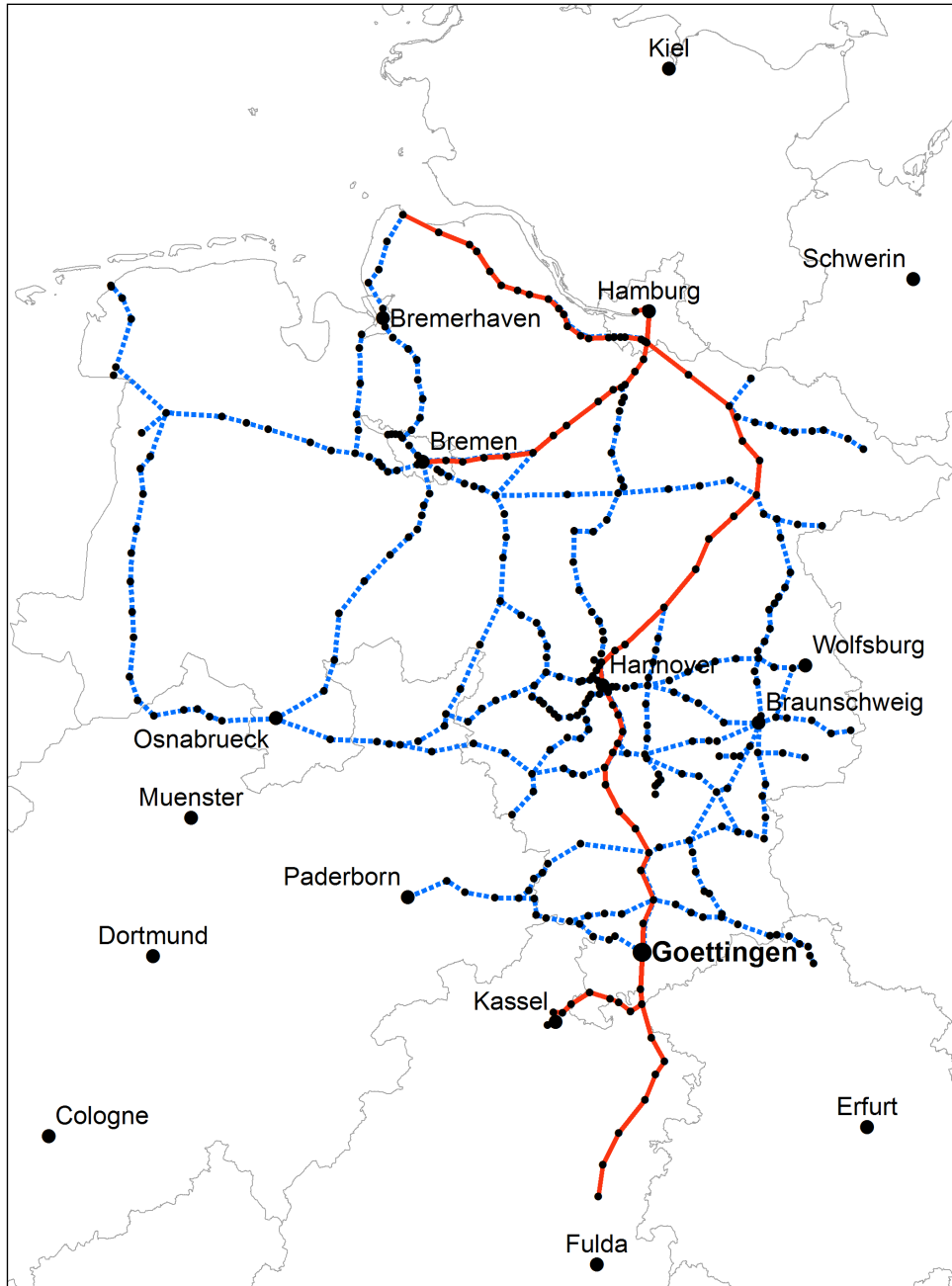
University of Goettingen holds referenda among students on whether they should collectively purchase flat rate tickets, called ‘*Semestertickets*’. These tickets give all students at the university the right to use a specific service as often as they wish. The price of a ticket is very attractive compared with prices for individual use; however, once a ticket is accepted in the referendum, its price is collected as part of the registration fee from all students with very few exemptions.

Referenda are usually held yearly over at least three consecutive days in January at several locations on campus, and voting by mail is possible. For a ticket to be accepted, more than 50% of the votes must be in favor of the ticket, and, at the same time, at least 15% of the total number of students must vote in favor.

We analyze votes on tickets for regional trains, local buses, and cultural amenities. The train ticket was introduced in 2004. Until 2010, it covered, with only minor changes, all of the tracks depicted in Figure 1, served by several operators. The vote in 2010, however, was preceded by complaints from student representatives about the price charged by Deutsche Bahn for its section of the tracks. As a result, the ticket was split in two. The first ticket covered the offer by the two companies Metronom and Cantus, henceforth called the MetroCan ticket (the tracks are depicted as solid red lines in Figure 1), and was approved in January 2010. The second ticket covered the tracks served by Deutsche Bahn and two smaller companies (depicted as blue dashed lines in Figure 1), jointly referred to as Bahn throughout this paper. After some further negotiations, a referendum on the Bahn ticket was held in May 2010. The ticket cost 42.24 euros per semester. Of approximately 22,800 students registered at that time, 25% participated in the referendum, of whom 77% voted yes.

In subsequent years the train ticket proposal again covered all tracks. The culture ticket was introduced in October 2012. It offers free or highly discounted entrance to a number of cultural institutions and events, such as theaters, museums,

Figure 1: Map



The tracks covered by the Bahn (dashed blue lines) and MetroCan (solid red lines) tickets. The gray lines are state boundaries.

and concerts. The bus ticket, which covers all buses within Goettingen and two nearby villages, would have been a novelty in 2013. In the 2013 referenda, the prices per semester amounted to 8.55 euros for the culture ticket, 25.80 euros for the bus ticket and 95.04 euros for the train ticket, and approximately 36% of almost 25,600 students took part in each referendum. While the culture ticket just passed with 53% approval, the bus ticket failed with 46% support. An overwhelming majority of 82% voted in favor of the train ticket.

3.2 Dataset I

Information in Dataset I refers to the referendum on the train ticket covering the Bahn tracks in May 2010. This dataset was collected from July 6 until November 11, 2010, using an anonymous online survey.⁵ Unlike exit polls, this method allows non-voters to be included in the dataset. To incentivize participation, students were invited to take part in a lottery with prizes including 250 euros and 15 pairs of tickets to a local cinema.

Summary statistics for Dataset I are reported in Table 2. This dataset consists of 1,189 observations after cleaning the data.⁶ Of these, 828 students took part in the referendum, showing an overrepresentation of voters in our sample. At the same time, these data allow us to base our analysis on detailed information on almost one sixth of all voters in the referendum. Among the voters in the sample, the share of yes votes is 68% and hence smaller than the share of yes votes among the electorate.

The key variable in this dataset which allows us to measure pocketbook benefits is the individual savings of each student. We construct an objective measure of the savings associated with the Bahn ticket by combining the number of trips to visit the respondent's parents using this ticket within the previous 12 months with the price that would have been paid in the absence of the ticket. This price takes into account all available rebates other than the *Semesterticket*, effectively capping the savings at the price of an annual free pass for German railways (*BahnCard 100*). We focus on trips to visit parents because this is the most common trip students make. Moreover, since the location of parents' residence along the Bahn tracks is exogenous, the opportunity to use the ticket for these trips varies randomly among students. Finally, the two larger cities close to Goettingen, namely Hannover

⁵Translations of survey questions are available in Appendix A.VIII. (Labels numbered with 'A.' refer to the supplementary material.)

⁶See Appendix A.I for a detailed description.

Table 2: Summary statistics Dataset I

Variable	All		Vote on Bahn ticket=1	
	N	Mean	N	Mean
Vote on Bahn ticket	1189	0.70	828	1.00
Bahn ticket: yes	818	0.68	818	0.68
Savings [◇]	1189	255.09	828	302.92
Own price threshold [♣]	1125	69.76	783	72.31
Exp. ave. price threshold [♡]	1099	63.20	764	63.03
Leisure/work	1189	0.06	828	0.06
Visiting others	1174	0.65	819	0.67
Female	1176	0.57	817	0.54
Freshman	1099	0.15	768	0.18
Altruist (−)	1074	0.14	741	0.13
Altruist (+)	1074	0.34	741	0.33
Protest	1189	0.21	828	0.24
Christian Democrat	911	0.21	645	0.22
Social Democrat	911	0.24	645	0.27
Liberal Democrat	911	0.11	645	0.11
Green	911	0.35	645	0.33
Left	911	0.03	645	0.02
Other parties	911	0.05	645	0.05

[◇]Savings are between 0 and 3,800 with a standard deviation of 449.72 within the entire sample and 487.99 among the voters; [♣]own price thresholds are between 0 and 750 with a standard deviation of 65.22 and 64.14, respectively; [♡]and expected average price thresholds are between 10 and 720 with a standard deviation of 47.92 and 46.76, respectively.

and Kassel, which might be attractive leisure destinations, can be reached using the MetroCan ticket (Figure 1).⁷ As seen in the note below Table 2, the savings variable exhibits a large variation. We define the difference between savings and the ticket price as net savings. In the econometric analysis, we use a transformation of net savings to measure pocketbook benefits $b_i^1 - b_i^0$.

A limitation of the savings variable is that students can also use the ticket for other trips. To complement the savings measure, we asked whether the respondent visited people other than his or her parents using the ticket. We coded this information as a binary variable since quantifying monetary savings from these trips would have required the zip codes of other people visited and the number of times each of them was visited.

The key variables measuring social preferences or expressive concerns describe whether a student considered benefits of others in his or her voting decision and his or her evaluation of these benefits. These variables are based upon the answers to three questions. The first asks what is the highest price at which the respondent would vote in favor of the Bahn ticket; we refer to this variable as the price threshold. The second asks about the respondent's belief about the corresponding average of

⁷A detailed description of the calculation of savings is included as Appendix A.II.

fellow students. The third question asks how the respondent weighted these two considerations in his or her vote. If the voting decision is influenced by the belief about the average preferences of other students, then the respondent is classified as an altruist. The resulting group of altruists is then split into those who think that students on average will gain from this ticket and those who think that students on average will lose. Accordingly, $altruist(+)$ is equal to one if the student is an altruist and believes that the price threshold of fellow students is on average at least as large as the price, and zero otherwise. We define $altruist(-)$ analogously. If the student did not vote, then the third question on the actual voting decision is replaced by a corresponding question about a hypothetical voting decision. In the econometric analysis, the binary variables $altruist(+)$ and $altruist(-)$ are components of the vector $(\mathbf{a}_i^1 - \mathbf{a}_i^0)$ representing social preferences or expressive concerns.

The questionnaire also allowed students to enter free text regarding the primary reasons to vote for or against the Bahn ticket. To use this qualitative information, a content analysis was performed to identify the relevant topics. Afterward, three raters independently coded all of the answers with respect to whether a topic did appear. Finally, an indicator variable was defined that is equal to one if at least two of the three raters independently identified the topic in the statement given and zero otherwise. We use two variables resulting from this qualitative analysis. The first item, *leisure/work*, complements our measures of pocketbook benefits. It captures whether the student mentioned leisure activities other than visiting people, such as exploring the region, or work-related usage. The second item emerging from the content analysis is *protest*: some students expressed their unwillingness to accept the price of the ticket or feared that accepting the conditions would foster future price increases. Among the voters, the shares of students referring to *leisure/work* and *protest* are approximately 6% and 24%, respectively. The control variables in this dataset include gender, the party for which the student voted in the federal election in 2009, and whether the student is a freshman. This latter variable controls for the fact that freshmen could not have used the Bahn ticket for an entire year before the referendum.

3.3 Dataset II

Dataset II covers the referenda on all three tickets that took place in January 2013 and was collected using exit polls. After leaving the polling place, students were

approached by members of the survey team and asked to take part in a paper-based survey. To preserve anonymity, cubicles similar to polling booths were installed. Participation was incentivized by a lottery with prizes of 200, 100, and 50 euros.

After excluding those students who did not provide any voting decision, Dataset II contains 1,334 observations, corresponding to one seventh of all the votes cast. Summary statistics are shown in Table 3. Within our sample, the shares of yes votes for all three tickets are slightly higher than the respective overall shares. The students in the dataset would have just passed the bus ticket, which narrowly missed the 50% approval threshold in the referendum.

Table 3: Summary statistics Dataset II

Variable	N	Mean	Variable	N	Mean
Train ticket			Control variables		
Train ticket: yes	1252	0.86	Female	1276	0.50
Would buy it	1248	0.64	Freshman	1318	0.30
<i>Intensity of use</i>			Christian Democrat	1140	0.26
Never	1321	0.07	Social Democrat	1140	0.29
Rarely (≤ 5 /year)	1321	0.17	Liberal Democrat	1140	0.04
Sometimes (monthly)	1321	0.32	Green	1140	0.31
Often (weekly)	1321	0.21	Left	1140	0.05
Very often (≥ 2 /week)	1321	0.24	Other parties	1140	0.05
Savings to others important	1292	0.47	Economic sciences	1322	0.30
Environment important	1284	0.38	Social sciences	1322	0.24
Bus ticket [◇]			Forestry/Agriculture	1322	0.06
Bus ticket: yes	1246	0.51	Humanities	1322	0.27
Would buy it	1276	0.37	Geology/Geography	1322	0.03
<i>Intensity of use</i>			Law	1322	0.11
Never	1329	0.40	Natural sciences	1322	0.08
Rarely (1 or 2/semester)	1329	0.24	Other fields	1322	0.03
Sometimes (monthly)	1329	0.13			
Often (weekly)	1329	0.09			
Very often (≥ 2 /week)	1329	0.14			
Savings to others important	1280	0.23			
Strengthening bus important	1245	0.12			
Culture ticket					
Culture ticket: yes	1283	0.54			
Would buy it	1233	0.44			
<i>Intensity of use</i>					
Never	1234	0.56			
Rarely (1 or 2/year)	1234	0.25			
Sometimes (3 to 5/year)	1234	0.12			
Often (6 to 10/year)	1234	0.04			
Very often (> 10 /year)	1234	0.03			
Savings to others important	1235	0.24			
Others should go important	1201	0.29			
Strengthening local culture important	1229	0.39			

[◇] Intensity of the use of the bus ticket refers to the lecture period.

Pocketbook benefits $b_i^1 - b_i^0$ are measured by categorical variables on the intensity of use, defined differently for the tickets (Table 3). For the train and culture tickets,

students were asked about their use of these amenities within the last 12 months and the year before the ticket had been introduced, respectively. For the bus ticket, the intensity of use refers to teaching periods. In addition, students were asked if they would buy the ticket for themselves if the ticket were rejected in the referendum but were available for purchase at the same price on an individual basis.

For each of the three tickets, the vector $(\mathbf{a}_i^1 - \mathbf{a}_i^0)$ representing social preferences or expressive concerns contains as a common component information on whether the respondent considered savings to other students to be important in his or her vote. The answers to these questions were given on a four-point Likert scale ranging from ‘not important’ to ‘important’. Furthermore, we asked about other motives, such as environmental aspects in the case of the train ticket or strengthening local transportation or local cultural life in the case of the bus or culture tickets, respectively, using the same Likert scale. In Table 3, we give the shares of students who replied that these other considerations were important, meaning that they checked the highest category in the scale. This binary coding is also used in Figure 5 and in the regression analysis presented in Section 5. Additional control variables include gender, fields of study,⁸ and being a freshman. Political preferences were captured by a question on how the respondent would vote in a federal election if this election were to take place the following Sunday.

4 The big picture

In this section, we take a closer look at the data in a descriptive analysis. The big picture that emerges is that there is strong evidence for pocketbook voting but that social preferences or expressive motivations also play an important role. This means that both null-hypotheses H_0^β and H_0^α are refuted.

We first give the evidence for pocketbook voting in the 2010 vote on the Bahn ticket based on Dataset I. For this purpose, we define those for whom savings from visiting parents were less than the price of the ticket and who neither visit other people using the ticket nor mention leisure or work-related trips as losers in terms of private benefits. Similarly, we classify those for whom the savings from visiting parents exceeded the price of the ticket as winners. Those for whom savings from

⁸Due to the high number of polling stations, the survey team could not cover all of the stations during opening hours on all three days. Therefore, the faculties of Law, Humanities, Economic Sciences and Social Sciences are overrepresented in the dataset.

visiting parents fell short of the price of the ticket but who also mentioned other trips are a middle category, in which we cannot say for sure whether the student in question privately gained or lost from the ticket. Of the 815 voters in Dataset I, 24% are classified as losers and 49% as winners.

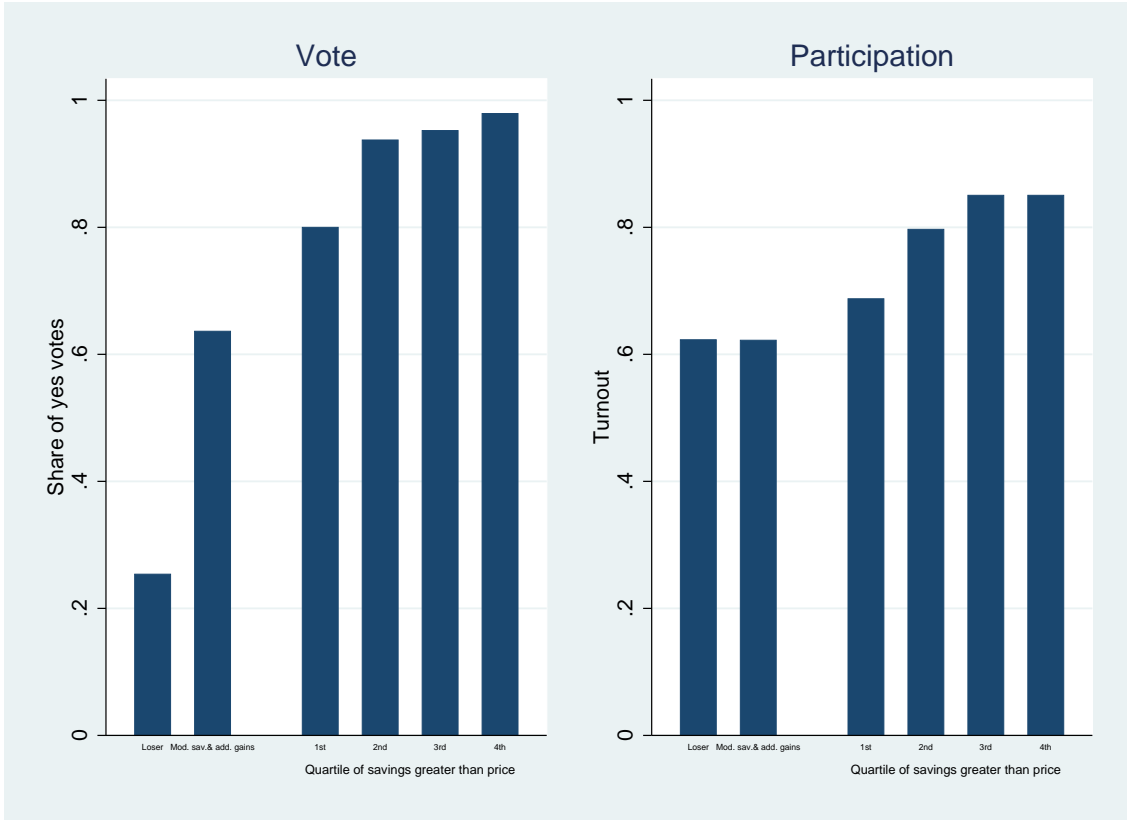
Figure 2 depicts the shares of yes votes (left panel, calculated among all voters) and voters (right panel, calculated among all respondents) for losers, the middle category, and winners. To illustrate how voting and turnout depend on the magnitude of pocketbook gains, these shares are calculated for each quartile of savings among the winners. The results are very much in line with pocketbook voting. Overall, 92% of the winners voted in favor of the ticket and 75% of the losers against. Among the winners, the share of yes votes increases from 80% in the first quartile to 98% in the last. Similarly, although less pronounced, we see that losers and those in the middle category are least likely to vote. Among winners, turnout increases monotonically in stakes.

A corresponding picture of strong pocketbook voting also arises from Dataset II. Figure 3 depicts the share of yes votes depending on how intensively the voter used the service that was the subject of the vote. For each ticket, more than 90% of those who used the service very often voted in favor, while the share of yes votes varies between 24% and 32% for those who never used the service.

In Dataset I, the variables *altruist(-)* and *altruist(+)* capture a social or expressive concern for the interest of other students. The left panel in Figure 4 shows that the share of votes cast in favor of the Bahn ticket rises from 36% among students classified as *altruist(-)* to 64% among non-altruists and to 87% among students classified as *altruist(+)*. Thus, voters for whom the average price threshold of other students is important and who think that students on average lose (gain) from the ticket are less (more) likely to vote in favor than those who do not consider the price threshold of others in their vote. Comparing with Figure 2, one notices, moreover, that the variation in the share of yes votes according to pocketbook benefits is stronger than according to altruism. As shown in the right panel of Figure 4, participation shares do not differ much between the three groups. Thus, while pocketbook benefits predict turnout, the effects of altruism are minor. Even more, the turnout is marginally higher among those who do not report altruistic motivations than among those who do.

Dataset II provides similar evidence in favor of social preferences or expressive concerns. Figure 5 shows that support for the ticket is 17 (train), 25 (bus), or

Figure 2: Savings, share of yes votes, and turnout – Dataset I



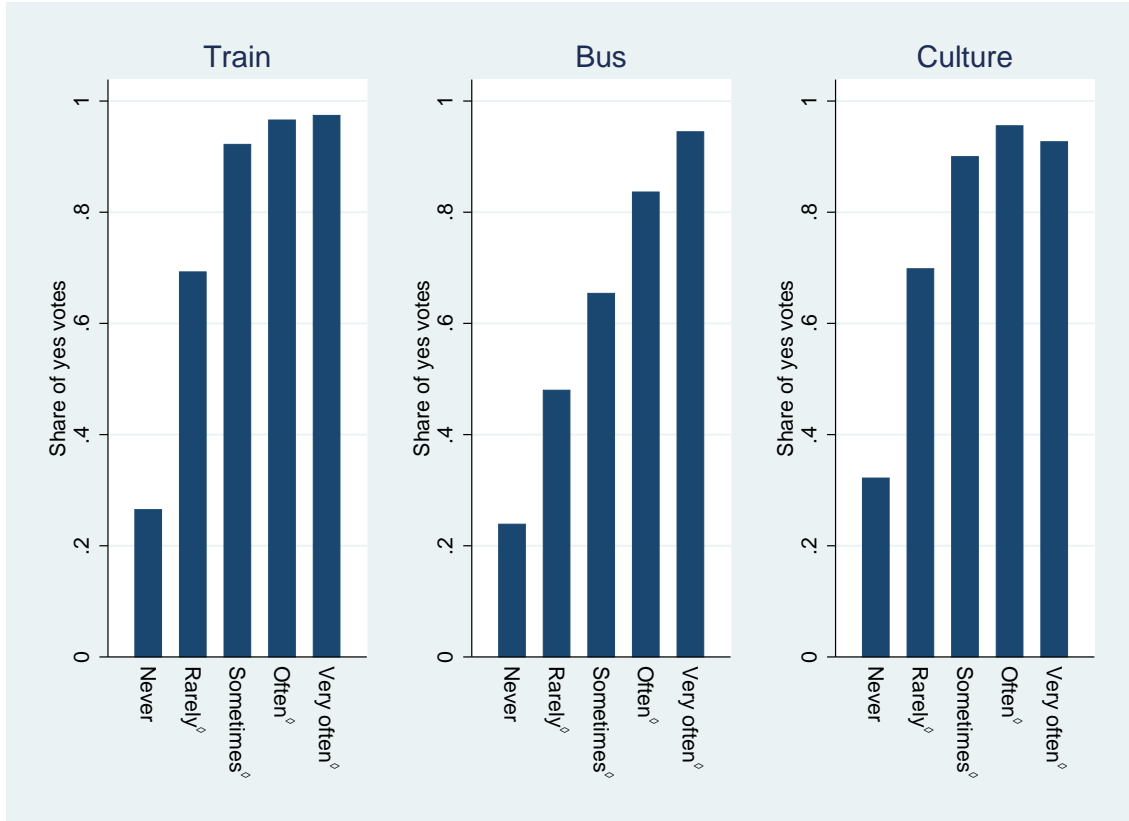
Losers' savings do not cover the ticket price, and they neither visit other people using the ticket nor mention leisure/work usage. The savings of the second group, labeled 'moderate savings and additional gains', alone do not cover the ticket price; however, they mention other trips. The last four bars refer to respondents whose savings exceed the ticket price.

30 (culture) percentage points larger among those who consider savings to other students important for their voting decision than among those who do not.

Students' self-declared assessment of motives sheds some light on the relative importance of pocketbook benefits and social or expressive concerns. In Dataset I, we asked respondents how they weighed (or would have weighed, in the case of non-voters) their own price threshold and the average price threshold of all students in their decision. The results are summarized in Table 4. We find that 84% of voters and 77% of non-voters put more weight on their own benefit, 11% and 12% weighed both thresholds equally, and only 5% and 11% assigned higher importance to other students' benefits.

In Dataset II, we asked separately how important own savings and each social or expressive motive was for the voting decision. The latter motives encompass altruistic concerns, when a respondent notes that savings to other students are a

Figure 3: Intensity of use and yes votes – Dataset II

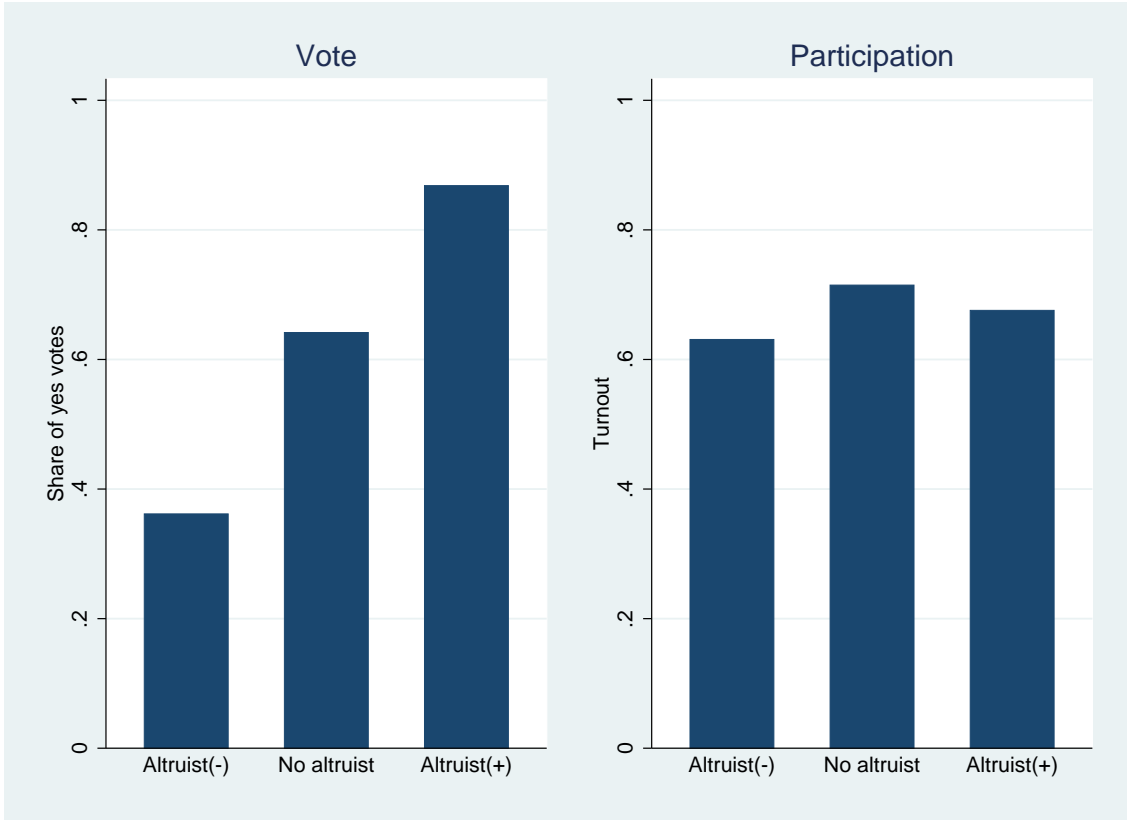


◇ Definitions of the intensity of use differ: Rarely, Sometimes, Often, and Very often correspond to at most 5 times a year, monthly, weekly, and at least twice a week, respectively, for the train ticket; once or twice a semester, monthly, weekly, at least twice a week, respectively, during the lecture period for the bus ticket and once or twice a year, 3 to 5 times a year, 6 to 10 times a year, > 10 times a year, respectively, for the culture ticket.

motivation to vote in favor of a ticket, and common good considerations, when a respondent supports the service in question because it benefits the environment (in the case of the train ticket), because he or she wants to strengthen local culture or the bus system, or states, paternalistically, that other students should use cultural services more often.⁹ In Table 5 we compute the share of respondents who, on

⁹Strengthening local cultural institutions or the bus system can also be self-interested, to improve the choices that one has as a private consumer. Similarly, wanting other students to consume more culture might also reflect a desire to have more company at cultural events, or other forms of positive consumption externalities. Yet another reason for supporting the culture ticket could be related to problems of self-control. Students may want to commit themselves to consuming more culture, just as a flat rate gym membership can be seen as a commitment device to exercise more often (DellaVigna and Malmendier, 2006). Note, however, that buying this ticket privately would also provide a commitment device. The fact that a substantial number of respondents voting in favor of the ticket would not make this private purchase but at the same time state that others should attend cultural events more often (see Table A.4) suggests that most

Figure 4: Altruism, share of yes votes, and turnout – Dataset I



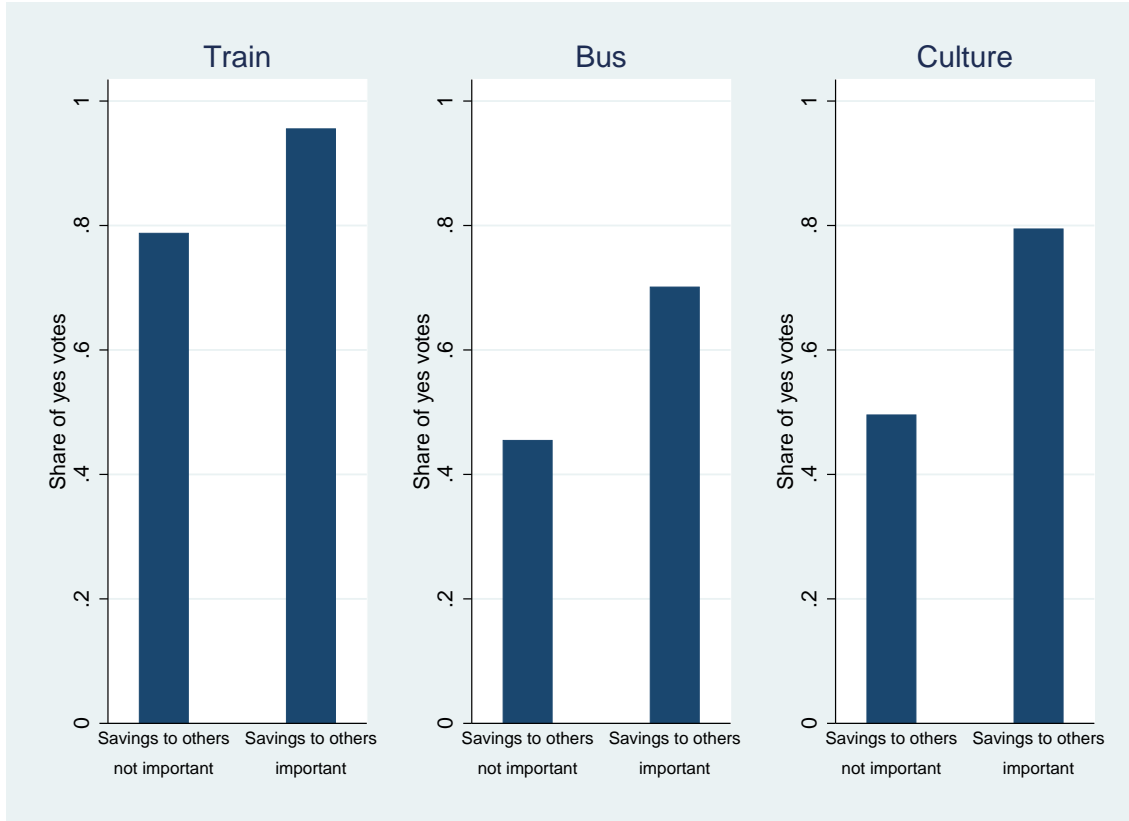
Non-altruists are individuals who state that the average price threshold of all students, defined as the maximum price up to which they would have been willing to vote for the ticket, is not important in their decision. *Altruist(+)* (*altruist(-)*) designates individuals who state that this threshold is important and estimate that others on average gain (lose) from the Bahn ticket.

the four-point Likert scale, attributed a strictly higher (the same, a strictly lower) importance to own monetary savings than to the most important social or expressive motive. Those who value own savings at least as important as all social or expressive motives are 92% for the train ticket, 87% for the bus ticket, and 72% for the culture ticket.¹⁰

In Dataset II, we also asked respondents whether they would have bought the ticket individually if it were rejected in the referendum but available for individual students saw the self-control problem in their fellow students rather than in themselves.

¹⁰A substantial number of students, namely 44% for the train, 17% for the bus, and 19% for the culture ticket, designated both own savings and savings to other students as ‘important’ (see Table A.1). In Table 5, these students are classified as attaching equal importance to both kinds of motives. We conjecture that, if pressed to make a comparison, a majority of them would have opted for own savings as being even more important than savings to others, similar to the findings for Dataset I in Table 4. Hence, in Table 5 the shares of students who consider own monetary benefits as more important than social or expressive concerns are likely to be understated.

Figure 5: Importance of savings to others and yes votes – Dataset II



Share of yes votes among students who state that the savings to other students are not important resp. important for their voting decision. 'Important' ('not important') refers to the highest category (the lowest three categories) in a four-point Likert scale ranging from 'unimportant' to 'important'.

purchase at the same price. If voting exclusively followed pocketbook considerations, we would expect those who voted in favor to also be willing to buy the ticket and those who voted against to be unwilling to do so. We find that 93% to 96% of those who voted against a semester ticket would also decline the opportunity to buy it privately. Remarkably, 23% to 27% of those who voted in favor of a ticket would not be willing to buy it privately for the same price. Taken together, 15% to 23% of the respondents voted differently as citizens than they would have chosen as private consumers (see Table A.2).

We conjecture that social preferences and expressive motives explain most of the votes which are not in line with pocketbook considerations. Indeed, in Dataset I the majority of respondents who voted in favor of the Bahn ticket even if they lost privately thought that other students gained from it and reported that they cared about this gain. Among those who voted against the ticket, even if it promised

Table 4: Dataset I: Importance of own vs. other students' price thresholds

Weighting of price thresholds	Voters (Percent)	Non-voters (Percent)
Only own price threshold	52.90	47.06
Stronger own price threshold	31.53	30.00
Both equally strong	10.82	11.76
Stronger expected average threshold of all students	3.56	8.53
Only expected average price threshold of all students	1.19	2.65
Observations	758	340

Responses to the question about how students weighed (would have weighed) their own price threshold and the expected average price threshold of all students in their voting decision on the Bahn ticket. Percentages refer to the total of voters (non-voters) who gave a response and did not tick "no answer".

Table 5: Dataset II: Importance of own savings vs. social or expressive motives

Importance of own savings compared to most important social or expressive motive	Train (Percent)	Bus (Percent)	Culture (Percent)
Own savings more important	34.28	52.37	26.12
Both equally important	58.00	34.47	45.53
Own savings less important	7.73	13.15	28.35
Observations	1,307	1,285	1,252

Students are classified according to stated importance of motives for the voting decision, measured on a four-point Likert scale. Social or expressive motives include savings to other students (all tickets); environmental concerns and strengthening public transportation (train ticket); strengthening the bus system (bus ticket); strengthening local culture and inducing other students to attend more cultural events (culture ticket). Observations are included if there is information on the importance of own savings and on at least one social or expressive motive.

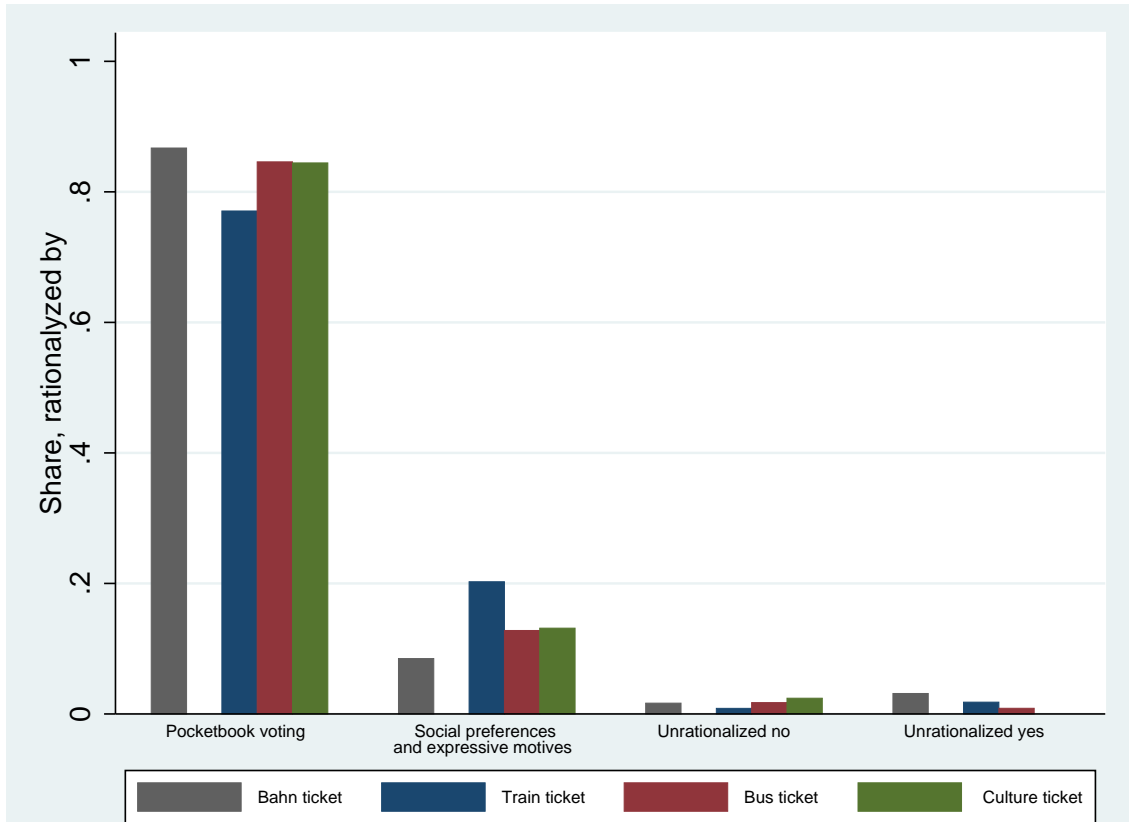
them higher private savings than the price of the ticket, a clear majority was either of the view that other students would lose from the ticket or mentioned protest motives¹¹ in the questionnaire's write-in section (see Table A.3).

In Dataset II, we calculated the fraction of those who voted in favor of each ticket but would not buy it privately who also reported at least one of the social or expressive motives considered in Table 5. Here, we classify a social or expressive motive to be present if the respondent stated that an item was at least somewhat important for his or her decision. We find that everyone who supported the culture ticket without being willing to buy it privately and more than 90% of those voting in favor of the train or bus ticket despite not being willing to buy it privately claimed at least one social or expressive motive (see Table A.4).

Figure 6 summarizes our findings. It shows that 77% to 87% of all votes can

¹¹Protest may be instrumental, aiming at pushing the Bahn company to lower its price, or expressive, when students did not expect that their individual vote would change the company's pricing policy.

Figure 6: Rationalizing votes – Datasets I and II



be rationalized by pocketbook voting alone. In Dataset I this corresponds to losers voting against the ticket and winners voting in favor (see Table A.3). Here, we disregard the middle category since it is not clear whether these respondents gain or lose from the ticket, and restrict the analysis to actual votes. In Dataset II a vote is rationalized by pocketbook considerations if the respondent votes in favor of a ticket if and only if he or she would buy it privately at the price charged (see Table A.2). Almost all of the votes that cannot be rationalized in this way can be rationalized by social preferences or expressive motives. The shares of unrationalizable no votes are between one and two percent, and the shares of unrationalizable yes votes are between zero and three percent.¹²

Figure 6 should not be interpreted to imply that individual financial interests and social preferences or expressive motives are mutually exclusive. The figure does not state that around 80% of all voters would base their decisions only on their own

¹²Unrationalized no votes could arise from libertarian reservations against forcing a collective choice upon individuals.

financial benefit. Rather, it shows that there are very few votes that cannot be rationalized by pocketbook voting or social or expressive considerations.¹³

To observe the full power of social preferences or expressive motives, note that although only a minority of students in the sample would have bought the culture ticket or the bus ticket (see Table A.2), a majority supported them in the referenda. As Figure 6 shows, for a sizable minority of the voters, social preferences or expressive motives were the decisive factor in their decision. The closeness of the results in the actual referenda on the culture and bus tickets suggests that such motives were pivotal in the former vote and close to pivotal in the latter.

The fact that these two referenda were close and the other two (both train tickets) were decided by a large margin¹⁴ also sheds some light on the relative importance of social preferences and expressive motives. In a trade-off between pocketbook benefits and expressive motives, pocketbook considerations are weighted by the probability to change the outcome, and should therefore become more important in close elections. The finding that pocketbook voting explains around 80% of votes in each election, irrespective of whether it was close or not, suggests that expressive concerns play a relatively small role.

5 The vote

5.1 Estimating the voting decision

For the empirical analysis, we assume $\lambda_i = \lambda$, $\zeta_i = \zeta$, $\psi_i = \psi$, and $p_i = p$ for all voters i . Moreover, we allow for an additive impact of a vector of individual covariates \mathbf{x}_i such as gender, political affiliation or fields of study, with the vector $\boldsymbol{\rho}$ measuring the effects of the various covariates. Finally, we add an error term μ_i with a standard normal distribution. This modifies equation (1) to

$$y_i = \beta (b_i^1 - b_i^0) + \boldsymbol{\alpha} \cdot (\mathbf{a}_i^1 - \mathbf{a}_i^0) + \boldsymbol{\rho} \cdot \mathbf{x}_i + \mu_i . \quad (6)$$

¹³We also performed the analysis summarized in Figure 6, splitting the sample by gender and by political orientation. We find that the differences are minor.

¹⁴This pattern has been remarkably stable. Before the train ticket was split in two in 2010, it had been approved by 80% in 2008 and 84% in 2009. In the referenda in 2011 and 2012, the approval rates were 80% and 82%. The culture ticket passed in 2012 with a 51% share of yes votes.

Equation (6) is the basis for the empirical analysis. We estimate the coefficients $\beta = p\lambda$, $\alpha = p\zeta + \psi$ and ρ using a probit regression, where the dependent variable is the binary choice to support the ticket or not. The probability that i votes in favor of the ticket is given by $\Phi(\beta(b_i^1 - b_i^0) + \alpha \cdot (\mathbf{a}_i^1 - \mathbf{a}_i^0) + \rho \cdot \mathbf{x}_i)$, where Φ is the cumulative distribution function of the standard normal distribution. Due to the standardization of the error term inherent in the probit model only the relative sizes of the coefficients can be interpreted.

We cannot observe the exact monetary benefit $b_i^1 - b_i^0$ since we do not have information about the shape of the function w_i or the counterfactual intensity of use in case the ticket is not provided. In Dataset I, we have a continuous variable for the savings τh_i^1 provided by the ticket, calculated using the number of trips that were taken with the ticket in place. Net savings $\tau h_i^1 - t$ likely overstate the benefit which heavy users derive from the ticket, since individual use might drop considerably if marginal cost were positive instead of zero. Therefore, we approximate the equivalent variation by (for details, see Appendix A.IV)

$$b_i^1 - b_i^0 = \begin{cases} \ln(\tau h_i^1 - t + 1) & \text{if } \tau h_i^1 - t \geq 0 \\ \tau h_i^1 - t & \text{if } \tau h_i^1 - t < 0. \end{cases} \quad (7)$$

In this expression, we use the logarithm of net savings for individuals whose savings exceed the ticket price. We add +1 to ensure that net savings smaller than one are valued positively. In contrast, since negative net savings occur only with individuals who use the ticket rarely or not at all, we do not transform negative net savings. In the empirical application, we prefer not to force a common coefficient on the two branches of equation (7), and hence introduce both of them as separate regressors.

In Dataset II, the pocketbook benefit is quantified by categorical variables. The coefficients associated with these variables measure by how much the utility of a voter whose intensity of use of the service covered by the ticket falls in the respective category exceeds the utility of a voter who never uses it.

Social preferences and expressive motives are measured by survey responses which are coded in binary variables. In all cases, these variables state whether an individual cares for some issue linked to the outcome of the vote, such as benefits of others or the environment. In Dataset I, we use the variables *altruist(+)*, *altruist(-)*, and *protest*. In Dataset II, we code an individual as having a certain social or expressive motive if he or she mentioned, in the four-point Likert scale

used in the survey, that the corresponding item is important. Thus, for a voter who states (does not state) that an issue is important, the corresponding component of the vector $\mathbf{a}_i^1 - \mathbf{a}_i^0$ is set to one (zero).

5.2 Empirical results

We report results for Dataset I in Table 6. The main explanatory variables measuring monetary self-interest are *log positive net savings* and *negative net savings*, which refer to the two branches of equation (7). The table shows the corresponding marginal effects for the benchmark student who is defined by all indicator variables being zero. Thus, the benchmark is male and not a freshman, does not use the Bahn ticket for leisure, work, or visiting others, and is neither an altruist nor states a protest motive. However, to account for the high variation with respect to individual savings on trips to visit parents, we also incorporate the individual values of the net savings variable in the calculation of marginal effects. Hence, we display average marginal effects for benchmark students.¹⁵ To ensure comparability of estimates across specifications, we use the observations for which there is information on all variables included in column (5) in all columns. When we use all available observations, the results are virtually unchanged.

The variable *log positive net savings* shows the expected positive sign and is significant at the 0.1 percent level. From column (2) onwards, the corresponding marginal effect remains virtually the same if we include additional variables. A benchmark student is on average 0.6 percentage points more likely to vote in favor if net savings increase by 10%. Given the range of the variable, this translates into sizable differences in the prediction: based on the full specification, column (5), the probability of a positive vote is 32% if the benchmark student's savings only cover the ticket price. The predicted probability is 71% if his net savings are of average size and 82% if he saves one thousand euros more than the ticket

¹⁵We calculate marginal effects as discrete changes from zero to one for all indicator variables. For positive net savings, average marginal effects are determined as follows. Setting all indicator variables to zero, we first evaluate the derivative of the probability to vote in favor of the ticket with respect to the log of net savings +1 at the individual value of net savings of each observation with positive net savings. These derivatives are then averaged over all observations with positive net savings in the sample, yielding the average marginal effects displayed in the first row of Table 6. Similarly, for observations with negative net savings we evaluate the derivative of the probability to vote for the ticket with respect to net savings at their individual values and average over these observations, yielding the average marginal effects in the second row of Table 6. Coefficients for all regressions in the paper are reported in Tables A.5-A.7.

Table 6: Bahn ticket – Dataset I

Dependent Variable: Supporting Bahn Ticket					
	(1)	(2)	(3)	(4)	(5)
Log positive savings	0.021*** (3.52)	0.063*** (4.20)	0.063*** (3.93)	0.066*** (3.78)	0.062*** (3.64)
Negative net savings	0.003** (2.68)	0.001 (0.91)	0.001 (1.26)	0.001 (1.48)	0.002 (1.57)
Leisure/work		0.059 (0.74)	0.050 (0.63)	0.030 (0.39)	0.034 (0.44)
Visiting others		0.314*** (8.37)	0.318*** (8.22)	0.279*** (6.86)	0.281*** (6.99)
Female			0.061 (1.64)	0.037 (0.98)	0.035 (0.94)
Freshman			0.091 (1.75)	0.106* (2.01)	0.114* (2.18)
Altruist(-)				-0.143** (-2.98)	-0.140** (-2.88)
Altruist(+)				0.283*** (6.66)	0.281*** (6.70)
Protest					-0.080* (-1.96)
Pseudo R ²	0.251	0.351	0.357	0.438	0.442
Log likelihood	-312.2	-270.7	-268.0	-234.5	-232.6
Observations	669	669	669	669	669

Probit estimation; marginal effects for benchmark students; discrete changes from 0 to 1 for indicator variables; z-statistic in parentheses. Regressions are based on the observations for which there is information on all variables included in column (5). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

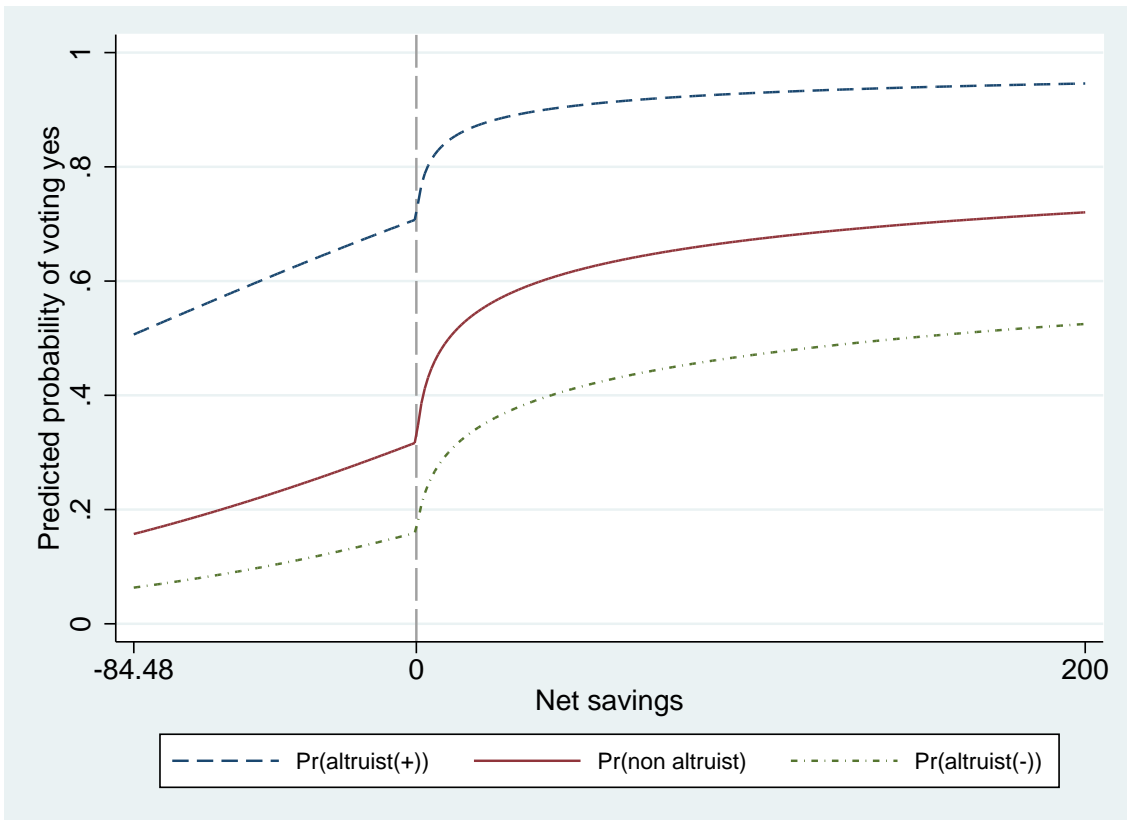
price. The marginal effect of the variable *negative net savings* is not statistically significant but positive throughout. The lack of statistical significance may be due to the fact that this variable varies only between -84.48 and zero euros. Finally, visiting others using the ticket significantly increases the probability of voting in favor. These findings confirm the high importance of personal monetary benefits to individual votes. Hence, for the observations contained in Dataset I, we clearly reject null-hypothesis H_0^β , which says that pocketbook motives do not influence the voting decision.

Social preferences and/or expressive concerns also play a role in this vote: both altruism variables carry the expected sign and are significant at least at the 1 percent level. Approximately half of the students consider their fellow students' gains and losses in their votes. According to their own perception of whether the other students will on average gain or lose, these students are, *ceteris paribus*, respectively more or less likely than the benchmark to vote in favor of the ticket. Expecting other students to gain from the ticket and considering this expectation increases support for the ticket as much as using it oneself to visit other people

aside from one’s parents. Furthermore, the protest variable carries a negative sign and is significant at the 5 percent level. This suggests that some students protested against the train company’s pricing policy by voting against the ticket. From these results we conclude that null-hypothesis H_0^α , which states that neither social nor expressive motives affect the voting decision, is rejected for Dataset I.

To examine whether general political attitudes contribute to explaining individual votes, we include party preferences in the regressions. This does not change our main results. All else being equal, supporters of the left are not more likely to vote in favor of the ticket; we do not find significant effects for any of the parties (Table A.8). This finding also holds true when grouping parties on the left (Social Democrats, Greens, and Left Party) and on the right (Christian Democrats and Liberal Democrats) into blocs.

Figure 7: Predicted probability to vote in favor of Bahn ticket – Dataset I



◇ Prediction based on Table 6, column (5), as function of net savings in euros. All binary variables except *altruist(+)* and *altruist(-)* are set to zero. The line labelled *Pr(non altruist)* refers to an individual who states that he did not consider the benefits of others in his vote. The line *Pr(altruist(+))* (*Pr(altruist(-))*) refers to an individual who considered benefits of others in his vote and estimates that others on average gain (lose) from the Bahn ticket.

We summarize the quantitative results on the voting decision in Figure 7, based on the specification of column (5) in Table 6. In this figure, we restrict attention to monetary savings and altruism since these variables are our main focus of interest and contribute most to the pseudo R-squared in Table 6.

The solid red line in Figure 7 plots the predicted probability of voting in favor of the Bahn ticket for a benchmark student as a function of net savings. This probability reaches 50% at net savings of 10 euros, which is plausible since students with very small net gains should be fairly indifferent between the alternatives. The broken blue line labelled $Pr(altruist(+))$ shows that the predicted probability to support the ticket is shifted upwards by a substantial amount when the respondent cares about the benefit of others and anticipates that other students benefit from the ticket. Even when he does not use the ticket at all, such a student is more likely to support the ticket in the referendum than to reject it. The dotted line labelled $Pr(altruist(-))$ shows the predicted voting behavior of an altruist who estimates that the ticket is harmful to the interests of others. Even with substantial net savings of 140 euros, such a student is more likely to vote against the ticket than in favor of it.

Table 7 contains results for the train, bus and culture tickets. We display marginal effects for benchmark students who are characterized by all indicator variables being zero. Thus, the benchmark is male and not a freshman, and savings to other students are not important to his decision. The base category for the intensity of use is “never”.

Our econometric results confirm the impressions gathered in Section 4: the probability of voting in favor of a ticket strongly increases with the intensity of use, suggesting a high degree of pocketbook voting. The effects are significant at the 0.1 percent level and of an economically relevant size. For example, an otherwise identical student who uses the bus several times per week is 73 percentage points more likely to vote in favor of the bus ticket than the benchmark student who does not use the bus. Thus, also for Dataset II, null-hypothesis H_0^β is rejected. Variables capturing social preferences and/or expressive concerns also show highly significant and positive effects. From these results, null-hypothesis H_0^α is also rejected in Dataset II.¹⁶

¹⁶A similar picture emerges from the regression analysis if we use indicator variables encompassing motives that were at least somewhat important rather than focusing on motives that were important. In line with expectations, these variables capturing less pronounced social preferences or expressive concerns in general display smaller marginal effects than those shown in Table 7. We

Table 7: Train, bus and culture tickets – Dataset II

Dependent Variable: Supporting Ticket			
	Train	Bus	Culture
Rarely	0.373*** (6.21)	0.203*** (5.64)	0.290*** (6.83)
Sometimes	0.676*** (13.14)	0.411*** (8.19)	0.572*** (7.80)
Often	0.745*** (14.19)	0.587*** (11.38)	0.649*** (4.94)
Very often	0.760*** (14.69)	0.728*** (20.17)	0.522** (2.95)
Female	0.074* (2.04)	0.007 (0.29)	0.019 (0.80)
Freshman	-0.029 (-0.92)	0.067* (2.44)	0.084* (2.58)
Savings to others	0.198*** (3.65)	0.158*** (4.07)	0.104* (2.40)
Environment	0.242** (3.25)		
Strengthening bus system		0.418*** (5.87)	
Others should go			0.433*** (5.83)
Strengthening local culture			0.453*** (8.74)
Pseudo R ²	0.364	0.285	0.440
Log likelihood	-277.9	-539.1	-378.7
Observations	1145	1090	988

Probit estimation; discrete effects for benchmark students due to changes from 0 to 1 for all variables; *z*-statistic in parentheses. Frequencies of use are defined as follows: Rarely: train, ≤ 5 /year; bus, 1 or 2/semester; culture, 1 or 2/year. Sometimes: train, monthly; bus, monthly; culture, 3 to 5/year. Often: train, weekly; bus, weekly; culture, 6 to 10/year. Very often: train, ≥ 2 /week; bus, ≥ 2 /week; culture, > 10 /year. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

As a robustness check, we also control for the field of study (Table A.9). The overall picture is that it does not appear to matter much for individual votes. Only a small number of fields show significant effects on the voting decisions, and our main results remain robust. Students of the humanities and social sciences are more likely to vote in favor of the culture ticket, possibly because a large share of them study culture-related subjects.

The strong empirical support for both pocketbook voting and social or expressive considerations is robust to the inclusion of party preferences and to the inclusion of both fields and party preferences in the regressions (Tables A.10 and A.11). This remains unchanged also if we group parties into a left bloc and a right bloc. Furthermore, support for the train and bus tickets appears quite unrelated to party

have also included complete sets of indicator variables containing information on whether someone considered a motive unimportant, somewhat important, or important, and the conclusions remained the same.

preferences. However, we find that support for the culture ticket, *ceteris paribus*, is larger among supporters of parties on the left, both when parties are included separately or as blocs.

A general concern with survey data is the reliability of answers. In our setting, this problem may arise particularly with regard to social preferences because of social desirability considerations. For example, one might wonder whether the respondents genuinely care for others or if they just feel social pressure to state this concern. While we cannot prove that stated altruism reflects a genuine care for others, it is remarkable that stated social preferences are in line with actions. Both the descriptive and econometric analyses show that stated social preferences, altruism in particular, or expressive concerns have a substantial impact on the voting decision, explaining most votes that cannot be rationalized by monetary benefits.

From an econometric perspective, one might be concerned with reverse causality, omitted variables, or sample selection. To perfectly deal with these issues, one would have to use an experimental or quasi-experimental set-up, which we do not have. Nevertheless, the fact that the MetroCan tracks were not included in the Bahn ticket goes some way towards randomly allocating monetary benefits. Regarding social preferences or expressive concerns, a reverse causality problem would arise if those respondents who voted in favor of a ticket against their monetary interest *ex post* rationalized their decision by mentioning such motives. However, this argumentation leaves open the question of why they voted in favor of the ticket in the first place. While it is always possible that results are affected by an omitted variable, it is reassuring that by adding all the controls we have, the coefficients of our main variables remain stable. An issue of sample selection could arise if the voters among the respondents in the surveys systematically differ from the voters in the student population. We aimed at minimizing this problem by mailing the invitation to the survey for Dataset I to all students, and by collecting the paper based survey for Dataset II just outside the polling stations immediately after students voted, covering a majority of polling stations in the main university campus.

Summarizing our empirical analysis, although pocketbook considerations are the main determinant of voting decisions, social preferences or expressive motives also have measurable and sizable effects. In light of our theory, if voters assign a negligible probability to their being decisive in the referendum, this pattern can only arise if expressive motives are absent. If, in contrast, voters perceive their probability of affecting the outcome to be non-negligible, social preferences and

expressive motives are observationally equivalent.

6 Participation

6.1 Estimating the participation decision

For the estimation of the participation decision, we make the same assumptions and use the same controls as when analyzing the voting decision. The error term ν_i follows a standard normal distribution. In the participation equation, the controls also capture $d_i - c_i$, the net benefit from voting which is unrelated to how one votes.

There are two alternative measures for the indicators of the intended vote. First, a natural measure is provided by the actual vote of those who participated, and the self-reported hypothetical vote of those who did not participate. We capture this information by two indicators I_i^{a1} and I_i^{a0} . The indicator I_i^{a1} (I_i^{a0}) equals one if the individual voted or would have voted yes (no), and zero otherwise. However, the stated hypothetical vote of non-participants might differ from the vote they would have cast had they actually voted. In contrast to this, we have an objective measure for the monetary benefits. Exploiting this information, we define an indicator I_i^{b1} (I_i^{b0}) which equals one if the sign of net savings $\tau h_i^1 - t$ is positive (non-positive), and zero otherwise. Relating to pocketbook benefits, we prefer to use this objective indicator. It would, however, be problematic to interact the variables measuring social and expressive motives with an indicator based exclusively on monetary benefits. Therefore, we prefer to attribute the two types of indicators to the two types of variables separately. That is, we interact monetary benefits with the indicators I_i^{b1} and I_i^{b0} , while the variables $\mathbf{a}_i^1 - \mathbf{a}_i^0$ are interacted with I_i^{a1} and I_i^{a0} . Thus, we modify equation (5) to

$$z_i = \delta^1 I_i^{b1} \ln(\tau h_i^1 - t + 1) + \delta^0 I_i^{b0} (t - \tau h_i^1) + \gamma^1 \cdot [I_i^{a1} (\mathbf{a}_i^1 - \mathbf{a}_i^0)] + \gamma^0 \cdot [I_i^{a0} (\mathbf{a}_i^1 - \mathbf{a}_i^0)] + \boldsymbol{\sigma} \cdot \mathbf{x}_i + \nu_i. \quad (8)$$

Equation (8) is the basis of the probit estimation of the participation decision. It yields estimators for the coefficients $\delta^1 = p^1 \lambda$, $\delta^0 = p^0 \lambda$, $\gamma^1 = p^1 \boldsymbol{\zeta} + \boldsymbol{\psi}$, $\gamma^0 = -(p^0 \boldsymbol{\zeta} + \boldsymbol{\psi})$, and $\boldsymbol{\sigma}$, the impact of controls on the net benefit of participation. In this estimation, for individuals with negative net savings, we use the net loss $(t - \tau h_i^1)$ to have a positive coefficient associated with the regressor expressing monetary stakes.

Moreover, similar to the analysis of the voting decision, we find only a combined impact of instrumental social preferences and expressive motivations, quantified by the coefficients γ^1 and γ^0 .

6.2 Empirical results

The results from estimating equation (8) are presented in Table 8, which shows the average marginal effects for benchmark students.¹⁷ We see a highly significant positive effect from the variable *log positive stakes*, which stands for $I_i^{b1} \ln(\tau h_i^1 - t + 1)$, the monetary benefit of those who have positive net savings from the ticket on trips to parents. This effect is robust to the inclusion of additional motives and control variables. Quantitatively, a 10% increase in the net gain from the ticket raises the probability of participation by 0.4 percentage points. Using the specification from column (5), for a benchmark student, this results in an increase in the predicted probability of turnout from 54% at net savings of zero to 80% at average net savings and to 86% at net savings of a thousand euros.

The variable *negative stakes*, which stands for $I_i^{b0} (t - \tau h_i^1)$, the absolute value of the monetary loss inflicted by the ticket, also shows a positive sign but is not statistically significant at 5% level. Similarly to the voting decision, the difference in significance between the two stakes variables may be due to the asymmetric distribution of gains and losses. Losses are limited to the yearly price of the ticket, 84.48 euros, whereas the stakes of someone who uses the Bahn ticket every weekend to visit his or her parents could be much higher. In terms of size, also the coefficient estimated for negative stakes is substantial. Based on the specification in column (5) of Table 8, a benchmark student whose savings just cover ticket cost is 14 percentage points less likely to participate in the referendum than someone who does not use the ticket at all.

Columns (4) and (5) introduce variables measuring the joint effect of social preferences and expressive concerns. We find large negative effects for *altruist(-) (yes)* and *altruist(+)(no)*, the first effect being statistically significant in column (5) and the second one in both columns. The first of these variables equals one for an individual who states that he or she cares for the benefit of others, thinks

¹⁷As in Section 5, all binary variables are zero for benchmark students. The continuous variables enter into the calculation of marginal effects at individual values. As in Table 6, we use the observations for which there is information on all variables included in column (5) in all columns. When we use all available observations, the results are virtually unchanged.

Table 8: Taking part – Dataset I

Dependent Variable: Taking Part in Referendum					
	(1)	(2)	(3)	(4)	(5)
Log positive stakes	0.036*** (3.85)	0.037*** (3.70)	0.035*** (3.74)	0.035*** (3.78)	0.037*** (3.81)
Negative stakes	0.001 (1.09)	0.001 (1.08)	0.001 (1.25)	0.001 (1.52)	0.002 (1.65)
Leisure/work		0.022 (0.35)	0.028 (0.49)	0.034 (0.63)	0.035 (0.62)
Visiting others		0.004 (0.13)	0.009 (0.28)	0.012 (0.39)	0.007 (0.21)
Female			-0.110*** (-3.61)	-0.107*** (-3.49)	-0.109*** (-3.48)
Freshman			0.116*** (3.50)	0.114*** (3.54)	0.113*** (3.30)
Altruist(-) (no)				0.007 (0.14)	0.003 (0.06)
Altruist(-) (yes)				-0.136 (-1.87)	-0.167* (-2.22)
Altruist(+)(no)				-0.196** (-2.81)	-0.204** (-2.83)
Altruist(+)(yes)				-0.001 (-0.02)	-0.003 (-0.09)
Protest (no)					0.060 (1.26)
Protest (yes)					0.126*** (3.53)
Pseudo R ²	0.035	0.035	0.055	0.066	0.075
Log likelihood	-568.9	-568.8	-557.3	-550.7	-545.2
Observations	962	962	962	962	962

Probit estimation; marginal effects for benchmark students; discrete changes from 0 to 1 for indicator variables; z-statistic in parentheses. Regressions are based on the observations for which there is information on all variables included in column (5). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

that others on average lose out by the ticket, and voted or would have voted in favor of the ticket. According to column (5), such an individual is 17% less likely to participate than someone who does not mention that he or she cares for others. Similarly, an *altruist(+)(no)*, i.e. someone who mentions to care for others, thinks that other students gain from the ticket, and voted or would have voted against, is 20% less likely to take part. Thus, students who consider the benefits of others but whose intended vote goes against the perceived interests of others are substantially less likely to participate. This result can be explained by rational abstention. Voters whose expressive concern for others suggests voting against their monetary interests face a trade-off. As argued in Section 2.2, they may solve this conflict by abstaining. This interpretation is re-enforced by the fact that the variables *altruist(-)(no)* and *altruist(+)(yes)* are not significantly different from zero.

Those who mention protest motives took part in the referendum with higher

probability (column 5), even if the corresponding variable is significant only for those whose actual or intended vote is yes. Possibly, students who mention protest motives are generally more engaged in the debate about the ticket, and therefore more likely to turn out.

We also examined whether students with high gains from the ticket drive the finding that pocketbook benefits are relevant for participation. For this purpose, we gradually removed observations with the highest net savings from the dataset (see Table A.12). The more observations we removed, the smaller the size and z-statistic of the marginal effect of positive net savings became. When dropping the top 25% of students in terms of net savings, the effect was no longer significantly different from zero. In contrast, the significance of most other variables suffered much less from this reduction of the sample, and the marginal effects were much more stable. This suggests that the loss of significance for the stakes variable should not be attributed to the smaller sample size alone.

Some econometric issues may arise also related to the estimation of the participation equation. The indicator for the actual or intended vote might not be exogenous. This would be the case if the error terms in the voting and the participation equations (6) and (8) were correlated, for example if there is an omitted variable which affects both decisions. However, it is not clear what such an omitted variable could be and in which direction it would bias our results.

Reverse causality should not be a problem here. The variables capturing travel patterns and demographics are clearly not affected by the decision to vote. The protest variable is derived from the write-in section; consequently, it appears unlikely that it captures ex-post rationalization of the participation decision. In contrast, stated altruism could be affected by the participation decision. One could argue that it is easy to claim noble motivations if one does not make an actual decision. In this case, we would expect the share of those who state that they care for others and would have voted in line with the perceived interest of others to be higher among non-voters than among voters. This would imply negative coefficients of the variables *altruist(-) (no)* and *altruist(+)(yes)*. Similarly, we would expect that among those who did not vote a lower share would admit that they would have voted against the interest of others than among those that actually voted. This would lead to positive coefficients of the variables *altruist(-)(yes)* and *altruist(+)(no)*. These predictions are opposite to the observed patterns in Table 8, which speaks against this kind of reverse causality.

In summary, our results are in line with the theory of instrumental voting, which predicts that for a given probability of being pivotal and a given cost of voting, participation should increase with stakes. We also find evidence that social preferences or expressive considerations have an impact on participation.

7 Conclusion

We formulate and test a theory of individual voting and turnout decisions which integrates monetary benefits, social preferences, and expressive concerns. Social preferences are instrumental in the sense that voters want to change the outcome in a way that benefits others. The theory of expressive voting suggests that voters perceive their probability of being pivotal to be negligible, and that they derive utility from voting in a particular way irrespective of the outcome.

A major challenge in previous literature on voting has been how to distinguish social preferences from expressive motivations, as both could be driven by what appears good for others. Our theory presents conditions under which expressive voting can be ruled out or shown to exist. If pocketbook benefits are empirically found to be relevant and voters perceive their impact on the outcome to be negligible, then expressive motivations do not play a role in the decision on how to vote. Conversely, if own pocketbook benefits do not explain voting, then voting is expressive. If voters perceive their probability of affecting the outcome to be non-negligible, then social preferences and expressive motives are observationally equivalent.

We test our theory using individual data on referenda on deeply discounted flat rate tickets for train, bus, and cultural services held among university students. Our results show that monetary interests are a major driver of both turnout and voting decisions. However, we find that in addition to this pocketbook voting, social or expressive motives such as the costs and benefits to other students or the desire to support local public transportation or cultural life are also important and occasionally even decisive for the referendum outcome. Based on our theory, the strong empirical support of pocketbook voting rules out a purely expressive explanation of observed voting behavior.

Our setting can be described as a real-world laboratory of direct democracy. Like in a laboratory, voters faced a clearly defined decision and had very good information on the individual costs and benefits associated with both outcomes.

Thus, confounding influences such as asymmetric information were minimized. At the same time, the polity to which the respondents belong is real and the social ties between the participants are independent of researchers. Since the decisions we study have strong parallels with decisions on local public goods, our results are particularly informative for direct democracy at the local level. The relative importance of pocketbook voting and social or expressive motives can be expected to vary according to circumstances. We therefore invite other researchers to test the predictions of our theory in other settings. It would be especially interesting to compare the relative importance of pocketbook benefits, social preferences, and expressive motives across referenda taking place at different levels of government. Jurisdictions like California and Switzerland would be fertile testing grounds for such analyses.

Supplementary material

A.I Data handling

The survey for Dataset I was conducted online between July 6 and November 11, 2010. It was advertised in lectures, on posters on campus, and in two e-mails that were sent to all students of the University of Goettingen from the office of student affairs. On the survey webpage students were informed that the survey was conducted for research purposes and about a possibility to participate in a lottery. At the end of the questionnaire, students were provided with a link to another webpage, where they could register for the lottery. In order to identify winners without ambiguity, we required the (unique) student ID number for a registration for the lottery as well as an e-mail address. For the sake of data protection, questionnaire data and lottery data were collected in separate databases. As the savings variable plays a key role in explaining the decision on whether to vote and if voting, on how to vote, we excluded observations without information on voting behavior or for which we cannot assess savings, because, for instance, we lack data on traveling behavior or the corresponding student started studying only one month before the referendum took place. Besides, we removed less than fifteen observations from the dataset due to clear data errors or where answers given seemed highly implausible, such as visiting parents 20,000 times in one year.

A challenge in the data management is that 75 ID numbers show up twice and

on different days, suggesting that 75 students also show up twice in the dataset. Using the time stamps of the lottery data showed that in most cases, the responses were entered shortly after receiving an e-mail from the office of student affairs that was advertising the survey. Therefore, it is likely that these students had forgot that they had already answered a survey or thought that they should answer for a second time. After we explored this issue, we realized that we also have time stamps for survey responses, although in a separate data base. To guarantee the anonymity of respondents, we recruited a research assistant who was not otherwise connected to the project to select those entries from the lottery data that belong to duplicates in the lottery data base and to provide the two time stamps for each of the 75 pairs. As only time stamps were extracted pairwise from the lottery database, anonymity was guaranteed at all times. Specifically, no individual information that could be used to identify the person behind a time stamp, such as a student ID number, was extracted from the lottery data.

Time stamps from the lottery were then assigned to the time stamps in the response dataset. For all pairs of time stamps, we examined responses that were submitted close to the time stamp in the lottery. For all pairs of these subsamples, we identified potential pairs of observations present in both subsamples, based on the data provided. Initial selection was made using gender, year of birth and the zip code of their parents. If students indicated that their parents do not live together, then the maternal, or if missing the paternal, zip code was used. If these three variables, year of birth, gender and parental zip code, were the same for observations in both subsamples, they were considered potential duplicates based on the data provided. Potential duplicates were then compared based on additional variables, such as subjects studied, travel frequencies, general attitudes and voting decisions, party preferences and reasons to be in favor and against the ticket. This procedure allowed us to identify 46 pairs of assigned duplicates. Consequently, we dropped the later entry of every pair of duplicates from the dataset. This left us with 29 pairs of duplicates which we could not identify. This corresponds to about two percent of the dataset and should, therefore, have only a tiny effect on the results. To be on the safe side, we also replicated the analysis of the first dataset without excluding observations based on this assignment. The results remain virtually unchanged.

A.II Construction of the savings variable

In the survey, students were asked about their parents' address (zip code) and how many times they visited their parents' residence within the last 12 months (July 1, 2009 - June 30, 2010) using the Bahn ticket. If students indicated that their parents did not live in the same city, questions were asked for both parents separately.

To translate trips to parents into monetary savings, the nearest train station covered by the Bahn ticket was identified for every parental address (zip code) using a standard route planner.¹⁸ Afterwards, for each station, the relevant price was derived. Therefore, we identified the suggested route to Goettingen using local trains for all stations on the Bahn tracks (dashed blue lines on the map, Figure 1) using software provided by Deutsche Bahn. At the time of the referendum, it was already known that students could use the MetroCan tracks (solid red lines) without additional costs. Consequently, savings per trip from the Bahn ticket are the price that would have to be paid to the station on this route where the "free" train (red) is entered.¹⁹

If the determined price was greater than 21 euros it was capped to this amount to reflect the possibility to buy the so called Lower-Saxony-ticket that is valid on all local trains in the state on the day of validation at this price. As visiting one's parents involves a round-trip, final savings are calculated as the product of the relevant price and twice the number of visits using the Bahn ticket. To also reflect the opportunity to buy a train ticket for *all* trains in Germany including high speed trains (BahnCard100) at a price of 3800 euros per year at the time of the survey, the savings variable is capped at 3800 euros.

For some students in Dataset I, Goettingen is not the nearest train station. Most of these students live in the same town as their parents, presumably with their parents. For these students, the savings variable captures direct monetary savings when they come to campus. If they live apart from their parents we calculate savings correspondingly, starting from their respective nearest station. Ten students, however, live outside Goettingen apart from their parents and save little on trips to them, but could primarily use this ticket for commuting. We refrain from calculating savings in these cases as they might severely misrepresent the benefit

¹⁸Google maps, standard proposal for cars.

¹⁹Due to the non-linear pricing in the German railway market, this price is in most cases not equal to the price from a station to Goettingen less the price from the station where the free train is entered to Goettingen.

from the ticket. Consequently, these observations are dropped.

A.III Tables for descriptive analysis

Table A.1: Importance of own savings vs. savings to other students – Dataset II

Importance of own savings	Importance of savings to others									
	Train					Bus				
	imp. (1)	(2)	(3)	unimp. (4)	sum	imp. (1)	(2)	(3)	unimp. (4)	sum
imp. (1)	43.94	19.10	9.78	13.12	85.95	17.27	20.19	13.64	16.17	67.27
(2)	1.48	3.57	1.48	0.62	7.14	2.60	7.89	4.57	2.76	17.82
(3)	0.93	0.93	1.01	0.39	3.26	1.26	2.44	2.13	1.26	7.10
unimp. (4)	0.85	0.16	0.31	2.33	3.65	1.89	0.87	1.26	3.79	7.81
sum	47.20	23.76	12.58	16.46	100	23.03	31.39	21.61	23.97	100
Observations	1,288					1,268				
Importance of own savings	Culture									
	imp. (1)	(2)	(3)	unimp. (4)	sum					
	(1)	(2)	(3)	(4)	sum					
imp. (1)	19.37	12.12	7.57	13.67	52.73					
(2)	2.20	12.12	4.64	2.36	21.32					
(3)	1.55	2.52	5.78	1.71	11.55					
unimp. (4)	1.14	0.73	1.71	10.82	14.40					
sum	24.25	27.50	19.69	28.56	100					
Observations	1,229									

Distribution (percentages) of stated importance of own savings and of savings to other students for the voting decision, on a four-point Likert scale ranging from important (1) to unimportant (4). Observations are included if there is information on both questions.

Table A.2: Pocketbook voting – Dataset II

Train ticket				Bus ticket				Culture ticket			
Buy it	Vote		Total	Buy it	Vote		Total	Buy it	Vote		Total
	No	Yes			No	Yes			No	Yes	
No	158	256	414	No	572	160	732	No	519	147	666
Yes	11	755	766	Yes	21	441	462	Yes	27	495	522
Total	169	1,011	1,180	Total	593	601	1,194	Total	546	642	1,188

Table A.3: Social preferences and protest among winners and losers – Dataset I

Bahn ticket, only losers				Bahn ticket, only winners			
Altruist(+)	Vote		Total	Altruist(−) or protest	Vote		Total
	No	Yes			No	Yes	
No	119	17	136	No	9	239	248
Yes	12	23	35	Yes	23	100	123
Total	131	40	171	Total	32	339	371

Losers' savings do not cover the ticket price, and they neither visit other people using the ticket nor mention leisure/work usage. Winners' savings cover the ticket price. *Altruist(+)* is equal to one if the student's voting decision is influenced by the belief about the average preferences of other students and if he or she believes that the price threshold of fellow students is on average at least as large as the price, and zero otherwise. *Altruist(−)* is defined analogously.

Table A.4: Voting in favor but unwilling to buy: importance of social preferences

	Train	Bus	Culture
Social preferences or expressive motives	235	147	147
Neither social preferences nor expressive motives	21	10	0
Total	256	157	147

The social preferences and expressive motives considered include for all three tickets savings to other students. They also include environmental aspects for the train ticket, strengthening local public transportation for the bus ticket, and strengthening local cultural life and the belief that others should visit cultural institutions more frequently for the culture ticket.

A.IV Approximation of $b_i^1 - b_i^0$

In this Appendix, we show how our measure of the monetary gains given in (7) relates to the equivalent variation $b_i^1 - b_i^0$. Consider first voters with $h_i^1 = 0$, who do not care for the public good. These voters will also choose $h_i^0 = 0$, so that one immediately has $b_i^1 - b_i^0 = -t = \tau h_i^1 - t$. Thus, for voters with a corner solution for the use of the public good, our measure is exact.

Consider then voters with $h_i^1 > 0$. From the strict concavity of w_i and the optimality conditions, for these individuals it follows $\tau \geq w'_i(h_i^0) > 0 = w'_i(h_i^1)$ and $0 \leq h_i^0 < h_i^1$. Hence

$$\begin{aligned}
 w_i(h_i^0) + \tau(h_i^1 - h_i^0) &\geq w_i(h_i^0) + w'_i(h_i^0)(h_i^1 - h_i^0) > w_i(h_i^1) \\
 \implies \tau h_i^1 - t &> w_i(h_i^1) - t - [w_i(h_i^0) - \tau h_i^0] = b_i^1 - b_i^0. \quad (\text{A.9})
 \end{aligned}$$

There are three cases.

(a) $b_i^1 - b_i^0 > 0$. Then with (A.9) also $\tau h_i^1 - t > 0$, and hence (A.9) shows that observed net savings $\tau h_i^1 - t$ overestimate the true net monetary gain $b_i^1 - b_i^0$.

(b) $\tau h_i^1 - t < 0$. Then with (A.9) also $b_i^1 - b_i^0 < 0$, and hence, (A.9) is equivalent to $|\tau h_i^1 - t| < |b_i^1 - b_i^0|$. Hence, in this case the absolute value of observed net

savings, or ‘stakes’, *underestimates* the absolute value of the true monetary loss.

(c) $b_i^1 - b_i^0 < 0 < \tau h_i^1 - t$. Here, the approximation of the equivalent variation by net savings goes in the wrong direction. We expect, however, that the error introduced by this approximation is moderate given that this case occurs when net savings are rather close to zero.

To correct for the overestimation in case (a), positive net savings should be reduced. This is particularly important for observations with very high values of h_i^1 , which are common in our dataset. We choose to take the log to achieve this, after augmenting net savings by one to make sure the measure is positive also for observations with net savings between 0 and 1.

To correct for the underestimation in case (b), we could in the same way enhance the loss $|\tau h_i^1 - t|$ conferred by the public good. However, the difference between h_i^1 and h_i^0 , and hence the difference between $|b_i^1 - b_i^0|$ and $|\tau h_i^1 - t|$ is rather small when net savings are negative. As mentioned above, the underestimation even vanishes completely for individuals who do not use the public good at all. Given that in our dataset a large share of the voters with negative net savings display such a corner solution, we consider it the best choice to approximate, for individuals with negative net savings, the loss conferred by the public good by the absolute value of net savings without any correction.

Altogether, we approximate

$$b_i^1 - b_i^0 = \begin{cases} \ln(\tau h_i^1 - t + 1) & \text{if } \tau h_i^1 - t \geq 0 \\ \tau h_i^1 - t & \text{if } \tau h_i^1 - t < 0. \end{cases}$$

Notice that this function is differentiable at $\tau h_i^1 - t = 0$. At this point, on both branches, it takes on the value 0 and the first derivative is 1.

A.V Coefficients for Tables 6 to 8

Table A.5: Bahn ticket – Dataset I, coefficients for Table 6

Dependent Variable: Supporting Bahn Ticket					
	(1)	(2)	(3)	(4)	(5)
Log pos. net savings	0.169*** (0.05)	0.208*** (0.05)	0.195*** (0.05)	0.203*** (0.06)	0.200*** (0.06)
Neg. net savings	0.009** (0.00)	0.003 (0.00)	0.005 (0.00)	0.006 (0.00)	0.006 (0.00)
Leisure/work		0.196 (0.27)	0.168 (0.27)	0.108 (0.28)	0.123 (0.28)
Visiting others		1.123*** (0.13)	1.112*** (0.13)	1.001*** (0.14)	1.023*** (0.14)
Female			0.204 (0.13)	0.131 (0.13)	0.126 (0.13)
Freshman			0.304 (0.17)	0.373* (0.19)	0.405* (0.19)
Altruist(-)				-0.534** (0.18)	-0.521** (0.18)
Altruist(+)				1.016*** (0.16)	1.022*** (0.17)
Protest					-0.290 (0.15)
Constant	0.550* (0.26)	-0.478 (0.30)	-0.521 (0.30)	-0.564 (0.33)	-0.474 (0.34)
Pseudo R ²	0.251	0.351	0.357	0.438	0.442
Log likelihood	-312.2	-270.7	-268.0	-234.5	-232.6
Observations	669	669	669	669	669

Probit estimation; coefficients; standard errors in parentheses. Regressions are based on the observations for which there is information on all variables included in column (5).
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A.6: Train, bus and culture tickets – Dataset II; coefficients for Table 7

Dependent Variable: Supporting Ticket			
	Train	Bus	Culture
Rarely	1.060*** (0.20)	0.631*** (0.11)	0.931*** (0.12)
Sometimes	1.976*** (0.21)	1.160*** (0.14)	1.664*** (0.22)
Often	2.334*** (0.24)	1.653*** (0.17)	1.901*** (0.44)
Very often	2.439*** (0.24)	2.222*** (0.19)	1.523** (0.48)
Female	0.260* (0.12)	0.026 (0.09)	0.085 (0.10)
Freshman	-0.122 (0.13)	0.238* (0.09)	0.338** (0.12)
Savings to others	0.613*** (0.15)	0.509*** (0.11)	0.405** (0.15)
Environment	0.730*** (0.18)		
Strengthening bus system		1.179*** (0.18)	
Others should go			1.293*** (0.19)
Strengthening local culture			1.344*** (0.13)
Constant	-0.947*** (0.20)	-0.959*** (0.09)	-1.141*** (0.10)
Pseudo R ²	0.364	0.285	0.440
Log likelihood	-277.9	-539.1	-378.7
Observations	1145	1090	988

Probit estimation; coefficients; standard errors in parentheses. Frequencies of use are defined as follows: Rarely: train, ≤ 5 /year; bus, 1 or 2/semester; culture, 1 or 2/year. Sometimes: train, monthly; bus, monthly; culture, 3 to 5/year. Often: train, weekly; bus, weekly; culture, 6 to 10/year. Very often: train, ≥ 2 /week; bus, ≥ 2 /week; culture, > 10 /year. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A.7: Taking part – Dataset I, coefficients for Table 8

Dependent Variable: Taking Part in Referendum					
	(1)	(2)	(3)	(4)	(5)
Log pos. stakes	0.131*** (0.04)	0.131*** (0.04)	0.135*** (0.04)	0.140*** (0.04)	0.141*** (0.04)
Neg. stakes	0.003 (0.00)	0.003 (0.00)	0.003 (0.00)	0.004 (0.00)	0.004 (0.00)
Leisure/work		0.065 (0.19)	0.090 (0.19)	0.115 (0.19)	0.113 (0.19)
Visiting others		0.012 (0.10)	0.027 (0.10)	0.039 (0.10)	0.021 (0.10)
Female			-0.320*** (0.09)	-0.316*** (0.09)	-0.316*** (0.09)
Freshman			0.423** (0.14)	0.431** (0.14)	0.408** (0.14)
Altruist(-) (no)				0.022 (0.16)	0.009 (0.16)
Altruist(-) (yes)				-0.394* (0.20)	-0.471* (0.20)
Altruist(+) (no)				-0.555** (0.18)	-0.567** (0.19)
Altruist(+) (yes)				-0.002 (0.11)	-0.010 (0.11)
Protest (no)					0.200 (0.17)
Protest (yes)					0.469** (0.15)
Constant	0.100 (0.20)	0.086 (0.22)	0.170 (0.22)	0.170 (0.22)	0.104 (0.22)
Pseudo R ²	0.035	0.035	0.055	0.066	0.075
Log likelihood	-568.9	-568.8	-557.3	-550.7	-545.2
Observations	962	962	962	962	962

Probit estimation; coefficients; standard errors in parentheses. Regressions are based on the observations for which there is information on all variables included in column (5). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

A.VI Political parties and fields of study

Table A.8: General political preferences – Dataset I, coefficients

Dependent Variable: Supporting Bahn Ticket	
	(1)
Log pos. net savings	0.159* (0.07)
Neg. net savings	0.010* (0.00)
Leisure/work	0.331 (0.34)
Visiting others	1.051*** (0.16)
Female	0.136 (0.16)
Freshman	0.576** (0.22)
Altruist(-)	-0.621** (0.21)
Altruist(+)	1.118*** (0.19)
Protest	-0.384* (0.17)
Social Democrat	-0.017 (0.23)
Liberal Democrat	-0.270 (0.28)
Green	-0.257 (0.21)
Left	0.018 (0.49)
Other parties	0.314 (0.37)
Constant	-0.092 (0.42)
Pseudo R ²	0.453
Log likelihood	-179.8
Observations	534

Probit estimation; coefficients; standard errors in parentheses. The base category for the party preferences is Christian Democrat. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A.9: Fields of study – Dataset II, coefficients

Dependent Variable: Supporting Ticket			
	(1)	(2)	(3)
	Train	Bus	Culture
Rarely \diamond	1.083*** (0.20)	0.640*** (0.11)	0.859*** (0.13)
Sometimes \diamond	2.010*** (0.21)	1.174*** (0.14)	1.642*** (0.23)
Often \diamond	2.402*** (0.24)	1.644*** (0.17)	1.755*** (0.45)
Very often \diamond	2.438*** (0.25)	2.237*** (0.19)	1.430** (0.51)
Savings to others	0.632*** (0.15)	0.500*** (0.11)	0.398** (0.15)
Female	0.186 (0.13)	0.025 (0.09)	0.015 (0.11)
Freshman	-0.117 (0.13)	0.242* (0.10)	0.319* (0.13)
Environment	0.707*** (0.18)		
Strengthening bus system		1.177*** (0.18)	
Others should go			1.333*** (0.19)
Strengthening local culture			1.317*** (0.14)
Social sciences	0.149 (0.17)	0.086 (0.12)	0.560*** (0.14)
Forestry/Agriculture	-0.623** (0.22)	0.262 (0.19)	-0.147 (0.24)
Humanities	0.210 (0.16)	0.040 (0.11)	0.343* (0.14)
Geology/Geography	0.016 (0.41)	0.082 (0.26)	0.545 (0.32)
Law	-0.046 (0.20)	0.318* (0.15)	0.089 (0.17)
Natural sciences	-0.191 (0.21)	-0.026 (0.17)	0.440* (0.20)
Other fields	0.397 (0.47)	-0.146 (0.25)	0.240 (0.33)
Constant	-0.949*** (0.21)	-1.039*** (0.10)	-1.336*** (0.12)
Pseudo R ²	0.381	0.290	0.460
Log Likelihood	-270.4	-534.9	-364.3
Observations	1143	1088	986

Probit estimation; coefficients; standard errors in parentheses.

\diamond Definitions of the intensity of use differ: Rarely, Sometimes, Often, and Very often correspond to at most 5 times a year, monthly, weekly, and at least twice a week, respectively, for the train ticket; once or twice a semester, monthly, weekly, at least twice a week, respectively, during the lecture period for the bus ticket and once or twice a year, 3 to 5 times a year, 6 to 10 times a year, > 10 times a year, respectively, for the culture ticket. The base categories for the fields of study is economic sciences. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A.10: General political preferences – Dataset II, coefficients

Dependent Variable: Supporting Ticket			
	(1)	(2)	(3)
	Train	Bus	Culture
Rarely \diamond	1.034*** (0.21)	0.585*** (0.11)	0.893*** (0.14)
Sometimes \diamond	1.930*** (0.22)	1.083*** (0.15)	1.712*** (0.25)
Often \diamond	2.408*** (0.26)	1.626*** (0.18)	1.804*** (0.44)
Very often \diamond	2.344*** (0.25)	2.104*** (0.20)	1.981*** (0.60)
Savings to others	0.690*** (0.15)	0.538*** (0.12)	0.366* (0.16)
Female	0.332* (0.13)	0.040 (0.10)	-0.049 (0.12)
Freshman	-0.176 (0.14)	0.272** (0.10)	0.346* (0.14)
Environment	0.663*** (0.19)		
Strengthening bus system		1.225*** (0.20)	
Others should go			1.267*** (0.20)
Strengthening local culture			1.287*** (0.15)
Social Democrat	-0.104 (0.16)	0.017 (0.12)	0.628*** (0.15)
Liberal Democrat	-0.562 (0.29)	-0.232 (0.27)	0.171 (0.27)
Green	-0.104 (0.17)	-0.109 (0.13)	0.611*** (0.16)
Left	-0.065 (0.34)	0.037 (0.25)	0.970** (0.34)
Other parties	0.153 (0.31)	-0.076 (0.23)	0.260 (0.28)
Constant	-0.884*** (0.23)	-0.935*** (0.11)	-1.486*** (0.14)
Pseudo R ²	0.371	0.281	0.466
Log Likelihood	-246.5	-477.1	-312.7
Observations	1000	958	858

Probit estimation; coefficients; standard errors in parentheses.
 \diamond Definitions of the intensity of use differ: Rarely, Sometimes, Often, and Very often correspond to at most 5 times a year, monthly, weekly, and at least twice a week, respectively, for the train ticket; once or twice a semester, monthly, weekly, at least twice a week, respectively, during the lecture period for the bus ticket and once or twice a year, 3 to 5 times a year, 6 to 10 times a year, > 10 times a year, respectively, for the culture ticket. The base category for the party preferences is Christian Democrat.
 * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A.11: Political preferences and fields of study – Dataset II, coefficients

Dependent Variable: Supporting Ticket			
	(1)	(2)	(3)
	Train	Bus	Culture
Rarely \diamond	1.060*** (0.22)	0.583*** (0.12)	0.853*** (0.14)
Sometimes \diamond	1.963*** (0.22)	1.081*** (0.15)	1.728*** (0.25)
Often \diamond	2.475*** (0.26)	1.619*** (0.18)	1.762*** (0.45)
Very often \diamond	2.331*** (0.26)	2.112*** (0.20)	1.971** (0.63)
Savings to others	0.718*** (0.16)	0.529*** (0.12)	0.361* (0.16)
Female	0.261 (0.14)	0.035 (0.10)	-0.062 (0.12)
Freshman	-0.178 (0.14)	0.275** (0.10)	0.348* (0.14)
Environment	0.644*** (0.19)		
Strengthening bus system		1.225*** (0.20)	
Others should go			1.316*** (0.20)
Strengthening local culture			1.294*** (0.15)
Social sciences	0.172 (0.18)	0.127 (0.12)	0.446** (0.15)
Forestry/Agriculture	-0.661** (0.24)	0.165 (0.21)	-0.004 (0.27)
Humanities	0.201 (0.17)	0.033 (0.12)	0.176 (0.16)
Geology/Geography	0.013 (0.42)	0.267 (0.28)	0.608 (0.36)
Law	-0.097 (0.21)	0.414* (0.16)	0.073 (0.18)
Natural sciences	-0.367 (0.23)	0.059 (0.18)	0.379 (0.22)
Other fields	0.328 (0.52)	-0.065 (0.28)	0.231 (0.38)
Social Democrat	-0.231 (0.17)	0.046 (0.13)	0.541*** (0.16)
Liberal Democrat	-0.674* (0.29)	-0.218 (0.27)	0.178 (0.27)
Green	-0.221 (0.19)	-0.081 (0.13)	0.466** (0.17)
Left	-0.217 (0.35)	0.058 (0.26)	0.930** (0.36)
Other parties	0.106 (0.33)	-0.037 (0.24)	0.238 (0.29)
Constant	-0.780** (0.24)	-1.057*** (0.13)	-1.612*** (0.16)
Pseudo R ²	0.391	0.287	0.477
Log likelihood	-238.6	-472.9	-306.0
Observations	999	957	857

Probit estimation; coefficients; standard errors in parentheses.

\diamond Definitions of the intensity of use differ: Rarely, Sometimes, Often, and Very often correspond to at most 5 times a year, monthly, weekly, and at least twice a week, respectively, for the train ticket; once or twice a semester, monthly, weekly, at least twice a week, respectively, during the lecture period for the bus ticket and once or twice a year, 3 to 5 times a year, 6 to 10 times a year, > 10 times a year, respectively, for the culture ticket. The base categories for the fields of study and party preferences are economic sciences and Christian Democrat, respectively. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

A.VII Participation and stakes

Table A.12: Taking part, reduced sample – Dataset I, marginal effects

Dependent Variable: Taking Part in Referendum						
	(1)	(2)	(3)	(4)	(5)	(6)
Bottom	95%	90%	85%	80%	75%	70%
Log pos. stakes	0.038*** (3.48)	0.035** (2.86)	0.036** (2.79)	0.030* (2.01)	0.019 (1.04)	0.007 (0.34)
Neg. stakes	0.0015 (1.54)	0.0012 (1.24)	0.0013 (1.29)	0.0010 (0.95)	0.0006 (0.57)	0.0003 (0.27)
Leisure/work	0.040 (0.66)	0.037 (0.58)	0.032 (0.48)	0.040 (0.57)	0.027 (0.37)	-0.001 (-0.02)
Visiting others	0.009 (0.28)	0.010 (0.30)	0.016 (0.45)	0.018 (0.47)	0.002 (0.04)	-0.013 (-0.33)
Female	-0.109*** (-3.34)	-0.112*** (-3.29)	-0.111** (-3.18)	-0.104** (-2.87)	-0.110** (-2.91)	-0.099* (-2.53)
Freshman	0.119** (3.22)	0.122** (3.14)	0.117** (2.89)	0.126** (2.91)	0.127** (2.72)	0.130** (2.63)
Altruist (-) (no)	0.006 (0.11)	0.007 (0.13)	0.006 (0.10)	0.000 (0.01)	0.001 (0.02)	0.005 (0.08)
Altruist (-) (yes)	-0.111 (-1.38)	-0.107 (-1.30)	-0.148 (-1.70)	-0.144 (-1.56)	-0.151 (-1.54)	-0.123 (-1.16)
Altruist (+) (no)	-0.206** (-2.83)	-0.208** (-2.83)	-0.212** (-2.88)	-0.216** (-2.92)	-0.220** (-2.92)	-0.215** (-2.84)
Altruist (+) (yes)	-0.010 (-0.26)	-0.008 (-0.21)	-0.015 (-0.36)	-0.022 (-0.50)	0.000 (0.00)	0.030 (0.64)
Protest (no)	0.063 (1.28)	0.066 (1.31)	0.061 (1.18)	0.066 (1.23)	0.080 (1.47)	0.096 (1.74)
Protest (yes)	0.140*** (3.70)	0.145*** (3.69)	0.146*** (3.51)	0.150*** (3.37)	0.190*** (4.30)	0.183*** (3.72)
Pseudo R ²	0.071	0.062	0.059	0.050	0.050	0.042
Log likelihood	-520.0	-508.2	-487.1	-469.2	-444.3	-422.8
Observations	902	862	817	769	719	673

Probit estimation; marginal effects for benchmark students; discrete changes from 0 to 1 for indicator variables; z-statistic in parentheses. Columns show percentiles with respect to net savings, e.g., column (1) contains those observations that belong to the bottom 95% with respect to net savings. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A.13: Taking part, reduced sample – Dataset I, coefficients for Table A.12

Dependent Variable: Taking Part in Referendum						
	(1)	(2)	(3)	(4)	(5)	(6)
Bottom	95%	90%	85%	80%	75%	70%
Log pos. stakes	0.139*** (0.04)	0.118** (0.04)	0.122** (0.04)	0.094 (0.05)	0.054 (0.05)	0.020 (0.06)
Neg. stakes	0.004 (0.00)	0.003 (0.00)	0.004 (0.00)	0.003 (0.00)	0.002 (0.00)	0.001 (0.00)
Leisure/work	0.126 (0.20)	0.113 (0.20)	0.095 (0.20)	0.115 (0.21)	0.077 (0.21)	-0.003 (0.22)
Visiting others	0.029 (0.10)	0.031 (0.10)	0.047 (0.10)	0.050 (0.11)	0.005 (0.11)	-0.036 (0.11)
Female	-0.309*** (0.09)	-0.309** (0.09)	-0.304** (0.10)	-0.279** (0.10)	-0.290** (0.10)	-0.259* (0.10)
Freshman	0.415** (0.14)	0.410** (0.15)	0.385** (0.15)	0.405** (0.15)	0.395* (0.16)	0.396* (0.17)
Altruist(-) (no)	0.017 (0.16)	0.021 (0.16)	0.016 (0.16)	0.001 (0.17)	0.004 (0.17)	0.013 (0.17)
Altruist(-) (yes)	-0.314 (0.22)	-0.297 (0.22)	-0.402 (0.23)	-0.383 (0.24)	-0.394 (0.25)	-0.319 (0.27)
Altruist(+) (no)	-0.561** (0.19)	-0.556** (0.19)	-0.563** (0.19)	-0.565** (0.19)	-0.567** (0.19)	-0.550** (0.19)
Altruist(+) (yes)	-0.029 (0.11)	-0.024 (0.11)	-0.043 (0.12)	-0.061 (0.12)	0.000 (0.13)	0.082 (0.13)
Protest (no)	0.203 (0.17)	0.208 (0.17)	0.190 (0.17)	0.198 (0.17)	0.236 (0.17)	0.281 (0.17)
Protest (yes)	0.505** (0.16)	0.508** (0.16)	0.505** (0.17)	0.498** (0.17)	0.649*** (0.19)	0.598** (0.19)
Constant	0.101 (0.23)	0.158 (0.24)	0.146 (0.24)	0.206 (0.25)	0.295 (0.25)	0.348 (0.26)
Pseudo R ²	0.071	0.062	0.059	0.050	0.050	0.042
Log likelihood	-520.0	-508.2	-487.1	-469.2	-444.3	-422.8
Observations	902	862	817	769	719	673

Probit estimation; coefficients; standard errors in parentheses. Columns show percentiles with respect to net savings, e.g., column (1) contains those observations that belong to the bottom 95% with respect to net savings. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

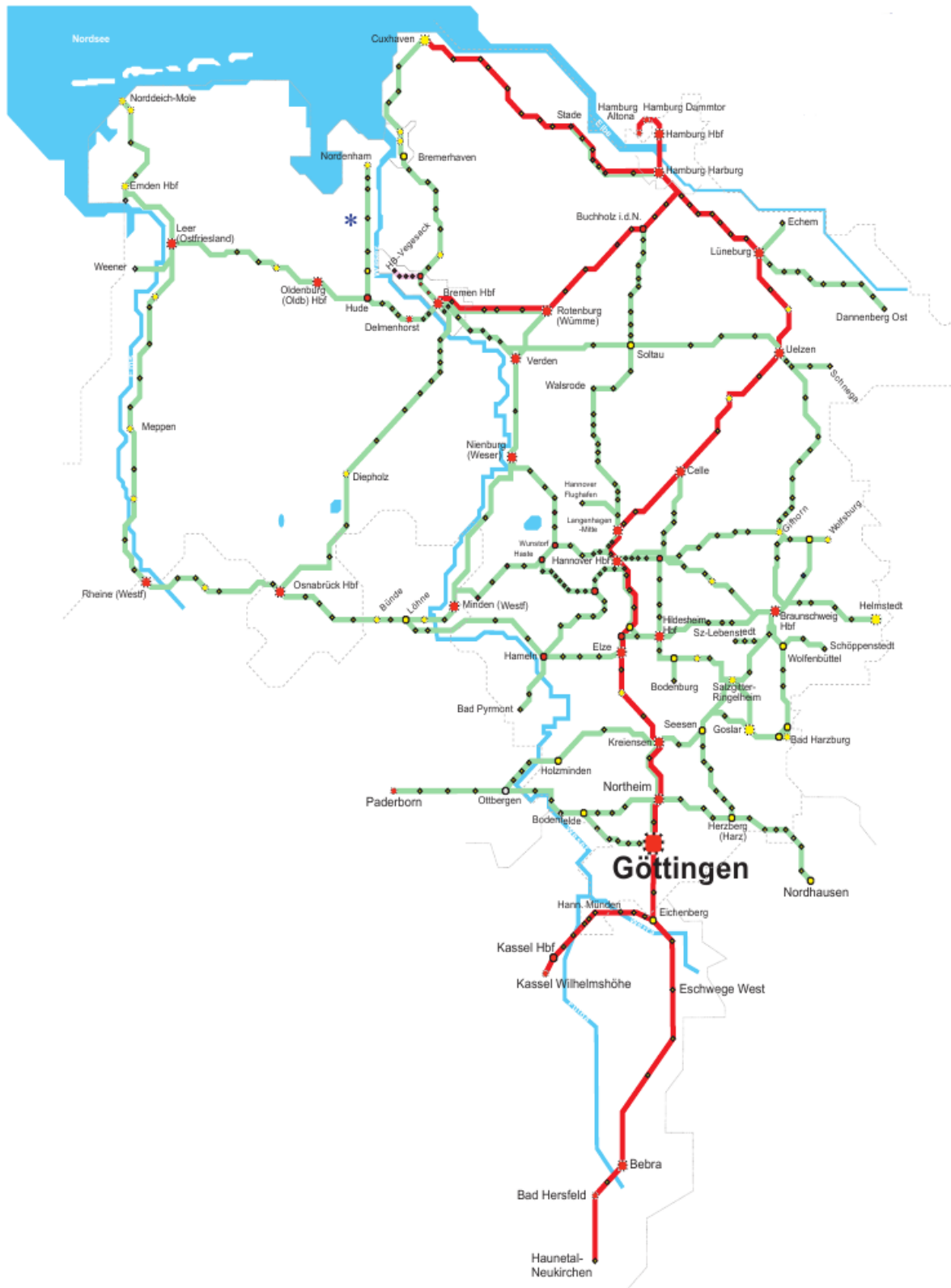
A.VIII Translation of survey questions

1. Survey 2010 (Dataset I)
2. Survey 2013 (Dataset II)

1. First, we would like to ask some questions about the semester ticket of the University of Goettingen and your travel habits:

- Many questions in this survey refer to the BAHNsemesterticket. This refers to the track sections of the Goettingen semester ticket that were voted on in a separate ballot in May 2010. (These are track sections of Deutsche Bahn (DB), NordWestBahn (NWB), Eurobahn and Ari-va). The figure shows these track sections in green.
- Some questions in this survey refer to the METRONOM/CANTUSsemesterticket. This refers to those track sections of the Göttingen semester ticket that were voted on during the election for the last Asta/Students' assembly in January 2010. (These are sections of Metronome (ME) and Cantus (CAN)). The figure shows these track sections in red.
- Some of your answers will make following questions irrelevant. The answer fields of such filtered out questions are colored and the entry of answers is blocked. Please skip these questions when answering. To participate in this survey, we recommend using Mozilla Firefox or Microsoft Internet Explorer.

Figure: Track map



Quelle: AstA Georg-August-Universität Göttingen, Plakat zur Urabstimmung über die Fortführung des Semestertickets im Mai 2010; Die Streckenabschnitte des BAHNsemestertickets sind grün dargestellt, die Streckenabschnitte des MOETRONOM/CANTUSsemestertickets sind rot dargestellt; * Die Strecke zwischen Nordenham und Hude entfällt ab dem 11.12.2010.

1.1 Did you take part in the vote of the METRONOM/CANTUSsemester ticket (see explanation above) in January 2010 (in the context of the election of the recent Asta/students' assembly)?

Yes No No answer

1.2 How did you vote concerning the METRONOM/CANTUSsemesterticket in January 2010 (in the context of the election of the recent Asta/students' assembly)?

Yes No No answer

1.3 How would you have voted concerning the METRONOM/CANTUSsemesterticket in January 2010 (in the context of the election of the recent Asta/students' assembly)?

Yes No No answer

1.4 Did you take part in the vote of BAHNsemesterticket in May 2010 (see explanation above) ?

Yes No No answer

1.5 How did you vote concerning the BAHNsemesterticket in May 2010?

Yes No No answer

1.6 How would you have voted concerning the BAHNsemesterticket in May 2010?

Yes No No answer

1.7 What would be the maximum price (in Euros) per semester at which you would vote in favor of the BAHNsemesterticket?

1.8 Assume that every student has a maximum price at which they would vote in favor of the semester ticket. What is, in your opinion, the average of these maximum prices for all students of the University of Goettingen?

1.9 How did you weigh these two components in your decision in the vote on the BAHNsemester-ticket in May 2010?

- Only my own maximum euro amount
- Stronger my own maximum euro amount
- Both equally strong
- Stronger the average willingness to pay of all students at University of Goettingen
- Only the average willingness to pay of all students at University of Goettingen
- No answer

1.10 How would you have weighted these two components in your decision in the initial vote on the BAHNsemesterticket in May 2010?

- Only my own maximum euro amount
- Stronger my own maximum euro amount
- Both equally strong
- Stronger the average willingness to pay of all students at University of Goettingen
- Only the average willingness to pay of all students at University of Goettingen
- No answer

1.11 From your point of view, what is the most important reason to be in favor of the BAHNsemesterticket?

1.12 From your point of view, what is the most important reason to be against the BAHNsemesterticket?

1.13 Do your parents live together/in the same city or municipality?

- Yes No No answer

1.14 How often did you go to your parents' place in the past 12 months (from 1st of July 2009 – 30th of June 2010)? (Please give a single number.)

1.15 How many of those times did you go with the BAHNsemesterticket? (Please give a single number.)

1.16 How often, do you think, will you go to your parents' place in the next 12 months (1st of July 2010 – 30th of June 2011)? (Please give a single number.)

1.17 How many of those times, do you think, will you go to your parents' place using the BAHNsemesterticket? (Please give a single number.)

1.18 How often did you go to your mother's place in the last 12 months (from 1st of July 2009 – 30th of June 2010)? (Please give a single number.)

1.19 How many of those times did you go with the BAHNsemesterticket? (Please give a single number.)

1.20 How often, do you think, will you go to your mother's place in the next 12 months (1st of July 2010 – 30th of June 2011)? (Please give a single number.)

1.21 How many of those times, do you think, will you go to your mother's place using the BAHNsemesterticket? (Please give a single number.)

1.22 How often did you go to your father's place in the last 12 months (from 1st of July 2009 – 30th of June 2010)? (Please give a single number.)

1.23 How many of those times did you go with the BAHNsemesterticket? (Please give a single number.)

1.24 How often, do you think, will you go to your father's place in the next 12 months (1st of July 2010 – 30th of June 2011)? (Please give a single number.)

1.25 How many of those times, do you think, will you go to father's place using the BAHNsemester-ticket? (Please give a single number.)

1.26 How often did you go to the place of other close persons (girlfriend, boyfriend, friends, other relatives beside your parents) in the last 12 months (from 1st of July 2009 – 30th of June 2010)? (within the area of BAHNsemesterticket but not within Goettingen) (Please give a single number.)

1.27 How many of those times did you go with the BAHNsemesterticket? (Please give a single number.)

1.28 How often, do you think, will you go to the place of these other close persons in the next 12 months (1st of July 2010 – 30th of June 2011)? (Please give a single number.)

1.29 How many of those times, do you think, will you go using the BAHNsemesterticket? (Please give a single number.)

1.30 How often did you use the BAHNsemesterticket in total in the last 12 months (from 1st of July 2009 – 30th of June 2010) (Please give a single number.)

1.31 How often did you use the METRONOM/CANTUSsemesterticket in total in the last 12 months (from 1st of July 2009 – 30th of June 2010) (Please give a single number.)

2 We would now like to ask you some questions regarding your person:

2.1 In which year were you born?

2.2 What is your gender?

Female

Male

No answer

2.3 What is the postal code of your current address?

2.4 What is the postal code of the location where you received your university entrance qualification (e.g.: high school diploma)? If you do not know the postal code or the location is outside Germany, please provide the name of city and country.

2.5 What is the postal code of your parents' address? If you do not know the postal code or the location is outside Germany, please provide the name of city and country.

2.6 What is the postal code of your mother's address? If you do not know the postal code or the location is outside Germany, please provide the name of city and country.

2.7 What is the postal code of your father's address? If you do not know the postal code, or the location is outside Germany, please provide the name of city and country.

2.8 What degree are you currently pursuing?

Bachelor

Master

Diploma

Magister

State examination

Doctoral

Other

No answer

2.9 What is your field of studies?

2.10 How many semesters have you studied at university, including your current semester?

2.11 How many semesters have you studied this major, including your current semester?

2.12 How much money do you have disposable each month? (e.g.: student grant, family allowance, scholarship, work etc.)

3 To conclude, we would like to ask you some general questions concerning your political beliefs and your convictions in terms of the organization of the university:

3.1 Limitation of master study places...

- | | | |
|--|---|---------------------------------------|
| <input type="checkbox"/> I favor | <input type="checkbox"/> I rather favor | <input type="checkbox"/> I am neutral |
| <input type="checkbox"/> I rather oppose | <input type="checkbox"/> I oppose | <input type="checkbox"/> No answer |

3.2 Study fees of 500 euros per semester (as, for example, in Lower Saxony)...

- | | | |
|--|---|---------------------------------------|
| <input type="checkbox"/> I favor | <input type="checkbox"/> I rather favor | <input type="checkbox"/> I am neutral |
| <input type="checkbox"/> I rather oppose | <input type="checkbox"/> I oppose | <input type="checkbox"/> No answer |

3.3 Did you take part in the last elections of the Bundestag (2009)?

- | | | |
|------------------------------|-----------------------------|------------------------------------|
| <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> No answer |
|------------------------------|-----------------------------|------------------------------------|

3.4. For which political party did you vote? (Second vote)

- | | | |
|------------------------------------|--------------------------------|--------------------------------|
| <input type="checkbox"/> CDU/CSU | <input type="checkbox"/> SPD | <input type="checkbox"/> FDP |
| <input type="checkbox"/> GRÜNE | <input type="checkbox"/> LINKE | <input type="checkbox"/> Other |
| <input type="checkbox"/> No answer | | |

3.5 If there would be a Bundestag election this upcoming Sunday, for which party would you vote? (Second vote)

- | | | |
|------------------------------------|--------------------------------|--------------------------------|
| <input type="checkbox"/> CDU/CSU | <input type="checkbox"/> SPD | <input type="checkbox"/> FDP |
| <input type="checkbox"/> GRÜNE | <input type="checkbox"/> LINKE | <input type="checkbox"/> Other |
| <input type="checkbox"/> No answer | | |

3.6 Are you a member of a political party or its youth organization or its campus organization?

- | | | |
|------------------------------|-----------------------------|------------------------------------|
| <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> No answer |
|------------------------------|-----------------------------|------------------------------------|

3.7 Are you member of a non-governmental organization (NGO) involved with environmental protection?

- Yes No No answer

3.8 Are you member of a non-governmental organization (NGO) not involved with environmental protection?

- Yes No No answer

3.9 An increase in income tax for high earners in Germany in order to raise unemployment and welfare benefits for the long-term unemployed (Hartz IV)...

- I favor I rather favor I am neutral
 I rather oppose I oppose No answer

3.10 The levying of a wealth tax...

- I favor I rather favor I am neutral
 I rather oppose I oppose No answer

3.11 Which of the following statements about financial success is most applicable, in your opinion?

- Financial success depends most on one's own decisions and efforts
 Financial success depends equally on one's own decisions and efforts as well as fortune or family background
 Financial success depends most on fortune
 Financial success depends most on one's family background
 No answer

3.12 How did you find out about this survey?

- Via the news ticker In a lecture Via a friend
 Other way No answer

3.13 If your previous answer was "other way", please state how you found out about this survey?

--

Research survey on direct democracy

Thank you for participating!

Mark as follows: Please use a pen or a marker that is not too strong. This questionnaire is processed by a machine.

Correction: In the interest of optimal data collection, please note the information on the left-hand side when filling out the form.

1 Bus semester ticket

1.1 How often did you take the bus within the area of Goettingen/Bovenden/Rosdorf during the lecture period (round trip = 2 trips)?

- Never 1-2 times a semester 1 time a month
 1 time a week Several times a week No answer

1.2 How often did you take the bus within the Goettingen/Bovenden/Rosdorf area during the semester break (round trip = 2 trips)?

- Never 1-2 times a semester 1 time a month
 1 time a week Several times a week No answer

1.3 Do you have a season ticket with which you can use the bus within the Goettingen/Bovenden/Rosdorf area? If yes, which one?

- I do not own a season ticket
 Sometimes a weekly ticket
 Monthly ticket for one month a year
 Monthly ticket for at least two months a year
 Yearly subscription
 No answer

1.4 How often do you expect to take the bus within the Goettingen/Bovenden/Rosdorf area, if the bus semester ticket will be accepted?

- Never 1-2 times a semester 1 time a month
 1 time a week Several times a week No answer

1.5 How did you vote concerning the bus semester ticket?

- In favor
 Against
 Abstention/ No participation
 No answer

2 Culture semester ticket

2.1 From October 2011 to September 2012 (before the culture semester ticket existed), how often did you use the offerings that are now part of the culture semester ticket?

- Never 1-2 times 3-5 times
 6-10 times More than 10 times No answer

2.2 During the current winter semester 2012/2013, how often have you already used the offerings of the culture semester ticket?

- Never 1-2 times 3-5 times
 6-10 times More than 10 times No answer

2.3 How did you vote concerning the culture semester ticket?

- Yes
 No
 Abstention/ No participation
 No answer

Please indicate on a scale from “important” to “unimportant”, how important the following aspects were in your voting decision for the culture semester ticket?

2.4 Your own saving of costs:

Important Unimportant No answer

2.5 Saving of costs for other students:

Important Unimportant No answer

2.6 That students should visit these institutions more often:

Important Unimportant No answer

2.7 The strengthening of local cultural institutions:

Important Unimportant No answer

2.8 Other reasons:

Important Unimportant No answer

2.9 If other reasons were significant to your voting decision, what were they?

2.10 Assume the culture semester ticket would be rejected in this ballot and Goettingen’s cultural institutions would then offer the ticket for individual purchase for 8.55 € per semester. Would you personally buy the culture semester ticket at these conditions?

- Yes No No answer

3 Rail semester ticket

3.1 In the past 12 months, how often did you use the rail semester ticket?

- Never Up to 5 times 1 time a month
 1 time a week Several times a week No answer

3.2 How did you vote concerning the rail semester ticket?

- Yes
 No
 Abstention/No participation
 No answer

Please indicate on a scale from “important” to “unimportant”, how important the following aspects were to your voting decision for the rail semester ticket?

3.3 Your own saving of costs:

Important Unimportant No answer

3.4 Saving of costs for other students:

Important Unimportant No answer

3.5 Environmental aspects:

Important Unimportant No answer

3.6 Strengthening of public transport:

Important Unimportant No answer

3.7 Other reasons:

Important Unimportant No answer

3.8 If other reasons were significant to your voting decision, what were they?

3.9 Assume the rail semester ticket would be rejected in this ballot and rail companies would then offer the ticket for individual purchase for 82.61 € per semester. Would you personally buy the rail semester ticket at these conditions?

- Yes No No answer

4 Personal information

4.1 Since which semester do you study at the Georg-August-University of Goettingen?

- | | |
|---|---|
| <input type="checkbox"/> Winter term 2012/2013 | <input type="checkbox"/> Summer term 2012 |
| <input type="checkbox"/> Winter term 2011/2012 | <input type="checkbox"/> Summer term 2011 |
| <input type="checkbox"/> Winter term 2010/2011 | <input type="checkbox"/> Summer term 2010 |
| <input type="checkbox"/> Winter term 2009/2010 | <input type="checkbox"/> Summer term 2009 |
| <input type="checkbox"/> Winter term 2008/2009 | <input type="checkbox"/> Summer term 2008 |
| <input type="checkbox"/> Winter term 2007/2008 or earlier | <input type="checkbox"/> No answer |

4.2 Where do you currently live?

- In Goettingen
- In Bovenden or Rosdorf
- In another place in the radius of up to 20 km from Goettingen
- In another place in the radius of up to 50 km from Goettingen
- Further away from Goettingen
- No answer

4.3 What are the two latter digits of your year of birth?

4.4 What is your gender?

- Female Male No answer

4.5 What is your field of studies?

- | | |
|---|---|
| <input type="checkbox"/> Forestry and agricultural sciences | <input type="checkbox"/> Humanities |
| <input type="checkbox"/> Geology or geography | <input type="checkbox"/> Law |
| <input type="checkbox"/> Medicine | <input type="checkbox"/> Natural sciences |
| <input type="checkbox"/> Social science | <input type="checkbox"/> Economics |
| <input type="checkbox"/> Other | |

4.6 What degree are you currently pursuing?

- | | | |
|-----------------------------------|------------------------------------|--|
| <input type="checkbox"/> Bachelor | <input type="checkbox"/> Diploma | <input type="checkbox"/> Magister |
| <input type="checkbox"/> Master | <input type="checkbox"/> Doctoral | <input type="checkbox"/> State examination |
| <input type="checkbox"/> Other | <input type="checkbox"/> No answer | |

4.7 For the next elections to the Bundestag, will you be entitled to vote?

- Yes No No answer

4.8 If there would be a Bundestag election this upcoming Sunday, for which party would you vote?

(Second vote)

- | | | |
|------------------------------------|--------------------------------|--------------------------------|
| <input type="checkbox"/> CDU/CSU | <input type="checkbox"/> SPD | <input type="checkbox"/> FDP |
| <input type="checkbox"/> GRÜNE | <input type="checkbox"/> LINKE | <input type="checkbox"/> Other |
| <input type="checkbox"/> No answer | | |

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