All's fair in taxation: A framing experiment with local politicians

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Abstract

Tax and benefit systems commonly assign premiums to (socially) preferable states. For instance, having a child usually warrants a (cost-reducing) premium compared to remaining childless. These premiums may equivalently be achieved as positive benefits for the preferable state, or as taxes for the non-preferred state. However, perceptions of fair treatment of the rich and poor may differ with the frame. This paper contributes to the understanding of framing effects in tax and benefit system design by providing an empirical test with actual political decision-makers exposed to system-relevant considerations. Using a survey-experiment, we find participants ($N = 608$) to grant higher premiums for having children to low income families in a benefit frame, but to high income families in a tax frame. A similar framing effect occurs in a second scenario based on real competencies of our respondents. In both scenarios the effect is moderated by the political ideology of participants' parties. Its occurrence among policy-makers raises concerns about imbalanced tax and benefit schedules being designed unintentionally despite (or because of) attention to social fairness.

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1. Introduction

In discussions on tax and benefit system design, the notion of fairness plays an important role for citizens and politicians. Yet, what many intuitively perceive as fair or unfair may not pass closer scrutiny. In an in-class (thought-)experiment Schelling (1981) argues that it is possible to construct two systems which, in order to both be judged as fair, produce very different - if not contradictory - results. Briefly summarized, Schelling (1981) argues that the perception of what constitutes fair treatment of the rich and poor in creating premiums for certain (socially) desirable behaviours may be dependent on the frame used in posing that question. More precisely, the baseline dimension upon which either a tax is levied or a subsidy granted plays a key role in evaluating fair treatment across income levels. This notion that people's feelings towards economically vital instruments such as taxes and benefits are susceptible to the way they are presented has been described by Daniel Kahneman (2011, p.369) as his "favorite example of a framing effect".

While (risky-choice) framing effects in taxation have received ample attention in the literature on tax compliance (see e.g. Cullis et al., 2006, 2012; Hasseldine and Hite, 2003; Torgler, 2002, 2003), behavioural influences on tax and benefit system design remain understudied. Previous empirical tests of the influence of framing on 'fair' taxation preferences are few and find mixed results (LeBoeuf and Shafir, 2003; McCaffery and Baron, 2004, 2006; Reimers, 2009; Traub, 1999). This paper presents a survey-experiment carried out among Flemish local politicians with actual authority over financial incentives in their municipalities. It contributes to the evaluation of framing effects in taxation by i) broadening the empirical base to political

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actors involved in the design of tax and benefit schedules, ii) expanding the testing of this type of baseline framing effects from the commonly used scenario of child benefits as proposed by Schelling (1981) to another decision area in which the participants of the survey-experiment have authority, namely municipal taxes, and iii) identifying the political ideology of participants (measured by the average self-placement of their party on a left-right scale) as a moderating factor of the framing effect. Overall, our findings provide a clear confirmation of framing effects in the perception of taxes and benefits also among those deciding such issues.

The occurrence of strong framing effects among politicians tasked with designing and implementing fiscal instruments raises concerns about *ex post* unintended tax and benefit schedules. It appears that despite (or potentially even because of) due *ex ante* consideration of social fairness aspects, implemented schedules may disproportionally favour some subjects over others. As our results indicate, the baseline upon which an intervention is planned (i.e. the choice between a benefit for a (socially) desirable state or a tax for the undesired state) can lead to contradictory results with regards to fairness across income levels. However, the size and direction of the effect may be domain dependent. Particularly for the design of new taxes or benefit schemes, it may be insufficient to judge the size of a tax or benefit in relation to income levels. Instead, discussion and deliberation of 'fair' amounts may benefit from the use of multiple instruments and increased focus on the intended differential between recipients of different income or wealth levels *before* determining the treatment of the group representing the baseline.

2. Literature and motivation

Redistributive policies usually evoke discussions on *who* should provide the money and *how* it should be allocated, particularly when redistribution is meant to alleviate disadvantages of certain (e.g. income) groups. Schelling (1981) describes how (supposedly) ethical concerns and the principle of equity can guide policy-making. With respect to the question *how* to (re-)allocate money, the wish to provide equitable solutions may impair the economic efficiency of redistribution. For instance, rent control or food stamps may provide appealing options in helping the poor. Yet, if the provision of a welfare programme comes at a higher cost than the recipient's valuation of the benefits, it fails to optimally use the available funds. Instead of, for example, receiving food stamps to subsidise food, the recipient may prefer to invest more in their child's education or other necessities. The point Schelling (1981) makes is that in such circumstances the intended fairness of a policy may in fact make it an unsuitable instrument for dealing with the issue to be solved. A single instrument may be insufficient to solve different redistributive issues. In many cases, the obvious answer may be the provision of cash instead of earmarked coupons to remove the problem of imbalanced valuations of certain benefits, allow optimal allocation by the recipient, and reduce market distortions. It also allows disentangling the issue of food/rent/energy or any other issue targeted by a redistributive programme from the underlying problem of, e.g., poverty.

Even when there is agreement on how to distribute funds, the question remains *who* should provide them, and in what share. Here again, the notion of fairness is typically important. The design of taxation and benefit schedules can often be thought of as a two-step process. First a baseline is defined as reference point for the intervention. For example, in defining social benefits, the baseline may be: a childless couple for defining child benefit; the net income of a worker for defining the size of a pension; or the certification of a certain status or licence (e.g. safety training, standards, modern equipment) for subsidies. In the second step the differential between the baseline and the group under consideration is determined. For example, how much benefit parents should receive for having a child, what ratio of income should be recognised for determining the size of a pension, what kind of subsidies emission free cars should get, etcetera. In economic terms, the result of such tax and subsidy schemes is the assignment of a financial premium for one condition compared to another. The underlying principle, often supported by widespread public preferences for progressive tax systems (see e.g. Edlund, 2003; Kirchler, 2007)[1], is usually that the premium should decrease for those with ample financial means, and increase for those less well-off.

[1]Note, however, that public opinion on such issues may itself be subject to cognitive biases and other influences (Mehlkop and Neumann, 2012; Roberts et al., 1994)

Schelling (1981) argues that thinking of the collection of funds for redistribution along the lines of a single instrument may have unintended consequences. Looking more closely at child benefit systems as an example, they typically provide a financial benefit to families with children, thus creating an additional incentive for having children. The baseline is a family without children, with a certain sum being granted for each additional child (commonly either as a lump sum or as a tax break). When asking how fair such a system is, and whether something should be changed, Schelling (1981) argues that most people will likely agree that poor families should receive more support for their children than the affluent.

What happens if the system were not operating with the childless as its baseline, but, for instance, took a family with two children as the standard? Those without children could pay a 'fee' for not having any. The childless poor family can certainly pay a little more tax than the poor family with two children. But the childless rich could pay even more (both compared to the rich families with children and the poor families without children), because they have more disposable income.

Teaching a class at the Kennedy School at Harvard, Schelling (1981) found this reasoning that the rich should pay higher taxes for not having children to be very popular among his students.[2] However, it is also a direct contradiction to the protest they voiced against increasing the child benefit payments for rich parents. In the extreme of the assigned benefit case, fairness considerations may lead to a preference for rich couples not getting any child benefit. Such benefits may be seen as best reserved for the poor. Rich couples with children thus end up with the same disposable income as the childless rich. If, however, the question is shifted to how large a 'fee' childless couples should pay, the expected response may be that the poor should not pay any, while the rich should pay a lot. In the latter case it is obvious – and in contrast to the benefit case – that rich couples without children end up with lower disposable income than rich couples with children. Specifically, in the benefit frame the financial incentive to have children is largest for the poor couple. In the tax frame, the financial incentive is largest for the rich couple. In other words, the tax scheme is expected to generate a different treatment than the subsidy scheme.

In a world of rational decision-makers such effects would not be expected. Any decision should be based on the final asset position achieved. The information available to the decision-maker to determine the appropriate size of the premium is the same under both approaches. The different starting points should be realised to be equivalent and lead to identical final premiums (Kahneman and Tversky, 1979). While errors may occur in the perception or the evaluation of the decision problem, under rational choice theories there is no reason to expect these errors to be systematic across different individuals. Yet, a large literature on framing effects demonstrates that decisions depend on the way a problem is presented. The two different scenarios for looking at child benefit establish different exogenously altered structures for the decision-problem even before a perception and mental construct of the decision-problem can be formed (Tversky and Kahneman, 1981; Jullien, 2016).

To understand the Schelling paradox, it should be recognised that in making the decision on how large a premium couples should receive for having a child, the two most salient dimensions under consideration are presumably family size and income. In the benefit frame, family size is likely more salient. The (socially) desirable state is to have children. When the consideration is predominantly focused on increasing family size as a positive change from the baseline of not having children, income is a constraining factor in changing from the undesirable to the desirable state. To achieve the salient goal of increased family size, support for those most constrained is warranted. This constraint also informs opinions on what would be fair treatment in terms of child benefit. The basic hypothesis under such a scenario thus is:

> **H1a**: When a premium is determined by assigning benefits across income categories, the amount considered fair is decreasing with income.

If the baseline is a family with children and a tax is levied on the childless, the premium for having children can still be assessed against the income levels. However, by changing the reference point, the fairness considerations may lead to different outcomes. Arguably, when thinking about how high a tax

[2] See also Edlund (2003); Kirchler (2007) for confirmation of such attitudes outside the classroom.

should be, income is the more salient dimension in forming an opinion. Instead of focusing on the cost-reducing aspect of the premium, attention shifts to the available income that can be taxed. If a rich family has to pay more tax for not having children than a poor family, its premium for having children becomes comparably larger. The hypothesis for such a scenario is:

> **H1b**: When a premium is determined by assigning tax burdens across income categories, the amount considered fair is increasing with income.

The solution, as advocated by Schelling (1981), is to use multiple instruments in designing systems with redistributive implications to disentangle considerations of redistribution, fairness, and preferences over specific allocations. In practical terms this may mean that one committee first sets tax differentials for rich families with children and a second deals with the progressiveness of the basic tax schedule. Beyond the example of child benefits, the fairness aspect is often reduced to a comparison between the treatment of the rich and the poor, with the intuitive response to protect the poor. Such an intuition can, however, lead to the described outcomes and undermine the aim of reaching the intended fairness and an efficient allocation of resources. It is the structural arrangement in the design process that determines which relevant dimension (family size or tax differential) is considered first, and therefore how 'fair' the *ex post* outcome will be (see also Druckman, 2001).

A useful classification of different types of framing effects is provided by Levin et al. (1998), who differentiate between i) *risky-choice* framing, which relies on different perceptions of risk depending on gain or loss situations (usually associated with Prospect Theory (Kahneman and Tversky, 1979)); ii) *attribute framing*, which relies on a manipulation of the valence of a defining attribute of an option (a common illustrating example is whether beef were described as either 80% lean or 20% fat); and iii) *goal framing*, which stresses either the positive consequence of choosing an option (or behaving in a certain manner) or the negative consequence of not choosing it.[3]

In the context of taxation, previous studies predominantly focus on such issues as tax compliance. For instance, they explore the existence and determinants of risky-choice framing in tax-subjects' preferences and behaviour when taxes are presented either as a loss (e.g. compared to gross income) or as a gain (e.g. in case of a rebate at the end of the year). The effect is not necessarily universal. For instance, Cullis et al. (2006, 2012) report experimental evidence from student samples that gender, field of education, and social norms are significant determinants of framing effects in the decision to declare income. An example of goal framing is provided by Hasseldine and Hite (2003), who find no main effect of alerting respondents to positive or negative consequences of their tax compliance/avoidance. Instead, they find a significant interaction effect between gender and their framing manipulation for the declaration of income. Regarding the influence of framing on fairness considerations in taxation, Reimers (2009) reports a gain frame (i.e. expressing taxes in terms of money retained after tax) to increase preferences for progressiveness compared to a loss frame of taxes paid.

Schelling's thought experiment has been taken up by the literature as a standard to demonstrate the influence of framing (see, e.g., Houdek and Koblovskỳ, 2015; Kahneman, 2011; Krishna and Slemrod, 2003). In line with Levine et al.'s (1998) classification, attribute framing for taxes and benefits occurs by altering the baseline and the salience of the different dimensions relevant to the decision. The frames work 'loosely' by framing the decisions in two distinct ways which, under rational expectations, imply equivalence of outcomes in economic terms (Frisch, 1993). Rational decision-makers would be expected to arrive at the same final asset position regardless of the baseline manipulation. Considering the importance attached to the thought-experiment in the literature, it is surprising that empirical studies of this specific effect are few, far-between, and find mixed results. Traub (1999) tests the Schelling effect with a sample of German employees and finds no evidence of it, whereas McCaffery and Baron (2004) and LeBoeuf and Shafir (2003) report support for it, using a convenience sample in an online survey and undergraduate students, respectively. This literature only reports results for child benefit scenarios and does not explore the external validity of the effect for other

[3]Other relevant types of framing effects include the 'identifiable victim effect' (e.g. Kogut and Ritov, 2005) and 'response mode biases' (e.g. Kühberger, 1997; Kühberger, 1998). We thank our reviewers for pointing us towards this literature.

areas of taxation.[4] Consequently, we also test the Schelling effect with a novel scenario based on possible environmental protection policies, namely the introduction of an environmental certificate with impact on car taxes/subsidies. We expect the effect to occur similarly outside the traditionally tested child benefit scenario.

The susceptibility of different populations has been a prominent research question in the analysis of framing effects. Much attention has been paid to the influence of demographics and expertise. In a meta-study Kühberger (1998), for instance, argues that expertise reduces susceptibility to framing effects, but does not eliminate it. Lately, the decision-making and susceptibility of politicians has moved into researchers' focus. For instance, policy decisions in themselves may be subject to framing effects (see e.g. Lucas Jr. and Tasić, 2015; Kuehnhanss et al., 2015, 2017; Schnellenbach and Schubert, 2015, and references therein) and policy makers may exhibit the same biases as ordinary people (see e.g. Linde and Vis, 2017).

Closely related to the design of tax systems, Traub et al. (2009) study how different treatments, manipulating decision-makers' exposure to their decisions in terms of their own pay-off, influence the ranking of suggested income distributions for an imaginary country. Participants in their experiment make a trade-off between the equity level and the efficiency of the hypothetical society. People do not evaluate incomes solely according to their own interest, but also take social considerations into account (see Fehr and Schmidt, 2003). Traub et al. (2009) test whether equity or efficiency considerations predominate when participants are exogenously influenced to act as social planners (supposedly to the benefit of the population without personal involvement (as, for instance, theorized by Dalton, 1920; Atkinson, 1970; Cowell, 1985, 2011)), or to follow an individual-choice approach (expected to maximize their own pay-off (see e.g. Friedman, 1953; Rawls, 1971; Beckman et al., 2002)). They find that "the pure social planner is guided by a procedural fairness motive", but when "people are given the possibility to compare their own potential income position with the income position of other people, a 'comparative fairness' motive comes to the fore" (Traub et al., 2009, p.398). When comparative fairness becomes relevant, the preferred distribution will be reasonably fair, but will also allow the possibility to outperform others. Fairness considerations thus appear to depend on the incentives of the decision-maker to act as either social planner or individual chooser. In the context of tax framing issues beyond compliance, this finding raises concerns about the generalisability of results from respondent pools drawn only from populations subject to taxation (and particularly from students), rather than political decision-makers with a wider perspective. To at least some extent (see Congleton et al., forthcoming), politicians may be expected to have a public service motivation for carrying out their mandate (see e.g. Besley, 2004; Braendle, 2016), bringing them closer to the state of the social planner. In this light, we offer a test of tax and benefit framing with actual political decision-makers to alleviate concerns over the representativeness of student and convenience samples (Cappelen et al., 2015; Druckman and Kam, 2011; Mullinix et al., 2015). We expect that this type of framing effect will also affect policy-makers with authority over relevant considerations in the design and implementation of tax and subsidy schedules.

Finally, following previous findings in the literature on interaction effects between framing and demographic variables (e.g. Hasseldine and Hite, 2003; Kuehnhanss et al., 2015), we conduct an explorative analysis of the influence of our sample's demographic characteristics, political status and ideology, and opinions on taxation matters on a potential framing effect.

3. Framing experiment

This paper contributes to the understanding of framing effects in tax and benefit system design by providing an empirical test of the Schelling effect using a survey experiment with a sample of local Flemish politicians. Over recent years, (survey-)experimental research has experienced an increasing uptake and revitalization in political science (Druckman et al., 2006; Gaines et al., 2007; Kittel et al., 2012), in particular, for the analysis of behavioural influences on specific policy choices (see e.g Kuehnhanss et al., 2015, and references therein) and to test the susceptibility of actual administrative and political policy-makers (Blom-Hansen et al., 2015; Jilke et al., 2016; Kuehnhanss et al., 2017; Linde and Vis, 2017). Our sample is of

[4] See our discussion section below for more details on these studies.

particular interest for exploring the Schelling effect as these local politicians are directly involved in the system design in their municipalities, and their opinions may also feed into the considerations made at higher levels. We also expand the testing of this type of framing effect from the original child benefit scenario used by Schelling (1981) to a thematically novel scenario. Finally, we analyse the influence of our respondents' demographic and political attributes on the framing effect. To this purpose, we embed two test scenarios and a range of control questions in a large-scale survey on Flemish local politicians' social and economic preferences.

Existing studies have used different approaches to gauge the preferred benefit/tax levels. We use a mix of within-subject and between-subject design to test the premium preferences of respondents and the differences between frames. Participants are randomly assigned to either a benefit frame or a tax frame and asked to provide the amount they would judge fair as a benefit for having a first child/tax for not having any child yet for families with three different monthly net income levels: €2000, €4000, and €6000, respectively. Each participant thus provides three distinct amounts considered fair, one for each income level, respectively.

Since July 2014, child benefits in Belgium have fallen under the competencies of the regional governments (Flanders, Wallonia, and Brussels). At the time of the survey, Flanders has a mixed system, with direct payments and an increase in the tax exemption for individual incomes. The amount of the direct payment component differs according to the number of children a family has. For employees, the benefit paid for the first child starts at a base rate of €92 per month, subject to potential additions depending on the exact family situation and the age, school status, and health of the child. For the second child the base rate is €170 and for the third and following children it is €254 per month. The increase in the tax exemption ranges from €1520 for the first child to €5400 for four and more children. The exact tax saving depends on the total amount of accumulated exemptions and the individual income level. To avoid unnecessary complexities in our scenario descriptions, we abstract from the exact mechanism and change the consideration from a two-child family as in Schelling's original experiment only to families with one child and to families without children. The complete scenario presented to participants reads as follows:

> In Belgium couples receive financial benefits from the state. Suppose that it is not relevant how the transfer is funded, and ignore any other benefits which might come into play. How much [more/less] should a couple [with their first child/without children] receive per month than a couple [without children/with their first child]? Please name amounts you consider appropriate if each couple has a combined monthly net income of:
>
> - €2000
> - €4000
> - €6000

Child benefit systems are typically well established parts of the public finances of countries and fundamental reforms are rare. The Schelling effect should, however, also extend beyond this example and may be particularly relevant to the design of new taxation or benefit schemes. Potential areas of application are 'green' taxes and subsidies to promote environmentally friendly behaviours and technologies (Feldman and Perez, 2012; Lucas Jr, 2017). The second scenario we test, therefore, focuses on the implementation of a hypothetical new support scheme for environmentally friendly cars. In contrast to child benefits, which traditionally had been exclusively regulated at the federal level in Belgium and are now a regional competence, local municipalities collect a surcharge on the tax on motor vehicles.[5] The scenario thus directly relates to the interests of our participants. As before, respondents are asked to provide amounts they consider fair as a premium, in this case for each of three cars at different price levels which either have or have not been certified to be environmentally friendly:

[5] In 2009, for instance, this surcharge resulted in an average tax income of roughly a quarter million euro for the 308 Flemish municipalities.

Suppose that Flemish municipalities want to financially support environmentally friendly cars. For this purpose a new certificate is introduced by an independent agency. Consider a [non-certified/certified] car from each of the following price classes (more or less corresponding to city, medium, and luxury cars). How much [more/less] should the owner of a [non-certified/certified] car have to pay in annual tax than the owner of an equally priced car that is [certified/non-certified]?

- €15.000
- €30.000
- €45.000

3.1. Participants

Invitations to participate in the online survey were distributed via email to 5,928 local Flemish politicians elected in 2012 for whom publicly available email addresses could be retrieved (in total 7,457 were elected). Participation was anonymous and not incentivised. The survey was returned by 869 respondents. As the survey contained different parts, none of which was compulsory, some attrition occurred between sections and not all returned surveys contained answers to the questions discussed in this paper.[6] After eliminating incomplete and nonsensical answers to the presented scenarios,[7] there are (N_1 =) 608 respondents in the child benefit scenario, and (N_2 =) 525 in the car scenario.[8] Respondents are predominantly male (N_1: 73.5%; N_2: 74.3%) and on average 53 years old ($median_{1\&2} = 54$, $sd_{1\&2} = 11.5$). Slightly more than two-thirds of respondents are married, roughly 10% live in other forms of cohabitation, and the rest reported being either single, divorced, or widowed. Respondents to the child benefit scenario have on average 2.0 children in total ($sd = 1.33$) and 0.6 children under the age of 18 ($sd = 1.01$). A third of the respondents hold a Bachelor, around 40% hold a Masters degree, and roughly 3% have a PhD. The remainder indicated either other (professional) degrees (circa 1.5% of the sample), or secondary school as the highest achieved level of education.

4. Results

Respondents saw both scenarios, but only one randomly drawn frame in each. In the child benefit scenario (N_{1b} =) 320 participants included in our analysis saw the benefit frame, and (N_{1t} =) 288 saw the tax scenario. In the car scenario the numbers of respondents are (N_{2s} =) 267 and (N_{2t} =) 258 for the subsidy and the tax frame, respectively. To interpret the within-subject effect in each of our frames, we create a panel data set by treating the responses to the different levels in each scenario as individual observations. We run separate individual fixed-effect models to estimate the different premiums respondents assigned in either of the two presented frames. Figure 1 presents the resulting graphs when plotting the estimates. The regression results can be found in table SI.3 in the supplementary information below. Each

[6] See table SI.1 in the supplementary information below for an overview of all control variables for the population of local Flemish politicians (only gender, age, and party list for the election available), those who answered the Schelling questions, and those who did not. Note that those responding to the Schelling questions are significantly more likely to have obtained a higher level of education. This may reflect a self-selection effect in light of the fairly complex scenarios. Unfortunately, we cannot determine the factors driving the non-responses, but possible channels may include reduced interest in the subject matter, too high demand on time and effort to respond adequately, or lack of understanding.

[7] We exclude answers if one of the given values exceeds €1000 in the child scenario, or if it exceeds €2000, €3000, or €5000 for the city, middle class, and luxury car classes, respectively, in the car scenario. In the results presented below, we also exclude responses indicating zero for all three answers in each scenario. However, the latter may also include valid responses with a preference for zero benefits/tax. The general results and conclusions are robust to the inclusion of all returned answers or the zero answers.

[8] Note that there is a much larger number of zero-responses in the car scenario than in the child scenario. Fifty-seven respondents in the subsidy frame and 71 in the tax frame responded with zeros to all three levels. The overall results are robust to their inclusion.

of the two graphs presents the predictive margins for the premiums along the income/car class levels and their 95% confidence intervals for each frame separately.

The graphs show clear differences between the administered frames. In the child scenario, the benefit frame shows a decrease of granted benefits as the income level increases, supporting our hypothesis H1a. Low income families would receive roughly €330 and middle income families around €200 per month. With €132, high income families are granted less than half the amount of low income families. In the tax frame, the additional tax burden considered fair for childless families compared to families with one child increases with income in line with our hypothesis H1b. High income families would be taxed more than twice the amount (€368) of low income families (€178) for not having a child.[9] In sum, our results give strong support for the Schelling effect. We identify a preference for treating childless rich differently from rich with children depending on the frame: the premium for having children under the benefit frame (€132) is considerably lower than under the tax frame (€368). For low income families the reverse is true: under the benefit frame the premium considered fair (€330) is much larger than under the tax frame (€178).

In the tax frame of the car scenario the results are very similar to the child scenario, and again support hypothesis H1a.[10] In the subsidy frame, the difference between the premiums assigned to each car class is small (€633, €678, and €778 for city, middle, and luxury class cars, respectively) and, contrary to the child benefit scenario, the trend is slightly positive with an increasing cost of the cars. While this finding leads us to reject hypothesis H1b for this scenario, the differences in premiums across frames remain substantial for the lowest and highest levels in the car scenario. Whereas the differences between levels are significant at the 1% level in all other pairings within each frame, the difference between the low and the middle class cars does not reach significance at the 5% level ($t = -1.61$) in the subsidy frame. As the Schelling effect is, in a strict interpretation, dependent on both hypotheses H1a and H1b being true, we technically do not observe it in this scenario. However, there is undoubtedly still a strong discrepancy between the amounts considered fair across frames. For two of the three specific car classes, the premium for having a certificate differs considerably depending on the frame used.

In the child scenario, we observe the exact pattern of responses predicted for the Schelling effect. While this does not hold in the car scenario due to the upward slope of the assigned subsidies over the different car classes, the differences between frames remain strongly significant. Policy-makers with authority over tax system relevant considerations seem to be susceptible to tax framing effects broadly construed.

For our explorative analysis of other factors' relation to the overall level of premiums assigned, we estimate pooled ordinary least squares regressions.[11] Note, however, that pooled OLS also draw on the between-subject variation, which may bias the estimates for the premiums. We run the following model within each frame:

$$Y_i = \alpha + \beta_i \mathbf{Level}_i + \gamma \mathit{Controls}_i + \varepsilon_i \tag{1}$$

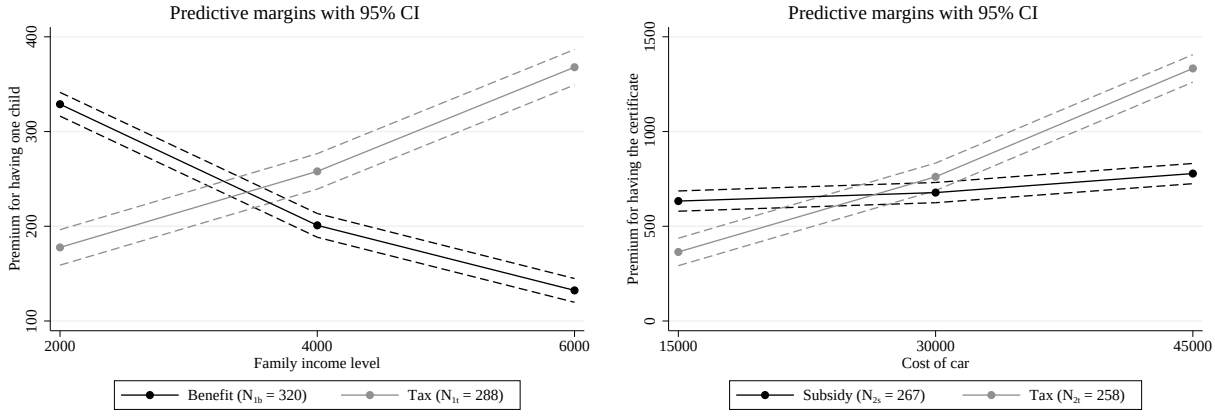
where Y_i is the assigned premium for having a child/the environmental certificate. The coefficients β_i describe the difference between the three levels i of income/car class expressed as vector $\mathbf{Level}_i$.

Our controls include socio-demographic characteristics of our respondents (*age*, *gender*, *education*, *marital status*, *household income*, and number of *children* – the latter is included only for the child benefit scenario where it seems most relevant) and further controls for their political function and preferences on taxation. Those comprise the *mandate* a local politician holds (mayor, council member, or other) and a left-right score for the local party. This *party index* is taken from Deschouwer et al. (2013), and captures the average self-placement of party members on an 11-point scale (see below). As a general indication of our respondents'

[9] Note that the resulting tax rate is regressive. As our respondents only provided the euro amounts they consider fair, this schedule may be a consequence of the so called metric effect (McCaffery and Baron, 2004, 2006). The increase in the euro amounts is perceived as an increase in the tax burden, although the tax rate falls.

[10] However, the resulting tax rates show a progressive schedule.

[11] Note that, while we exclude observations reporting zeros for all levels, some respondents indicated preferences for zero benefits/tax for certain levels but not others. As such preferences may raise concerns over a censoring of the data, we also run Tobit models with the lower limit set to zero and the upper limit set to our above defined cut-offs. To deal with potential heteroskedasticity issues in the Tobit models we calculate bootstrapped standard errors with 200 repetitions. The results are fully robust (details available on request)



(a) Child benefit

(b) Environmentally friendly car certificate

Figure 1: Predictive margins for premiums across level of family income/cost of car for each frame based on fixed effect regression models reported in table SI.3 in the supplementary information

tax preferences, they indicate among progressive (67.6%), flat tax (26.3%), regressive (3.6%), or their own suggestions (2.5%) which *tax system* they would prefer be used in Belgium. The influence of these preferences on the stated amounts remains insignificant.[12] This may be a surprising result, but it matches previous findings on the general public's attitudes and understanding of progressive taxation (Roberts et al., 1994). Finally, we include participants' ratings on 5-point scales of the *level*, *fairness* of distribution across income levels, and *efficiency* of the use of taxes at the federal level in Belgium.[13] As the amounts given by our respondents for the different income/car class levels are not independent of each other, standard errors in the ordinary least squares models are clustered at the level of the individual.

The trends in the initial results are fully confirmed in the presence of our controls in the OLS models (table 1).[14] The premiums significantly increase with higher income in both tax frames (columns (2) and (4)), and significantly decrease with higher income in the benefit frame in the child benefit scenario (column(1)). Rich (poor) parents would thus be treated differently depending on the frame: under the benefit frame rich (poor) parents receive a premium for having children that is lower (larger) than under the tax frame. The premiums assigned for having an environmental certificate remain largely stable in the car subsidy frame (column (3)). The control variables remain insignificant in the child scenario and in the subsidy frame of the car scenario.[15] In the car scenario's tax frame, however, higher education of respondents correlates with higher taxes for not having a certificate, thereby disproportionately benefiting the owners of (expensive) cars with a certificate. The further right on the political spectrum respondents are, the lower the taxes they would ask in this frame.

The literature on framing effects in tax compliance has identified a number of highly relevant interaction effects between the frames used and gender, educational background, and social norms for the amounts of taxable income participants report (Cullis et al., 2006, 2012; Hasseldine and Hite, 2003). Consequently, we explore the existence of interaction effects between the Schelling frames and our most relevant and novel control, political ideology, which is again operationalised using the data from Deschouwer et al. (2013) on

[12]See supplementary information B for a comparison of the premiums assigned by participants with a preference for progressive tax systems and those preferring other systems.

[13]An overview of all control variables by scenario and frame is provided in table SI.2 in the supplementary information.

[14]Additional OLS specifications with varied sets of controls are available in tables SI.4 and SI.5 in the supplementary information. The results remain robust.

[15]Note that in the latter respondents with preferences for a tax system in the category 'Other' generally assign significantly lower premiums. Given the small number of respondent in this category, this result is driven by a few respondents with very low premium preferences. Their exclusion does not change our main results.

Table 1: Estimated differences in the premiums for having a child/an environmental certificate within frames

	Child scenario		Car scenario	
	Benefit	Tax	Subsidy	Tax
	(1)	(2)	(3)	(4)
Level of income/car class	*Low is reference group*			
Middle	−140.96***	69.89***	45.68	372.52***
	(10.70)	(10.97)	(32.10)	(33.65)
High	−215.38***	173.73***	150.20**	908.47***
	(14.10)	(21.25)	(63.90)	(82.67)
Gender (1 = female)	15.81	−4.54	128.04	−24.63
	(24.93)	(21.24)	(92.22)	(138.67)
Age	1.12	−0.48	−6.62	3.33
	(1.28)	(1.11)	(4.53)	(5.32)
Children (#)	2.89	7.10		
	(8.10)	(8.13)		
Income	3.30	−7.26	−27.19	9.51
	(5.67)	(6.45)	(22.88)	(32.22)
Education	*Secondary is reference group*			
Bachelor	−16.37	23.07	97.55	258.46*
	(31.96)	(26.08)	(135.11)	(155.79)
Master	−0.05	43.95	−9.09	275.75*
	(33.58)	(27.11)	(136.46)	(156.99)
PhD	9.81	−33.10	12.78	673.47***
	(49.98)	(31.45)	(235.82)	(254.63)
Preferred tax system	*Progressive is reference group*			
Flat tax	47.69	48.64	9.88	−89.49
	(37.49)	(34.05)	(185.20)	(181.37)
Regressive	−42.76	56.52	−123.47	−264.89
	(49.29)	(53.28)	(290.94)	(317.80)
Other	69.40	−23.72	−557.65**	−222.26
	(47.62)	(89.54)	(270.58)	(340.98)
Party index	4.87	−0.49	3.34	−115.76***
	(6.47)	(8.84)	(36.80)	(36.61)
Constant	177.12	261.58**	−130.74	438.62
	(149.88)	(125.42)	(554.24)	(688.11)
Full controls	yes	yes	yes	yes
Observations	756	678	630	600
N	252	226	210	200
R^2	0.251	0.162	0.119	0.235

Notes: Pooled ordinary least squares coefficient estimates. For each participant three observations are included, one for each income/car class level. Standard errors are clustered at the level of the individual; $^*p < 0.10$,** $p < 0.05$,*** $p < 0.01$.

the average self-placement of members of the different Flemish parties on an 11-point left-right scale (from 0 to 10). Furthest on the left-hand side of the political spectrum are the green party (Groen!) with a self-placement value of 2.2 and the social democrats (Sp.a) with a value of 2.6. On the right-hand side, members of the nationalistic Vlaams Belang reported a value of 9.3. The centrist party CD&V (5.5) and center-right parties Open Vld (6.6) and N-VA (6.7) fill in the ideological landscape in Flemish municipalities. We estimate the following model:

$$Y_i = \alpha + \beta_i \mathbf{Level}_i + \theta_i Level_i \times party\ index + \zeta party\ index + \gamma Controls_i + \varepsilon_i \quad (2)$$

where, as previously, β_i describes the main effect of the vector $\mathbf{Level}_i$. The coefficients of interest are represented by θ_i, which describes the interaction between each level of income/car class and the *party index*.[16]

[16]We also run the same regression interacting *gender* with the level of income /car class. The only significant effect arises in the child benefit scenario, where men, in comparison to women, assign higher premiums to the low income level (+€55.88,

The results for the interactions between the different levels of income/car class and political ideology across frames are shown in table 2. Consistent across scenarios, those belonging to parties further right on the political spectrum assign higher premiums to the middle and high levels in the benefit frames (columns (1) and (3)), and lower premiums in the tax frames (columns (2) and (4)) than those on the left-hand side. With the interaction term never reaching the same magnitude as the main effect across the entire party spectrum (2.2 - 9.3), the framing effect persists but is indeed significantly moderated by political ideology. A more detailed graphical representation of the premiums granted for each income/car class across the political ideology spectrum is presented in figure A.2 in Appendix A. Note, however, that as shown in figure A.2, the levels of the premiums granted largely remain within the hypothesised ranking. Low income families are always granted more child benefit than high income families, and high income families are always taxed more than low income families across the entire political spectrum. The effect we observe for ideology indicates that right-wing politicians prefer smaller differences in premiums between income groups. This may reflect more general preferences for lower levels of redistribution. In the car scenario, the subsidies granted across car classes show similar trends, but the differences in premiums across levels are no longer statistically significant towards the left-hand side of the spectrum in the car subsidy frame, and towards the right-hand side of the spectrum in the car tax frame. The direction of the interaction effect falls in line with typical value and issue perception arguments across the ideological spectrum. For instance, equality concerns and benevolence values and traits seem characteristic of left orientations and acceptance of inequality and focus on achievement of right orientations (see, for instance Caprara et al., 2006; Jost et al., 2008; Knutsen, 1997; Piurko et al., 2011, within the literature on left/right placement, political orientation, and ideology). Speculatively, political ideology may further increase the salience of the dominant dimension (family size or income) according to the values and issue perceptions associated with the political ideology of a respondent. For instance, the family size dimension may already be more salient for a left-leaning politician, whereas a right-leaning politician may be more disposed towards maintaining the earned income of an individual especially when the income dimension is elicited. The relevance of political ideology and the mechanism by which it moderates framing effects poses an interesting avenue for future research.

Finally, to provide an estimate of the differences in premiums granted between the two frames, we pool the data from both frames of each scenario and estimate the following ordinary least squares model:

$$\begin{aligned} Y_i = \alpha & \\ & + \beta_i \mathbf{Level}_i \\ & + \delta_1 \text{Tax frame} \times \text{Low} \\ & + \delta_2 \text{Tax frame} \times \text{Middle} \\ & + \delta_3 \text{Tax frame} \times \text{High} \\ & + \gamma \mathit{Controls}_i + \varepsilon_i \end{aligned} \tag{3}$$

where each δ for the interaction terms indicates the estimated change in the premium by switching from the benefit/subsidy frame ($Taxframe = 0$) to the taxation frame ($Taxframe = 1$) for a particular income level/car class (denoted by the dummies *Low*, *Middle*, and *High*). The main effect for the $Level_i$ vector is again described by coefficients β_i, capturing the effect of the income/car class levels in the benefit frame. Note that each respondent only saw one frame for each scenario and these estimates provide between-subject comparisons. The estimated coefficients presented in table 3 confirm the results above. Assigned premiums significantly decrease for low income families with a switch to the tax frame, and significantly increase for high incomes. For a high income family the switch to a system with one child as baseline and a tax for not having any children would on average increase the 'fair' premium for having a child by €220 compared

$SE = 32.48$, $p-value = 0.087$, based on regression with full controls), but significantly lower premiums to the middle (−€49.38, $SE = 21.20$, $p-value = 0.021$) and high (−€70.83, $SE = 29.23$, $p-value = 0.016$) income levels. In the tax frame of the child scenario and in both frames of the car scenario the main and interaction effects of gender remain insignificant. We further test interaction effects for politicians' *household income*, number of *children*, and *tax system* preferences, but find none of them to be significant (further details available upon request).

Table 2: Interaction effects between party ideology and levels of income/car class

	Child scenario		Car scenario	
	Benefit	Tax	Subsidy	Tax
	(1)	(2)	(3)	(4)
Level of income/car class	*Low is reference group*			
Middle	−218.87***	130.50***	−145.09	778.17***
	(35.43)	(36.26)	(91.51)	(134.39)
High	−348.38***	293.68***	−209.73	1940.66***
	(43.94)	(70.64)	(169.21)	(323.48)
Party index	−8.56	10.89	−31.16	−25.19
	(8.58)	(7.29)	(30.66)	(26.21)
	Low × party index is reference group			
Middle × party index	14.88**	−11.46*	35.86**	−76.65***
	(6.18)	(6.50)	(16.92)	(21.98)
High × party index	25.40***	−22.69*	67.65**	−195.05***
	(7.79)	(12.54)	(32.40)	(53.95)
Gender (1 = female)	15.81	−4.54	128.04	−24.63
	(24.96)	(21.27)	(92.38)	(138.91)
Age	1.12	−0.48	−6.62	3.33
	(1.28)	(1.11)	(4.54)	(5.33)
Children (#)	2.89	7.10		
	(8.11)	(8.15)		
Income	3.30	−7.26	−27.19	9.51
	(5.68)	(6.46)	(22.92)	(32.28)
Education	*Secondary is reference group*			
Bachelor	−16.37	23.07	97.55	258.46*
	(32.01)	(26.12)	(135.33)	(156.06)
Master	−0.05	43.95	−9.09	275.75*
	(33.63)	(27.15)	(136.69)	(157.26)
PhD	9.81	−33.10	12.78	673.47***
	(50.05)	(31.50)	(236.21)	(255.08)
Preferred tax system	*Progressive is reference group*			
Flat tax	47.69	48.64	9.88	−89.49
	(37.54)	(34.10)	(185.51)	(181.69)
Regressive	−42.76	56.52	−123.47	−264.89
	(49.36)	(53.36)	(291.43)	(318.35)
Other	69.40	−23.72	−557.65**	−222.26
	(47.69)	(89.68)	(271.03)	(341.58)
Constant	247.43	201.39	52.83	−40.66
	(151.11)	(122.86)	(543.78)	(659.39)
Full controls	yes	yes	yes	yes
Observations	756	678	630	600
N	252	226	210	200
R^2	0.260	0.169	0.124	0.254

Notes: Ordinary least squares coefficient estimates. For each participant three observations are included, one for each income/car class level. Standard errors are clustered at the level of the individual; $^{*}p < 0.10,^{**}p < 0.05,^{***}p < 0.01$.

to the standard benefit system. A low income family with one child would 'lose' around €169 with the switch. In the child scenario, the control variables remain insignificant. In the car scenario the effects are similar, with the owner of a city car 'losing' around €295 with a switch to a tax frame, and the owner of a luxury car 'gaining' €461. In this scenario, those with higher education generally assign higher premiums to environmentally friendly cars, and those on the right-hand side of the political spectrum assign somewhat lower premiums.

Table 3: Estimated differences in premiums across frames

	Child premium	Car premium
Level of income/car class	*Low is reference group*	
Middle	−140.96***	45.68
	(10.60)	(31.73)
High	−215.38***	150.20**
	(13.96)	(63.17)
Tax frame × Low	−168.64***	−292.60***
	(17.53)	(49.39)
Tax frame × Middle	42.21***	34.24
	(15.21)	(72.05)
Tax frame × High	220.47***	465.67***
	(21.48)	(119.68)
Gender (1 = female)	6.10	97.63
	(17.14)	(84.22)
Age	0.24	−0.65
	(0.83)	(3.56)
Children (#)	8.11	
	(5.60)	
Monthly net income	−1.23	−3.38
	(3.99)	(20.80)
Education	*Secondary is reference group*	
Bachelor	1.23	219.28**
	(20.82)	(101.40)
Master	20.31	173.97*
	(22.06)	(100.46)
PhD	−18.16	337.07*
	(35.40)	(200.56)
Preferred tax system	*Progressive is reference group*	
Flat tax	38.88	−8.29
	(24.82)	(131.32)
Regressive	5.83	−105.76
	(37.09)	(195.11)
Other	17.57	−411.64**
	(41.98)	(164.17)
Party index	0.59	−52.08**
	(5.22)	(26.43)
Constant	287.27***	403.41
	(101.00)	(458.72)
Full controls	yes	yes
Observations	1434	1230
N	478	410
R^2	0.180	0.133

Notes: OLS coefficient estimates. For each participant three observations are included, one for each income/car class level. Observations from both frames are taken together for each scenario. The interaction terms describe the estimated difference in changing from the benefit/subsidy frame to the tax frame for each level of family income/car class. As individual participants' responses for the different levels are not independent of each other, standard errors are clustered at the individual; $^{*}p < 0.10$,$^{**}p < 0.05$,$^{***}p < 0.01$.

5. Discussion

Public opinion is important to political considerations surrounding the determination of different tax and benefit schedules. If the understanding and fairness perceptions of taxes and benefits by citizens is subject to framing effects – as argued by Schelling (1981) and confirmed by LeBoeuf and Shafir (2003) and McCaffery and Baron (2004) – they may alter the incentives of politicians to find redistributive levels reflecting the popular preferences and simultaneously satisfying economic (fairness) principles. The susceptibility of political decision-makers to the same effects has, to the best of our knowledge, not received any attention so far. By testing the Schelling effect with (local) Flemish politicians, this paper highlights the

necessity to consider framing effects in political decision-making on taxes and benefits. Whether individuals with different levels of expertise (or seniority, numeracy, need for cognition, etc.) are equally susceptible to framing has been widely researched (see e.g. Druckman, 2001; Gächter et al., 2009; Kuehnhanss et al., 2015; Kühberger, 1998; LeBoeuf and Shafir, 2003; Peters et al., 2006; Peters and Levin, 2008). Among politicians, the results of Linde and Vis (2017) testing framing effects with Dutch parliamentarians suggest that they are susceptible, but less so than the students often used in experiments. In this light, the findings for our sample are particularly relevant. All our participants are elected politicians, the sample has a relatively high average age, and they are all exposed to budgetary decisions. The occurrence of strong effects despite this combination of attributes highlights the relevance of Schelling-type frames.

However, we find differential effects between our two tested scenarios. While both scenarios show framing effects, only the child benefit scenario matches the distinct pattern of the Schelling effect. A potential explanation may lie in the domains under consideration. For risky-choice framing, for instance, Wang (1996) finds the typical preference reversal observed for Tversky and Kahneman's (1981) Asian Disease Experiment to disappear for scenarios using public property and personal money domains. Instead, he observes 'unidirectional effects': Preferences do not reverse but get augmented by the frame in the ex-ante dominant direction. In the tax frame of our car scenario, the focus on the income dimension (proxied by wealth via the car price) may be strengthened, whereas the environmental dimension may not necessarily evoke fairness considerations as strongly as the family size dimension in the child scenario. The aspiration level one holds towards the basic needs of caring for a child is simply larger (and therefore more influential) than the aspiration level associated with environmental certificates. A second alternative explanation may be related to the metric effect (McCaffery and Baron, 2004, 2006). Respondents may regard premiums as nominal values in the subsidy frame. In a car domain such an approach would mirror the way price discounts and transaction costs are often expressed. The regressive percentage rate (and therefore largely stable nominal values) we observe for the car subsidy thus seems intuitive. In contrast, in the tax frame respondents may be more likely to use percentage terms to estimate the fair tax as it is the more common approach for considering taxes in general. Expressed as rates, the premiums in the car tax frame are relatively stable across the three car class levels (2.42%, 2.53%, and 2.96%, respectively). The nominal values thus show a corresponding increase. Unfortunately, our data does not allow us to test these mechanisms.

As the existing literature on the Schelling effect is so far limited, a more detailed comparison of our findings with previous studies is warranted. McCaffery and Baron (2004) ask 49 participants in an online survey to rate the fairness of a pre-determined allocation of surcharges/benefits to a high ($100,000) and a low ($25,000) income household on 6-point Likert-type scales. The answer options present combinations of degrees of too high/too low statements for both households (e.g. 'much too much for high income, much too little for low'). Participants have no option to express indifference or approval of the presented allocation, nor to limit their answers to one part of the schedule or express differentiated opinions on either the high or low income household. An answer that one treatment is too high/low automatically implies the other to be too low/high. McCaffery and Baron (2004) also ask participants to rate the fairness of the surcharge/benefit as a whole, and find that they generally judge bonuses to be fairer overall. In total, they present each participant with eight scenarios in four different permutations to a total of 32 fairness ratings, testing simultaneously the concepts of marriage surcharges/single bonuses and of child benefits/childless taxes. They find their respondents to judge bonus allocations to high income households to be too high (and consequently too low for low income households), and surcharges too high for low income households (and consequently too low for high income families). While they confirm a Schelling-effect, they do not explore the driving mechanism of the effect. As the possible answers present only matched cases, it is unclear how participants would treat the different households in isolation. While the presentation of the different scenarios was randomised, such a within-subject design may be subject to carry-over and demand bias effects (Charness et al., 2012). Subjects may infer from comparing the frames, that each frame used has a certain treatment of either the low or high income household as the socially desirable option. Their decision may then be based on the corresponding half of the too much/too little choices provided by McCaffery and Baron (2004). In such a case the results may be less reflective of a Schelling effect, but potentially of a task frame effect (see, for instance, Shafir, 1993). In our set-up, such direct comparisons of frames are not possible, and hence the responses reflective of the processes each frame triggers in isolation.

Traub (1999) uses personal interviews with 219 German employees to test the Schelling effect also in a within-subject design. In a first round, he presents participants with wage slips containing the breakdown from gross income to income tax, social contributions, and net income as calculated under the actual German tax schedule for single childless persons of five different income groups (DM2500, DM3750, DM5000, DM7,500, and DM10,000 gross per month). They are asked to judge whether the presented tax burden is fair, and to state tax burdens they would consider fair if the same gross income was earned by a childless married couple, a married couple with one child receiving an additional DM200 child benefit per month, and a couple with two children receiving an additional DM400 child benefit per month. Two weeks later, participants are presented a second round of questions, but this time the wage slip relates to a married couple with two children and receiving DM400 in child benefit per month. The income tax shown in the wage slip no longer reflects the actual German tax schedule, but each respondent's individual answer from the first round two weeks prior. The same questions are posed again as in the first round (with the childless single substituting the married couple with two children in the last question). Traub (1999) calculates the tax rebates and tax surcharges considered fair from the answers to both rounds, and finds both rebates and surcharges to be increasing with income, and with the exception of the lowest income category, tax rebates to be higher than tax surcharges. He rejects the Schelling effect as he does not find the shape suggested by Schelling for any of the tax rebates, and only a small number (10.5%) of his respondents show strong enough framing effects in a within-subject analysis. While Traub (1999) provides a thorough test of within-subject changes, we see the use of a between-subject design to be in line with a larger share of the general framing literature. The between-subject component in our design, allowing us to compare independent responses across frames, is less vulnerable to carry-over and demand effects in this setting. Especially with fairness concerns and the likely dependence of answers on the dimension (income or family size) elicited, a clear separation and absence of confounds of answers seems unlikely in within-subject designs (Charness et al., 2012).

However, a few potential caveats of this study must be discussed. First, responses to a vignette experiment may not adequately reflect real-world behaviour. Empirical tests of the reliability of survey experiments in capturing such behaviour provide mixed results (Barabas and Jerit, 2010; Hainmueller et al., 2015; Kühberger et al., 2002), highlighting the need to further verify results with additional samples (McDermott, 2011) and, where possible, actual behaviour. In the case of our politician sample, expressed preferences in the survey may not necessarily translate into voting behaviour in the council meetings. However, our findings still provide a relevant pointer for further exploration of this issue. If the frame susceptibility stems from a manipulation of expressed preferences only, the voting process is the most relevant aspect for potential debiasing. If, however, the frame has an effect on the underlying beliefs about fair treatment of different incomes or wealth levels (as proxied by the car classes), the process of arriving at the proposal needs to be addressed for debiasing. Second, a lack of incentivisation may raise concerns about the consequentiality of our results. Creating adequate incentives for politicians to participate (truthfully) in a survey-experiment poses ethical and practical difficulties. Besides the inherent problems of offering payment from public research funds to politicians, the question arises to what extent policy decisions in the real world create economic incentives for the deciding politician. While rent-seeking behaviour is well documented, it is doubtful that decisions on, as in this case, child benefit payments are driven by personal gain considerations. Furthermore, there is no apparent competitive component or performance measure available in this framing experiment to justify individual-specific incentives. Finally, while our respondents do not have authority over child benefits in Flanders, a frame dependence of their views on a fair distribution of premiums also in this case may enter the political decision-making chain. An important avenue for further research on this type of tax-framing effects is the cognitive mechanism which leads to the observed results. In particular, a distinction between thinking types ("System 1" or "System 2", heuristic or rational (Kahneman, 2003)) could be useful in determining the psychological basis for judging differential treatments as fair or unfair within different frames. A potential avenue is the inclusion of a Rational-Experiential Inventory (Epstein, 2012; Pacini and Epstein, 1999) in future studies.[17]

[17] We would like to thank our reviewers for this suggestion.

6. Conclusion

This paper contributes to the understanding of framing effects in tax and benefit system design by providing an empirical test of the Schelling effect with actual political decision-makers. Our results indicate a strong and economically meaningful effect of the choice of baseline and mechanism on the size of tax and benefit premiums judged fair for different income levels. Testing the original child benefit scenario, our participants assign higher premiums for having a child to lower income families in the classic benefit frame. In a tax frame, where having a child is taken as baseline and not having a child penalised, larger premiums for having a child are granted to higher income families. Expanding the empirical test to the novel scenario of car taxes we similarly find strong, though unidirectional, framing effects for the hypothetical introduction of an environmental certificate for cars. The framing effects are moderated by the position of participants' parties on an ideological left-right scale determined by the self-ranking of the parties' members on an 11-point scale (Deschouwer et al., 2013).

Child benefit systems are a well established aspect of most tax systems, and of people's lives. It may be difficult to change them so fundamentally as to switch the baseline they are built on. New tax schemes, for example regarding environmental policy, however, offer the possibility to fully consider the influence of the interplay between baselines and premiums on the (perceived) fairness of redistributive interventions. As Schelling argued, coordination in determining those two dimensions and a focus on tax differentials rather than baselines may facilitate convergence of perceived and actual fairness of taxes and benefits.

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Appendix A. Graphical representation of results for party index on premiums

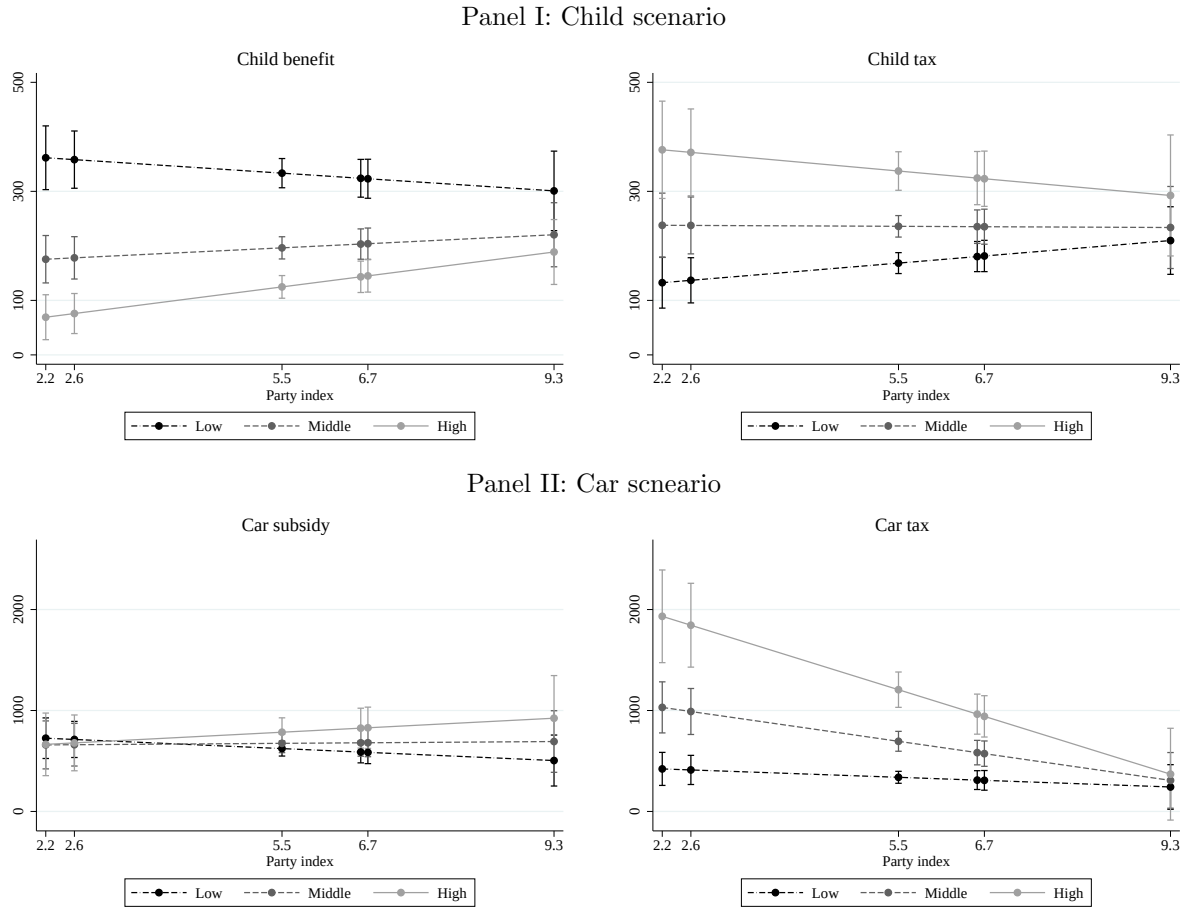

Figure A.2: Adjusted linear predictions for premiums in each frame and income/car class level over the party index with 95% confidence intervals

Notes: The graphs show for each frame how the premiums assigned within each income/car class category differ over the political ideology spectrum of our participants. Using the child benefit frame in Panel I as example, the premium granted to the low income (€2000) family slightly decreases as one moves along the political spectrum from left to right. For the high income (€6000) family the premium increases towards the right-hand side of the spectrum. Note that the larger confidence intervals at the extremes of the political spectrum reflect the lower number of participants from the parties located at those points in our sample.

Supplementary information A. Overview of control variables

Table SI.4: Demographic variables and differences between respondents and non-respondents to the Schelling questions

N in (sub-)sample	Population 869	Submitted 191	Invalid 678	Valid	Difference	Sig.
Gender (1 = female)	36.1%	27.8%	32.4%	26.6%	$\chi^2 = 2.48$	
Age	47.6	53.5	55.2	53.0	$t = 2.25$	$p < .05$
Family status					$\chi^2 = 4.38$	
Single		11.2%	8.6%	11.9%		
Civil partnership		3.0%	2.7%	3.1%		
Legal partnership		7.9%	5.9%	8.5%		
Married		70.2%	74.2%	69.1%		
Divorced		5.5%	5.4%	5.5%		
Widow(er)		2.2%	3.2%	1.9%		
Children (total)		1.95	1.85	2.00	$t = -1.23$	
Children (under 18)		0.56	0.48	0.59	$t = -1.29$	$p < .1$
Monthly net income					$\chi^2 = 23.97$	$p < .05$
less than 2000		6.9%	9.4%	6.2%		
2001 - 3000		19.8%	26.9%	17.9%		
3001 - 4000		24.6%	23.4%	24.9%		
4001 - 5000		23.0%	22.8%	23.1%		
5001 - 6000		14.0%	8.2%	15.5%		
6001 - 7000		6.0%	2.9%	6.8%		
7001 - 8000		2.3%	3.5%	2.0%		
8001 - 9000		1.6%	0.0%	2.0%		
9001 - 10000		0.5%	1.2%	0.3%		
10001 - 11000		0.6%	0.6%	0.6%		
11001 - 12000		0.1%	0.0%	0.2%		
more than 12000		0.7%	1.2%	0.6%		
Education					$\chi^2 = 20.11$	$p < .01$
Secondary		24.2%	36.8%	20.9%		
Bachelor		35.6%	32.8%	36.3%		
Master		37.3%	28.7%	39.5%		
PhD		3.0%	1.8%	3.3%		
Mandate (multiple possible)						
Mayor		7.9%	7.9%	8.0%	t = -0.05	
Councillor		55.0%	56.6%	54.6%	t = 0.48	
Alderman		28.7%	23.6%	30.1%	t = -1.76	$p < .05$
Other		15.8%	20.4%	14.5%	t = 2.00	$p < .05$
Party (index score)			Index from 1 - 11		$\chi^2 = 9.10$	
CD&V (5.5)	26.3%	31.9%	33.9%	31.3%		
Groen (2.2)	2.3%	6.8%	3.5%	7.7%		
N-VA (6.7)	20.8%	21.5%	19.5%	22.2%		
OpenVLD (6.6)	10.3%	11.4%	15.5%	10.6%		
sp.a (2.6)	6.3%	14.3%	13.8%	14.1%		
Vlaams Belang (9.3)	2.5%	2.8%	4.0%	2.3%		
Other (–)	31.5%	11.5%	9.8%	11.9%		
Preferred tax system					$\chi^2 = 4.30$	
Progressive		66.1%	60.3%	67.6%		
Flat tax		27.3%	30.7%	26.3%		
Regressive		3.7%	4.5%	3.6%		
Other		2.9%	4.5%	2.5%		
Fairness of tax systems			(5-point scales)			
Progressive		3.9	3.8	3.9	$t = -1.75$	$p < .05$
Flat tax		2.7	2.9	2.7	$t = 1.66$	$p < .05$
Regressive		1.7	1.8	1.7	$t = 1.94$	$p < .05$
Rating of federal taxes			(5-point scales)			
Level		1.8	1.8	1.8	$t = -0.00$	
Fairness		3.3	3.2	3.4	$t = -2.28$	$p < .05$
Efficiency		3.5	3.4	3.5	$t = 1.49$	$p < .1$
Social statements			(5-point scales)			
Differences as motivator		3.6	3.7	3.6	$t = 0.41$	
Differences as opportunities		3.7	4.0	3.7	$t = 2.24$	$p < .05$

Notes: The number of observations with available data varies by a few participants for each control variable. As the largest discrepancy between any given control and the total never exceeds 15 observations, these numbers are not reported. Differences in means for continuous variables and non-exclusive and non-exhaustive categories within variables are tested using t-tests (reported significances for one-tailed tests). Differences in distributions across exclusive and exhaustive categories within a variable are tested using Pearson's χ^2.

Table SI.5: Demographic variables and between-group differences for the experimental assignment

		Child scenario				Car scenario			
	Total	Benefit	Tax	Difference	Sig.	Subsidy	Tax	Difference	Sig.
N in (sub-)sample	869	320	288			267	258		
Gender (1 = female)	27.8%	22.5%	30.7%	$\chi^2 = 5.22$	$p < .05$	28.5%	22.8%	$\chi^2 = 2.26$	
Age	53.5	52.5	53.6	$t = -1.13$		52.8	53.1	$t = -0.23$	
Family status				$\chi^2 = 4.55$				$\chi^2 = 0.58$	
Single	11.2%	13.2%	10.5%			12.0%	13.3%		
Civil partnership	3.0%	2.2%	3.9%			3.4%	4.3%		
Legal partnership	7.9%	9.1%	7.7%			8.3%	8.6%		
Married	70.2%	70.2%	69.8%			69.2%	66.8%		
Divorced	5.5%	4.1%	5.6%			5.3%	5.1%		
Widow(er)	2.2%	1.3%	2.5%			1.9%	2.0%		
Children (total)	1.95	1.89	2.14	$t = -2.33$	$p < .05$	1.90	2.05	$t = -1.28$	
Children (under 18)	0.56	0.56	0.63	$t = -0.88$		0.61	0.57	$t = 0.42$	
Monthly net income				$\chi^2 = 6.43$				$\chi^2 = 7.28$	
less than 2000	6.9%	5.1%	6.8%			7.3%	5.7%		
2001 - 3000	19.8%	18.0%	15.8%			16.8%	17.8%		
3001 - 4000	24.6%	23.4%	26.6%			26.7%	21.9%		
4001 - 5000	23.0%	21.8%	24.8%			22.5%	24.7%		
5001 - 6000	14.0%	17.0%	15.1%			15.7%	14.2%		
6001 - 7000	6.0%	8.3%	5.8%			5.7%	8.9%		
7001 - 8000	2.3%	2.6%	1.4%			1.5%	2.4%		
8001 - 9000	1.6%	2.2%	1.8%			1.9%	2.8%		
9001 - 10000	0.5%	0.3%	0.4%			0.0%	0.4%		
10001 - 11000	0.6%	0.6%	0.4%			0.8%	0.8%		
11001 - 12000	0.1%	0.0%	0.4%			0.4%	0.0%		
more than 12000	0.7%	0.6%	0.7%			0.8%	0.4%		
Education				$\chi^2 = 1.30$				$\chi^2 = 3.92$	
Secondary	24.2%	20.8%	21.2%			20.0%	18.5%		
Bachelor	35.6%	34.3%	38.2%			36.6%	34.3%		
Master	37.3%	41.8%	37.8%			38.5%	44.9%		
PhD	3.0%	3.1%	2.8%			4.9%	2.4%		
Mandate (multiple possible)									
Mayor	7.9%	6.9%	10.1%	t = -1.42	$p < 0.1$	7.1%	8.9%	t = -0.76	
Councillor	55.0%	54.1%	52.1%	t = 0.49		58.1%	52.7%	t = 1.23	
Alderman	28.7%	30.6%	31.6%	t = -0.26		27.7%	32.6%	t = -1.21	
Other	15.8%	15.6%	12.9%	t = 0.98		13.9%	12.0%	t = 0.63	
Party (index score)				$\chi^2 = 1.99$				$\chi^2 = 11.6$	$p < 0.1$
CD&V (5.5)	31.9%	29.8%	33.3%			26.9%	32.9%		
Groen (2.2)	6.8%	8.0%	7.3%			9.0%	5.4%		
N-VA (6.7)	21.5%	24.5%	20.9%			26.2%	21.4%		
OpenVLD (6.6)	11.4%	9.9%	10.6%			7.0%	11.9%		
sp.a (2.6)	14.3%	15.2%	13.9%			13.3%	15.6%		
Vlaams Belang (9.3)	2.8%	2.3%	2.2%			3.9%	1.7%		
Other (–)	11.5%	10.3%	11.7%			13.7%	11.1%		
Preferred tax system				$\chi^2 = 3.94$				$\chi^2 = 4.49$	
Progressive	66.1%	65.8%	71.4%			68.8%	70.8%		
Flat tax	27.3%	28.2%	23.0%			22.9%	24.9%		
Regressive	3.7%	2.8%	3.8%			4.5%	3.1%		
Other	2.9%	3.1%	1.7%			3.8%	1.2%		
Fairness of tax systems		(5-point scales)				(5-point scales)			
Progressive	3.9	3.9	4.0	$t = -0.16$		4.0	4.0	$t = -0.11$	
Flat tax	2.7	2.7	2.6	$t = 1.15$		2.6	2.6	$t = 0.09$	
Regressive	1.7	1.6	1.7	$t = -0.41$		1.6	1.7	$t = -0.88$	
Rating of federal taxes		(5-point scales)				(5-point scales)			
Level	1.8	1.8	1.8	$t = 0.29$		1.8	1.8	$t = 0.25$	
Fairness	3.3	3.4	3.4	$t = -0.10$		3.4	3.3	$t = 1.49$	$p < 0.1$
Efficiency	3.5	3.5	3.4	$t = 1.49$	$p < 0.1$	3.6	3.4	$t = 1.73$	$p < 0.05$
Social statements		(5-point scales)				(5-point scales)			
Differences as motivator	3.7	3.6	3.7	$t = -0.72$		3.6	3.7	$t = -0.48$	
Differences as opportunities	3.8	3.7	3.6	$t = 0.73$		3.7	3.8	$t = -0.20$	
N with all controls present	652	260	234			210	201		

Notes: The number of observations with available data varies by at most 15 participants for any control variable compared to the total in each sub-sample. These numbers are not reported. Differences in means for continuous variables and non-exclusive and non-exhaustive categories within variables are tested using t-tests (reported significances for one-tailed tests). Differences in distributions across exclusive and exhaustive categories within a variable are tested using Pearson's χ^2. The N with all control present describes the number of observations for which all demographic information was reported.

Supplementary information B. Responses by preference of taxation system

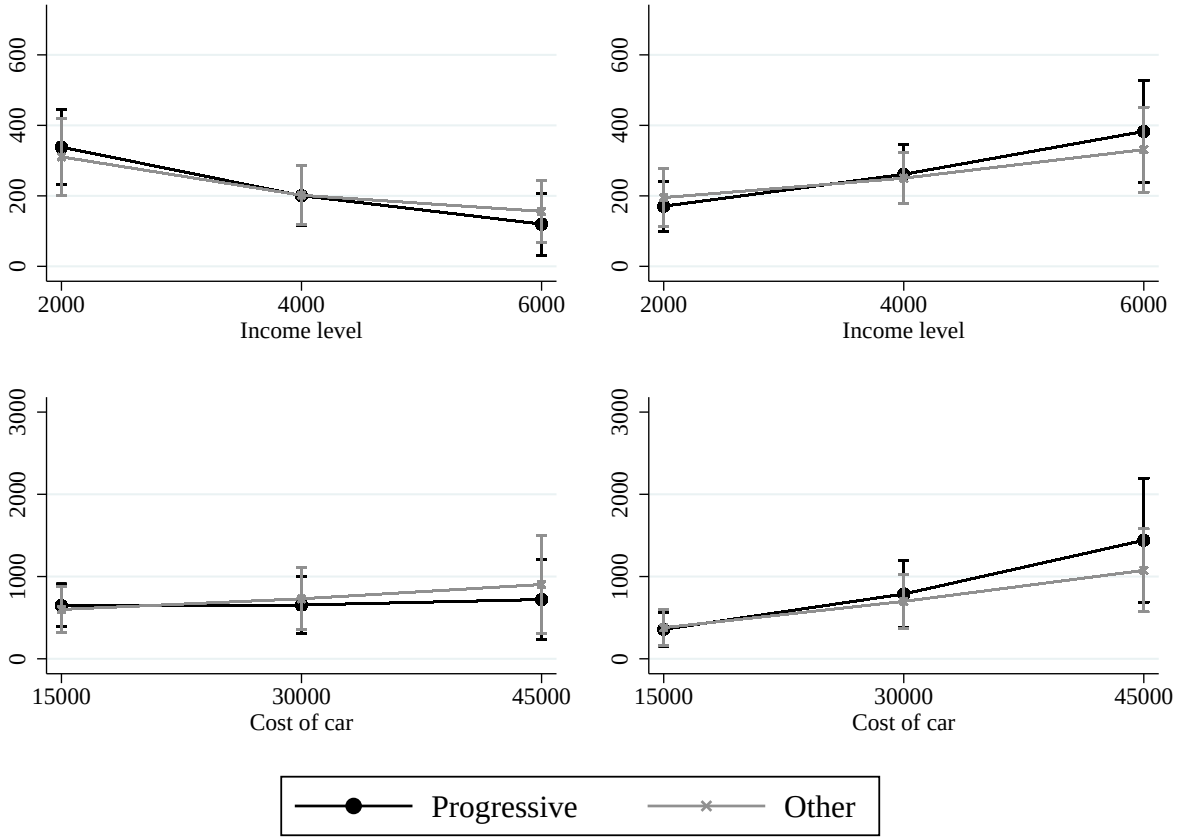

Figure SI.3: Mean amounts split by preference for progressive or other tax system, standard deviations indicated

Supplementary information C. Regression results

Table SI.6: Estimated fixed effect differences in premiums within each frame

	Child scenario			Car scenario	
	Child benefit	Child tax		Car subsidy	Car tax
Family income	*Low income is reference group*		Car class	*City car is reference group*	
Middle	−127.88***	80.30***	*Middle*	44.80	396.72***
	(9.05)	(13.50)		(38.51)	(52.33)
High	−196.53***	190.24***	*High*	145.21***	968.68***
	(9.05)	(13.50)		(38.51)	(52.33)
Constant	328.85***	177.68***		633.04***	364.50***
	(6.40)	(9.55)		(27.23)	(37.00)
Observations	960	864		801	774
N	320	288		267	258
R^2	0.433	0.258		0.027	0.403

Notes: Fixed effect coefficient estimates. For each participant three observations are included, one for each assumed income level of the beneficiary/taxable family (€2000 (low), €4000 (middle), €6000 (high)) or assumed cost level of the subsidised/taxable car (€15000 (low), €30000 (middle), €45000 (high)); $^{*}p < 0.10$,** $p < 0.05$,*** $p < 0.01$.

Table SI.7: Estimated differences in the premium for having a child across family income levels in the two frames of the child scenario

	Child benefit frame			Child tax frame		
Premium for a child	(1)	(2)	(3)	(4)	(5)	(6)
Family income	*Low income is reference group*			*Low income is reference group*		
Middle	−138.11***	−137.87***	−140.96***	70.29***	70.38***	69.89***
	(10.41)	(10.51)	(10.70)	(10.72)	(10.84)	(10.97)
High	−210.34***	−210.38***	−215.38***	174.29***	174.40***	173.73***
	(13.83)	(13.97)	(14.10)	(20.76)	(21.00)	(21.25)
Gender (1 = female)	18.20	15.77	15.81	−14.32	−16.93	−4.54
	(24.00)	(25.61)	(24.93)	(21.24)	(21.14)	(21.24)
Age	0.12	0.87	1.12	−0.30	−0.38	−0.48
	(1.08)	(1.20)	(1.28)	(0.86)	(1.02)	(1.11)
Children (#)	1.40	2.22	2.89	9.10	8.12	7.10
	(8.74)	(7.74)	(8.10)	(7.82)	(8.14)	(8.13)
Monthly net income	6.53	3.12	3.30	−10.39*	−7.81	−7.26
	(5.62)	(5.42)	(5.67)	(5.71)	(6.37)	(6.45)
Education	*Secondary is reference group*			*Secondary is reference group*		
Bachelor	−26.98	−24.60	−16.37	26.59	22.40	23.07
	(31.73)	(31.25)	(31.96)	(22.96)	(24.65)	(26.08)
Master	−4.86	−9.03	−0.05	35.22	39.79	43.95
	(34.91)	(33.01)	(33.58)	(25.08)	(26.37)	(27.11)
PhD	−6.13	6.72	9.81	−42.17	−38.09	−33.10
	(52.72)	(45.21)	(49.98)	(31.38)	(31.72)	(31.45)
Preferred tax system	*Progressive is reference group*			*Progressive is reference group*		
Flat tax	15.98	22.05	47.69	0.00	−2.81	48.64
	(25.59)	(26.48)	(37.49)	(23.15)	(23.92)	(34.05)
Regressive	−45.59	−59.39	−42.76	50.26	45.88	56.52
	(33.14)	(36.26)	(49.29)	(54.14)	(55.83)	(53.28)
Other	43.07	54.54	69.40	−3.38	−9.34	−23.72
	(40.26)	(41.46)	(47.62)	(77.96)	(86.86)	(89.54)
Party index	−0.86	−0.68	4.87	−7.41	−6.98	−0.49
	(4.77)	(5.25)	(6.47)	(6.61)	(6.96)	(8.84)
Constant	284.48***	213.42*	177.12	231.12***	281.38***	261.58**
	(79.93)	(122.80)	(149.88)	(75.14)	(81.30)	(125.42)
Full controls	no	no	yes	no	no	yes
Mandate dummies	no	yes	yes	no	yes	yes
Observations	777	774	756	687	684	678
N	259	258	252	229	228	226
R^2	0.198	0.228	0.251	0.143	0.151	0.162

Notes: Pooled ordinary least squares coefficient estimates. For each participant three observations are included, one for each assumed income level of the beneficiary/taxable family (€2000 (low), €4000 (middle), €6000 (high)). Standard errors are clustered at the level of the individual; $^{*}p < 0.10$,$^{**}p < 0.05$,$^{***}p < 0.01$.

Table SI.8: Estimated differences in the premium for having a certificate of environmental friendliness in the two frames of the car scenario

	Car subsidy frame			Car tax frame		
Premium for certificate	(1)	(2)	(3)	(4)	(5)	(6)
Car class	*City car income is reference group*			*City car income is reference group*		
Middle	50.20	50.20	45.68	371.16***	372.52***	372.52***
	(31.43)	(31.65)	(32.10)	(33.02)	(33.41)	(33.65)
High	161.41**	161.41**	150.20**	905.19***	908.47***	908.47***
	(62.73)	(63.18)	(63.90)	(81.12)	(82.10)	(82.67)
Gender (1 = female)	182.39*	136.55	128.04	−49.42	−36.68	−24.63
	(93.92)	(96.14)	(92.22)	(139.70)	(141.68)	(138.67)
Age	−3.64	−5.04	−6.62	5.07	4.67	3.33
	(4.14)	(4.69)	(4.53)	(4.76)	(5.19)	(5.32)
Monthly net income	−9.20	−20.92	−27.19	−14.88	9.93	9.51
	(21.57)	(22.74)	(22.88)	(30.47)	(35.04)	(32.22)
Education	*Secondary is reference group*			*Secondary is reference group*		
Bachelor	143.86	184.43	97.55	210.09	212.49	258.46*
	(131.13)	(135.53)	(135.11)	(147.92)	(153.96)	(155.79)
Master	47.91	59.72	−9.09	262.15*	235.92	275.75*
	(138.35)	(138.05)	(136.46)	(153.57)	(156.50)	(156.99)
PhD	−39.53	5.13	12.78	717.10***	714.84***	673.47***
	(291.16)	(262.27)	(235.82)	(266.79)	(274.10)	(254.63)
Preferred tax system	*Progressive is reference group*			*Progressive is reference group*		
Flat tax	46.67	63.60	9.88	−18.90	−64.69	−89.49
	(129.83)	(132.50)	(185.20)	(116.45)	(125.66)	(181.37)
Regressive	194.48	220.87	−123.47	24.38	−79.20	−264.89
	(300.05)	(297.53)	(290.94)	(185.97)	(231.07)	(317.80)
Other	−500.05***	−467.80**	−557.65**	−165.92	−166.17	−222.26
	(143.68)	(197.43)	(270.58)	(245.95)	(320.69)	(340.98)
Party index	22.69	17.37	3.34	−108.83***	−104.10***	−115.76***
	(29.96)	(32.36)	(36.80)	(34.70)	(34.20)	(36.61)
Constant	331.44	322.88	−130.74	579.32	52.07	438.62
	(329.34)	(378.26)	(554.24)	(422.15)	(587.66)	(688.11)
Full controls	no	no	yes	no	no	yes
Mandate dummies	no	yes	yes	no	yes	yes
Observations	642	642	630	603	600	600
N	214	214	210	301	300	300
R^2	0.027	0.061	0.110	0.403	0.201	0.217

Notes: Pooled ordinary least squares coefficient estimates. For each participant three observations are included, one for each assumed cost level of the subsidised/taxable car (€15000 (low), €30000 (middle), €45000 (high)). Standard errors are clustered at the level of the individual; $^{*}p < 0.10$,** $p < 0.05$,*** $p < 0.01$.

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