Do Economic Conditions Affect Public Support for Environmental Policy?

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Abstract

Economic conditions are typically viewed as having an important influence on environmental policy. In particular, it is widely believed that under adverse economic conditions, electorates and governments prioritize economic growth and jobs over costly ecological restraint. The empirical evidence for this received wisdom, however, remains surprisingly contradictory. We contribute to this debate by studying a case where the odds of the economy-environment trade-off claim holding true should be high: an emerging economy in severe recession, and environmental policy with high short-term costs and long-term benefits. Based on a representative survey (N=2449) in Brazil, implemented in late 2015/early 2016, we examine how ego- and socio-tropic economic conditions, both perceived and real, affect citizens' preferences concerning the mitigation of deforestation and climate change. We find no robust evidence for an economy-environment trade-off. The main policy implication is that, from a public opinion perspective, there is considerable room for ambitious environmental policy even under adverse economic conditions.

1. Introduction

Economic conditions are widely regarded as having an important effect on environmental policy-making. Specifically, economic downturns are widely presumed to undermine environmental policy, in the sense of making it harder for policy-makers to increase the ambition level of existing policies or put new policies into place, or in the sense of backsliding on policies already in existence. Economic recessions lead to increased unemployment and also to more economic insecurity (labour market risks) among the employed part of the population. Under such conditions, most people are likely to prioritize economic recovery (through economic growth) as well as social welfare spending for the needy (to reduce labour market risks) over costly environmental policy. Government thus faces strong pressure from citizens to avoid opportunity costs resulting from environmental policy and instead enact policies that stimulate economic growth and job creation, and provide enhanced social safety nets (e.g., Kachi et al., 2015; Scruggs and Benegal, 2012).

Critics of this argument point to two counter-arguments. One is that environmental quality (e.g., air and water quality) has become an increasingly important element in people's general quality of life. Even in times of economic recession, citizens and their governments are thus likely to value environmental quality in its own right. Another argument is that the opportunity costs of environmental policies are often overstated. In contrast, the literature on ecosystems services and co-benefits of environmental policy posits that such policies have net benefits for society. To the extent these arguments hold true, we should not expect economic downturns to undermine environmental policy (e.g., McCright and Dunlap, 2011; Mildenberger and Leiserowitz, 2017).

The empirical evidence for these claims is, thus far, contradictory and relies on rather few studies focusing on different levels of analysis, different (often single) countries, and different points in time (e.g., Kachi et al., 2015; Mildenberger and Leiserowitz, 2017; Scruggs and Benegal, 2012). Our study contributes to this literature by empirically testing the economy-environment trade-off argument in a case where the odds of finding support for this claim should be rather high. To this end, we pose the question, how does economic recession impact on environmental policy? To examine such question, we focus on an emerging economy facing a severe recession, and an environmental policy-area involving high opportunity costs, i.e., deforestation in Brazil (see also Viola and Franchini, 2017). The motivation for this approach is that failure to find supporting empirical evidence for an economy-environment trade-off in this case would clearly undermine the argument and thus speak in favour of the counter-arguments raised by sceptics of the economy-environment trade-off hypothesis.

The policy-relevance of studying the economy-environment trade-off derives from the problem of self-fulfilling prophecies. To the extent policy-makers believe that there is a strong economy-environment trade-off from the viewpoint of the electorate they are likely to lower their ambition level in environmental policy-making and implementation. In the same vein, they will tend to side with non-green interests when exposed to political pressure from interest groups advocating stronger (e.g., environmental NGOs) or weaker (e.g., energy intensive economic sectors) environmental standards respectively. Failure in trying to find empirical support for

this claim, in turn, would imply that policy-makers have, at least from a public opinion perspective, more room for pursuing ambitious environmental policies in economically difficult times than conventional wisdom suggests.

2. The Economy-Environment Trade-off

Existing empirical research on the economy-environment trade-off has focused primarily on variation in public support for environmental policy as the outcome to be explained, and less on variation in government regulatory activity. The reason is that we should expect the environmental "public mood" to be more sensitive to changes in economic conditions than the policy-making apparatus of government. This means that, when economic growth slows down, we are likely to empirically pick up the negative effects on environmental policy faster if we look at public opinion compared to formal output from policy-making processes (Anderson et al., 2017). Moreover, public opinion is obviously important for policy-making, particularly in democracies where policy-makers face elections at regular intervals (Tjernström and Tietenberg, 2008). This does not mean that policy-makers will always do what the majority of citizens prefer. However, if we assume that business actors, by-and-large, usually do not prefer stricter environmental standards, government could be less likely to enact new environmental policies if the public does not support such policies. That is, public support is probably not a sufficient condition for stricter environmental standards, but probably a necessary condition (Anderson et al., 2017).

Empirical work along these lines has produced somewhat contradictory evidence (Council on Foreign Relations, 2013; Diemann and Franzen, 1999; Gells, 2013; Kachi et al., 2015; Kahn and Kotchen, 2011; Mayer and Smith, 2016; Mildenberger and Leiserowitz, 2017; Scruggs and Benegal, 2012; Shum, 2012). For instance, Kahn and Kotchen (2011), in an analysis of the United States, find that "an increase in a state's unemployment rate decreases Google searches for "global warming" and increases searches for "unemployment ... (and that an) increase in a state's unemployment rate is associated with a decrease in the probability that residents think global warming is happening and reduced support for the U.S. to target policies intended to mitigate climate change" (p.257). Scruggs and Benegal (2012) conclude that "the decline in belief about climate change is most likely driven by the economic insecurity caused by the Great Recession…The implication of these findings is that the ''crisis of confidence'' in climate change will likely rebound after labor market conditions improve, but not until then" (p.505). In contrast, Kachi et al. (2015), focusing on the United States and Germany, find that "individuals' perceptions of their own economic situations have no significant effect on their policy support. Negative perceptions of the national economic outlook reduce support for climate policy in the US, but not in Germany" (p.227). Mildenberger and Leiserowitz (2017), focusing on the United States and using panel data for climate attitudes (survey data for the same individuals at two points in time, 2008, 2011), find that there is "little evidence that changes in either individual economic fortunes or local economic conditions are associated with decreased belief that climate change is happening or reduced prioritization of climate policy action. Instead, the evidence suggests that climate belief declines are associated with shifting political cues" (p.801).

One limitation of these studies is that they focus on high-income countries. To provide a hard test of the economy-environment trade-off claim amongst the mass public it is worthwhile to examine a worst-case setting. The logic for doing so is that if we cannot find a trade-off in such a setting, we are unlikely to find it in more benign settings. This is why, empirically, we focus on Brazil, an emerging economy that is facing a severe economic recession, and on a costly environmental policy issue.

According to the environmental Kuznets curve argument, developing countries or emerging economies are more likely to prioritize economic growth over environmental protection (Chandler et al., 2002; Dasgupta et al., 2002; Davidson et al., 2012; Solomon and Johnson, 2009; Stern, 2007; Tol, 2009; Tschakert, 2007). Combining this condition with an economic recession we should expect the mass public (as well as policy-makers) to prioritize economic growth and jobs over environmental protection even more strongly. This should be particularly the case with respect to environmental policies (mitigating deforestation and climate change is the focus here) that are associated with high short-term opportunity costs and longer-term benefits.

In this study we focus on Brazil, a key country in global climate, biodiversity, and forest policy (e.g., Aklin et al., 2013; Held et al., 2013; Viola, 2013). The importance of climate policy stems from the fact that tropical forests constitute an enormous carbon sink. Brazil and Indonesia, which account for around 35% of total carbon stored in tropical forests globally, are responsible for the largest emissions from tropical deforestation (Baccini et al., 2012). In 2005, deforestation accounted for as much as 60% of Brazil's total GHGs while a further 20% resulted from its agriculture (Dayrell and Urry, 2015; Gebara et al., 2014; Hargrave and Kis-Katos, 2013; Held et al., 2013; Lapola et al., 2014; Strassburg et al., 2014; Vincent et al., 2014).

At the same time, Brazil has been facing a severe economic recession. Figure 1 shows a comparison between individual-level perceptions of the economy and the real economic situation in Brazil between 1995 and 2015. The data for perceptions is from the Latinobarometro and the economic growth rates data is from the World Bank. Economic growth in Brazil has worsened since 1995 and people have become more concerned about the economic situation and unemployment. Taken together, the three aforementioned conditions (emerging economy, recession, deforestation policy) should make the economy-environment trade-off very salient among the mass public and result in relatively high odds of finding a negative effect of economic conditions on climate policy support.

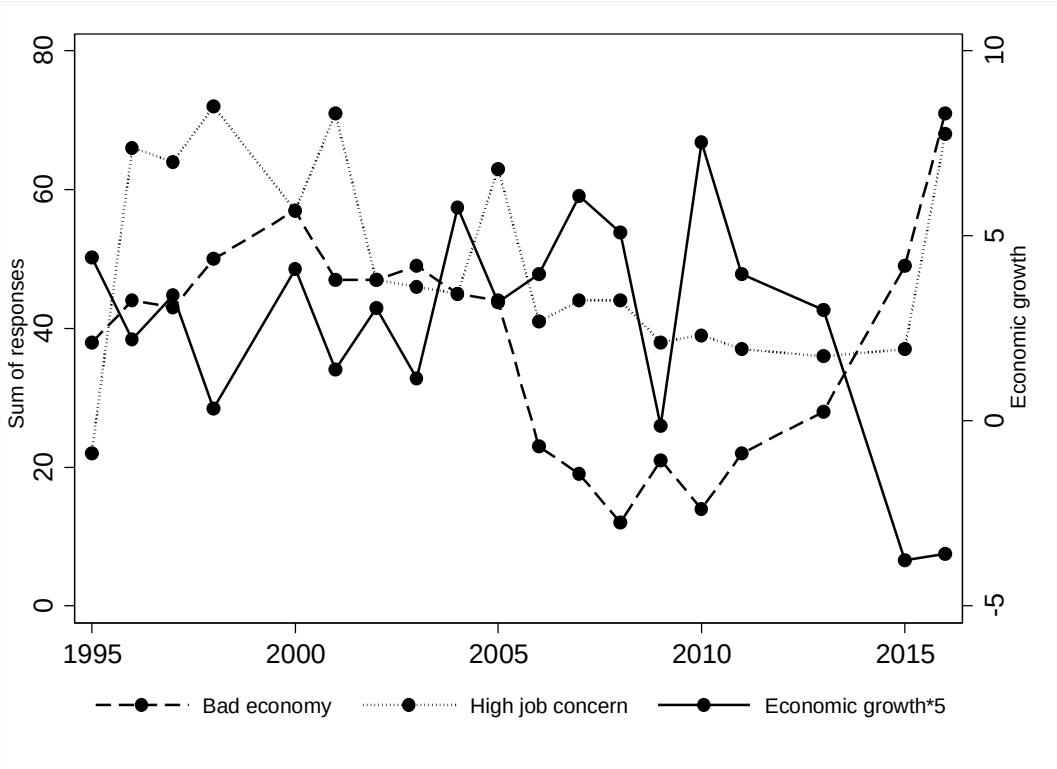

Figure 1: Real and perceived economic conditions in Brazil

Notes: The black-dashed line shows the sum of "bad" and "very bad" responses to the survey item: "In general, how would you describe the present economic situation of the country? Would you say that it is ...?." The black-dotted line shows the sum of "concerned" and "very concerned" responses to the survey item: "How concerned would you say you are that you will be left without work within the next 12 months?"

3. Empirical Study Design

If the economy-environment trade-off argument holds true our findings should be as follows. People who are worse off economically and hold more pessimistic views about their household's and their country's economic prospects are less likely to be concerned about environmental problems. Additionally, they are less supportive of and less willing to pay for environmental policy (in our case policies to mitigate climate change and deforestation).

To examine these hypotheses, we developed a dedicated survey instrument, and fielded the survey in Brazil from December 28, 2015, to January 12, 2016 (N=2,449). The survey was designed and pre-tested by the authors and was implemented by YouGov and its local partner in Brazil, Netquest (see also Table A.1 in the appendix). Around 3,000 Brazilian residents were recruited and interviewed online via Netquest's online platform. Survey participants were paid in pontos caracol (points that are exchanged in cash). Based on propensity score matching, they were then fitted to a sample of 2,500 to produce the final dataset. The sample is weighed according to age, gender, and education. The survey included, in random order, items capturing attitudes towards climate change, deforestation and policy preferences in

this regard, items on personal and national economic conditions, and various other items that serve as control variables. Our general approach was to capture climate and deforestation attitudes/preferences as well as economic conditions from a variety of angles and thus minimize measurement error and obtain robust findings.

Deforestation and climate change issues in Brazil are closely related, though of course not identical. This is why our outcome measures cover both. The outcomes to be explained are constructed from multiple survey items that capture: (a) climate risk perceptions, (b) support for climate change and deforestation mitigation, and (c) willingness to pay (WTP) for forest conservation in Brazil. The focus on three distinct constructs, which capture a broader set of environmental attitudes and preferences, derives from the notion that concern or risk perception is widely regarded as a prerequisite for policy support (Leiserowitz, 2006; Weber, 2010). However, concern is arguably a necessary but not sufficient condition for supporting costly policy to reduce the risk. This is why the second variable captures policy support (Harring and Jagers 2013; McCright, 2010; Tjernström and Tietenberg, 2008). Moreover, various studies show that people will often support risk reduction policies, but that costly policies are less attractive. This is why we add a willingness to pay variable (Aldy et al., 2012; Bakaki and Bernauer, 2016; Bechtel and Scheve, 2015; Diederich and Goeschl, 2014; Gampfer et al., 2014; Jacobsen and Hanley, 2009; Inglehart, 1995; Krosnick and MacInnis, 2013; Tobler et al., 2012; Vincent et al., 2014). Most of the existing literature relies on one or two single survey items for capturing the outcome variable. Mildenberger and Leiserowitz (2017) in fact note that "Future research could benefit from richer and more sophisticated measures of public opinion and concern, including measures that deliberately emphasize cost implications of different policy options, mirroring the cost sensitive frames that have become popular in the climate framing literature. Future panels should also collect subjective perceptual data on economic conditions across all waves" (p.18). Our study design improves on the existing literature along these lines. Table A.2 in the appendix shows the survey items used to construct the three dependent variables in the analysis.

To start with the dependent variable of climate risk perceptions, we measured people's perception of climate change harm at the individual and societal level (Kachi et al., 2015; Scruggs and Benegal, 2012). Confirmatory factor analysis (CFA) for the two items included in our study shows high uniqueness (0.8413). This means that we cannot create a CFA composite measure, but instead we aggregated the two items by adding their scores. The risk perception variable thus ranges from 2 to 10 (from low risk perception to high risk perception; see also Table A.3).

For the climate policy support variable, we asked participants whether they support climate change mitigation in general and deforestation policy more specifically. We constructed a composite measure based on polychoric correlation matrix analysis (see Tables A.4 and A.5), which resulted in a continuous variable scaled from 0 to 1. Polychoric correlation matrix analysis estimates the correlation between two (or more) theorised continuous latent variables (in this case support for climate change policy), from two (or more) observed ordinal variables (in this case 5 survey items pertaining to people's support for climate change mitigation). It also facilitates the construction of composite measures from items with different scaling. Particularly, it reduces the effect of statistical artifacts (e.g., the number of response scales) leading to items

grouping together in factors. Ultimately, it therefore allows testing the hypothesis that a relationship between observed items and their underlying latent constructs exists (as it is in our study).

The third outcome variable employed in our analysis refers to WTP for deforestation policy in Brazil. The existing literature has employed two approaches for examining WTP. The first gauges WTP in a rather broad sense, assuming that people who are concerned about environmental risks will eventually be willing to pay for their mitigation (e.g., Krosnick and MacInnis, 2013). The second approach results in monetized measurement units by providing cost implications of climate change mitigation (e.g., Kotchen et al., 2013). In our study, we pursue the broader approach and thus asked survey participants whether they are willing to financially contribute to mitigating deforestation and climate change in Brazil, either via taxes or by contributing to environmental non-governmental organizations (ENGOs).We constructed a composite variable based on polychoric correlation matrix analysis (see Tables A.6 and A.7), which resulted is a continuous variable ranging from 0 to 1.

Moving to the independent variables in the analysis, the existing literature does not offer elaborate theoretical arguments on the expected effects of different expressions of the "economic conditions" concept on environmental attitudes and policy preferences (e.g., Mayer and Smith, 2016). Besides differences in dependent variables as well as samples (different countries at different points in time), this may be one of the reasons for the mixed findings on the economy-environment trade-off. Arguably the most straightforward distinction relates to scale and time. Regarding scale, one reference frame for economic conditions pertains to the personal or household economic condition (ego-tropic frame), the other to larger-scale conditions, such as those of the country or region of residence (socio-tropic frame). Regarding time, economic conditions can be conceptualized as backward looking (e.g., the past few years), the present, or the future (e.g., the coming few years). Moreover, measures of current and past economic conditions, both ego- and socio-tropic, can be "objective" (e.g., survey respondents' stated current or past income, a country's current or past economic growth or unemployment rate). Which of these various ways of capturing economic conditions matters more is ultimately an empirical question.

We use three survey items to capture economic conditions. They cover both the ego-tropic and socio-tropic level. That is, we asked participants to assess the prospects of the national economy and also their household economic situation. Additionally, we asked for their current economic situation (refer to Table A.8 in the appendix for details on these items). Previous studies (e.g., Mayer and Smith, 2016) focus on current and retrospective economic conditions. We place greater emphasis on forward looking (subjective) economic measures because citizens, when asked to express their attitudes and preferences towards (prospective) environmental conditions and policies are more likely to relate them to what they expect their own and their country's economic condition to be in the future. We return to this issue in the concluding section.

4. Results

Before proceeding with the empirical analysis, we provide a series of descriptive statistics for the dependent and independent variables in the study. Table 1 shows the correlation matrix and the variance inflation factors (VIFs) of these three variables, each of which was constructed from several survey items (see Tables A.3, A.5 and A.7 in the appendix). The pairwise correlation of these three variables is rather low, with the highest correlation coefficient r=0.26. The VIFs also indicate that the three items are not strongly correlated or overlapping, since all VIFs scores are below the common threshold value of 5 (O'Brien, 2007).

Table 1: Correlations and VIFs for the dependent (outcome) variables

	Risk perception	Support	WTP	VIF
Risk perception	1.00			1.09
Support	0.26	1.00		1.10
WTP	0.17	0.17	1.00	1.05

Note: Significant at 1%.

Table 2 shows the pairwise correlation coefficients and the VIFs for the main explanatory variables. Neither are the correlation coefficients particularly large, nor do the VIFs point to a multicollinearity problem.

Table 2: Correlations and VIFs for the independent variables

	Household prospects	National prospects	Current income	VIF
Household prospects	1.00			1.14
National prospects	-0.35	1.00		1.15
Current income	-0.04	0.07	1.00	1.01

Note: Significant at 1%.

Kachi et al. (2015) and Mildenberger and Leiserowitz (2017) use geo-coded economic data to capture current economic conditions. They do not find significant effects of these variables on environmental attitudes and preferences. However, we add regional dummy variables, which are likely to capture differing economic conditions as well.

The regression models presented below on also include various control variables that have appeared as significant determinants of environmental risk perceptions and policy preferences in prior research (e.g., Aldy et al., 2012; Bakaki and Bernauer, 2016; Brulle et al., 2012; Carmichael and Brulle, 2017; Drews and Bergh, 2015; Fairbrother, 2016; Gampfer et al., 2014; Geels, 2013; Kachi et al., 2015; Kahn and Kochen, 2011; Lam, 2014; Low and Chow, 2015; Mayer and Smith, 2016; McCright and Dunlap, 2011; Pisano and Lubell, 2015; Scruggs and Benegal, 2012). Table 3 shows these variables, together with their summary statistics. Item wordings are shown in Table A.9.

Table 3: Summary statistics for independent (explanatory) variables

Variable	Obs.	Mean	Std. Dev.	Min	Max
Household prospects	2449	2.99	1.13	1	5
National prospects	2449	2.34	1.17	1	5
Current income	2449	2.81	2.82	1	16
Left	2449	0.14	0.35	0	1
Center	2449	0.24	0.43	0	1
Right	2449	0.09	0.28	0	1
Age	2449	34.89	11.93	18	78
Gender	2449	1.50	0.50	1	2
Education	2449	3.45	1.05	1	6
Salience of deforest.	2449	2.85	0.49	0	3
Unemployment	2449	0.80	0.40	0	1
Trust	2449	0.68	0.64	0	2
Knowledge	2449	0.50	0.50	0	1
North	2449	0.16	0.36	0	1
North East	2449	0.17	0.38	0	1
South	2449	0.17	0.37	0	1
South East	2449	0.40	0.49	0	1

A descriptive look at the key variables in our analysis shows that both personal and national economic conditions in Brazil are regarded as critical, which is in line with the data shown in Figure 1. More than 32% believe that their household income in the next three years will decrease somewhat or a lot. More than 62% think that the national economic situation will become somewhat worse or a lot worse in the next three years. However, climate change risks are regarded as very high and support for policies against deforestation and climate change is strong. Most study participants regard climate change as an important risk (mean=9.07 on a 2-10 scale, st.dev=1.02). Support for mitigating deforestation and climate change is also high (mean=0.82 on a 0-1 scale), whereas willingness to pay is, as one would expect, substantially lower but still quite high (mean=0.44 on a 0-1 scale).

Table 4 shows the main regression analysis results. Please refer to the appendix table A.10 for more information on the OLS assumptions. Due to the large number of categories of the ordinal variable (risk perceptions), we employ an ordinary least square (OLS) model (Long, 1997) (see also Model 1 in Table A.11 of the appendix for results from an ordered logit model). Model 1 focuses on climate risk perceptions. It indicates that for a unit increase in individuals' household income prospects climate risk perception decreases by 0.05 units. The perceived prospects of the national economy and current income have no significant effect. Older and more educated individuals as well as those who believe that deforestation is a salient issue perceive higher climate change risks. More educated individuals have a broader understanding of environmental issues and link deforestation with climate change. Generally, these results are in line with previous studies that do not find a substantive economy-environment trade-off (Kachi et al., 2015; Mildenberger and Leiserowitz, 2017) (see also Table A.11 for regression results for the survey items in disaggregated format).

In other words, these prior results uphold even in a poorer country in the midst of a severe economic recession.

With regards to Model 2, perceived prospects of the national economy are not significantly related to support for climate change mitigation. We find though that individuals who believe that their household income will improve show significantly stronger support for climate change policy. That is, better household income prospects do increase support for climate change policy. Current income also has a significant, positive effect on support for climate change mitigation. Wealthier individuals (measured by the current household status) are more supportive of climate policy (see also Franzen and Vogl 2013b). As to the political ideology indicators, we find significant results for "central" political ideology; individuals subscribing to this ideology show lower support for climate change mitigation ("uncertain" is the baseline category) (see also Harring et al., 2017; Hu et al., 2017; Cruz, 2017; Curie and Choma, 2018; Varela-Candamio et al., 2018). Older people are more supportive of climate change policy (Bakaki and Bernauer 2017; Goerres 2008). Educated, employed and more knowledgeable study participants also exhibit higher levels of support for climate change policy. People who trust the government more exhibit less support for climate policy. We also find some regional effects: people from the North, South and South East of Brazil show higher levels of climate policy support. For regression models examining each survey item of the "support" variable individually, see Table A.12.

Model 3 in Table 4 shows the results for the relationship between willingness to pay for forest conservation and economic indicators. We find that individuals' perceived economic prospects of their household have a significant, positive effect on WTP. People who are more optimistic about their future household income are more willing to pay for forest conservation. The perceived prospects of the national economy and current income have no significant effect on the WTP for forest conservation. Left ideology increases WTP while older individuals are less willing to pay. Also, the results show that women are in general more willing to pay for forest conservation than men, and that people with higher trust in government exhibit higher levels of WTP (e.g. Fairbrother 2016). Results for the survey items in disaggregated form are shown in Table A.13.

Table 4: Regression results

	(Model 1) Risk perception	(Model 2) Climate Pol. support	(Model 3) WTP
Household prospects	-0.05***	0.01*	0.01**
	(0.02)	(0.00)	(0.01)
National prospects	-0.03	-0.00	0.01
	(0.02)	(0.00)	(0.01)
Current income	0.00	0.01*	0.00
	(0.01)	(0.01)	(0.00)
Left	0.17***	0.01	0.04***
	(0.06)	(0.01)	(0.02)
Center	-0.05	-0.02**	0.01
	(0.05)	(0.01)	(0.01)
Right	0.06	-0.02	-0.01
	(0.07)	(0.01)	(0.02)
Age	0.01***	0.01***	-0.01***
	(0.00)	(0.00)	(0.00)
Gender	0.03	-0.01	0.03**
	(0.04)	(0.01)	(0.01)
Education	0.07***	0.01***	0.01
	(0.02)	(0.00)	(0.01)
Salience of deforest.	0.46***	0.08***	0.05***
	(0.04)	(0.01)	(0.01)
Unemployment	0.04	0.02**	-0.02
	(0.05)	(0.01)	(0.01)
Trust	0.04	-0.01***	0.07***
	(0.03)	(0.01)	(0.01)
Knowledge	0.02	0.03***	0.01
	(0.04)	(0.01)	(0.01)
North	0.04	0.02*	-0.01
	(0.08)	(0.01)	(0.02)
North East	0.01	0.02	0.03
	(0.08)	(0.01)	(0.02)
South	0.05	0.03**	-0.04
	(0.08)	(0.01)	(0.02)
South East	0.02	0.03***	-0.02
	(0.07)	(0.01)	(0.02)
Constant	7.35***	0.48***	0.20***
	(0.19)	(0.03)	(0.05)
N	2449	2449	2449
adj. R^2	0.07	0.09	0.06
F	11.42	15.73	9.93

Notes: Estimates are based on ordinary least squares regression (OLS). Standard errors are in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

We acknowledge that, like in most other statistical models based on survey data, the adj. R^2 values are rather small. However, since we are interested in the effects of specific variables and not in explaining as much of the total variance in the outcome variables as possible, this is of little concern here.

To obtain more information on the (relative) effects of different indicators for economic conditions on our three outcome variables, we calculated marginal effects, holding all other independent variables constant. Figure 2 depicts the results based on Models 1, 2 and 3 (Table 4). Point estimates and confidence intervals are based on actual values, while entries in Table 4 are rounded to two digits after point decimals. Marginal effects indicate change in the unit of the dependent variable when increasing the respective explanatory variable by one unit, while holding all other variables constant. Amongst the three explanatory variables of interest here, only one has a significant effect: perceived economic household prospects have a significantly negative effect on climate risk perceptions. That is, individuals who expect their household to be wealthier in the near future are less worried about climate change. At the same time, they are slightly more supportive of climate change policy and mitigating deforestation and more willing to pay for forest conservation (see also Franzen and Vogl, 2013b). Household wealth thus appears to make people more optimistic with respect to climate risks and somewhat more supportive of measures to mitigate climate change and deforestation. This result is orthogonal to the environment-economy trade-off claim. One interpretation of this finding is that richer individuals may expect to be able to better avoid or adapt to increased environmental risks, but still exhibit stronger socio-tropic environmental policy preferences. Overall, we find only very weak evidence in favour of the economy-environment trade-off argument. In fact, economic conditions matter (in terms of statistical significance) in one out of nine empirical models and the hypothesis that prospects of economy impact on people's risk perceptions about climate change.

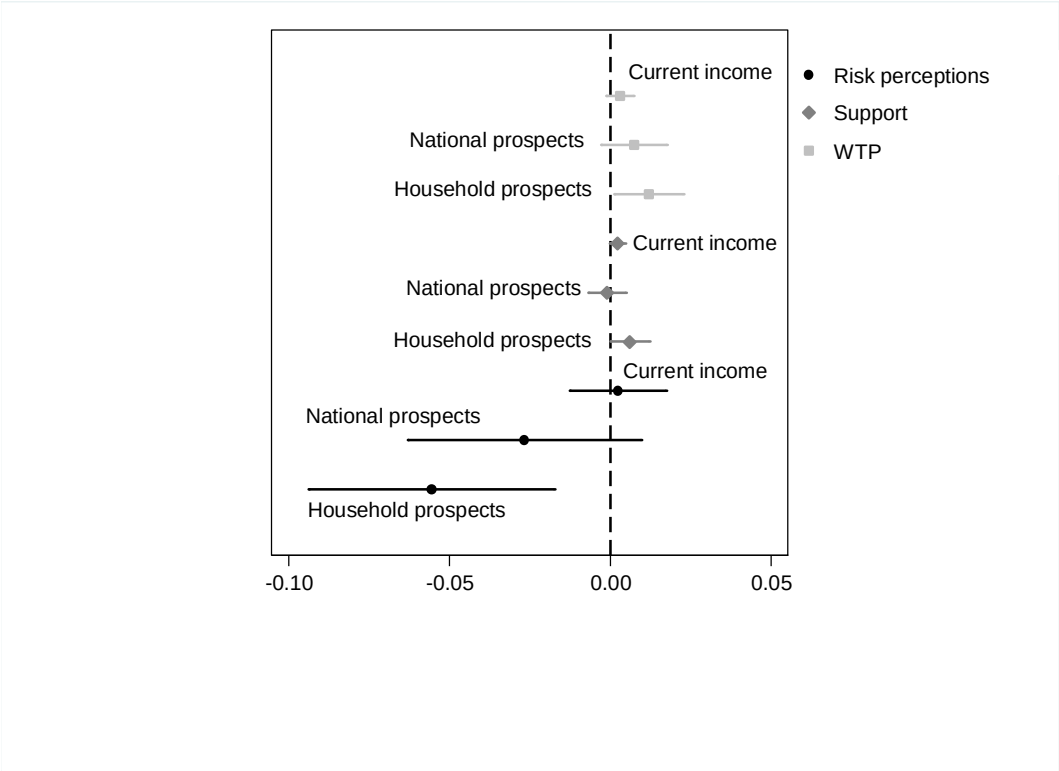

Figure 2: Marginal effects of the economic indicators

Notes: Horizontal bars denote 95% confidence intervals. The dashed vertical line marks a marginal effect of 0.

Figures 3-5 show predicted values for all three dependent variables when employing a three-way interaction with the three main explanatory variables: household prospects, national prospects, and current income. Predicted values pertain to those estimations from the model in light of the covariate information we feed into this. The rationale behind this approach is to examine whether anticipated economic conditions, i.e., household and national prospects, *condition* the impact of current income. Since it is difficult to directly interpret the signs or significance levels of such three-way interactions (Brambor et al., 2006; Dawson and Richter, 2004), we calculated and present predicted values for the respective outcome variable given certain scenarios pertaining to values of the three main explanatory variables.

Figure 3 focuses on climate change risk perceptions. This graph plots how much individuals' climate risk perceptions change across levels of current income (from the minimum to the maximum) for the extreme scenarios of household and national prospects of the economy (from the minimum to the maximum). Three interesting findings emerge from this analysis. First, at low levels of current income, the predicted values converge to the same, relatively high value of risk perceptions. This means that there is no conditional effect among the three economic indicators at low levels of current income. Second, there is, nonetheless, strong evidence for a conditioning effect at high levels of current income. Consider the maximum value of current income in Figure 3: for the scenario of very good (maximum) household and national economic prospects, the predicted value of climate risk perception is at the lowest value (around 8.0). Conversely, when worsening either household prospects or national prospects (or both), the predicted value of climate risk perceptions becomes higher. Third, and deriving from the last point, although the lowest value of risk perception obtains for a "good economic scenario," i.e., all three economic variables are linked to the best economic conditions, the scenario involving low household and low national prospects is not the worst among the high-income cases (see the maximum value of current income towards the right of Figure 3). In fact, the highest value for climate risk perceptions results for a high current-income situation, a good national prospect, but low expectations about the household situation (household prospect = minimum).

Figure 4 shows how much climate policy support changes across current income (from the minimum to the maximum) for the extreme scenarios of household and national economic prospects (from the minimum to the maximum). The results look similar to Figure 3. That is, climate change risk perceptions and policy support are affected by the economic variables in similar ways.

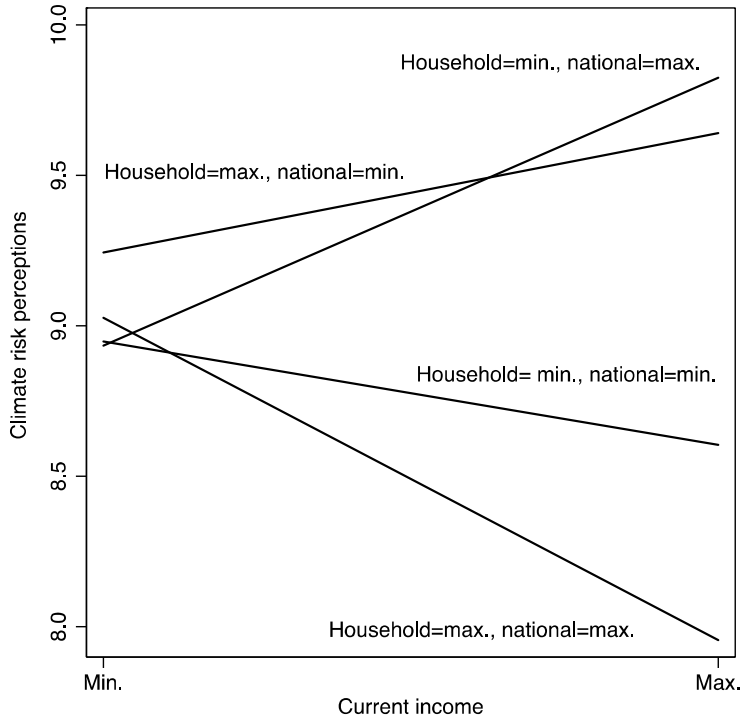

Figure 3: Predicted climate change risk perceptions, contingent on perceived economic prospects

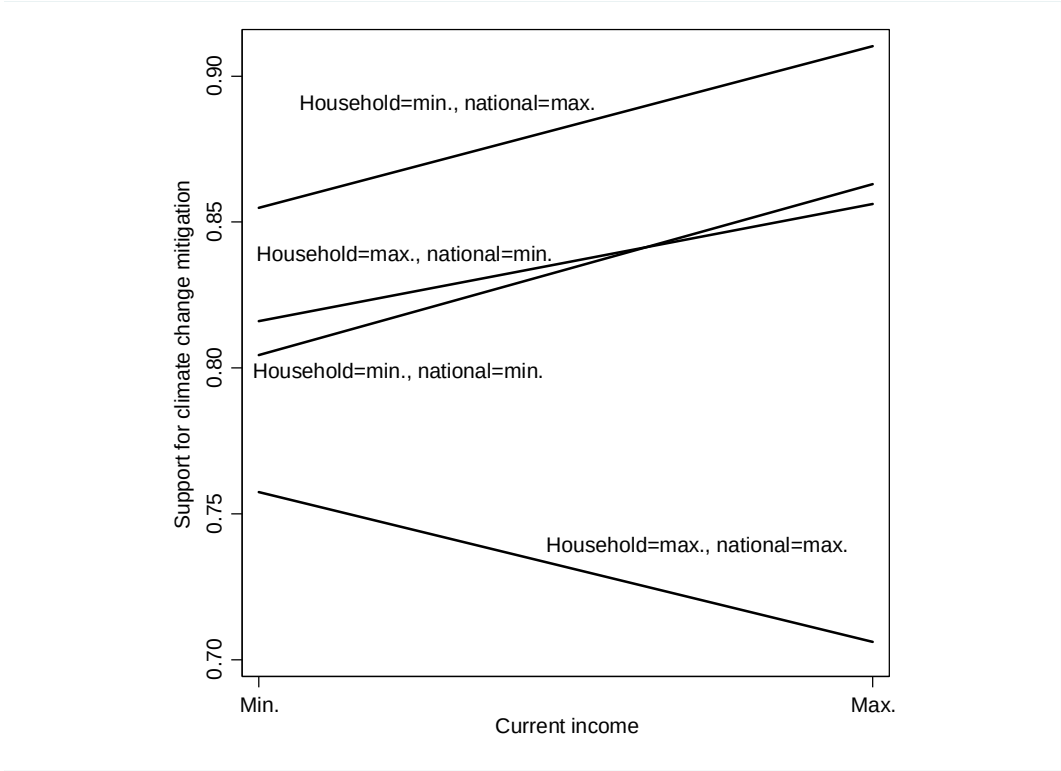

Figure 4: Predicted climate policy support, contingent on perceived economic prospects

Finally, the results displayed in Figure 5 do not suggest a clearly identifiable or consistent pattern. However, some effects shown in this figure are consistent with previously observed patterns or general expectations. Individuals with lower incomes exhibit a lower willingness to pay. This is evident from the higher predicted WTP scores on the right-hand side of the figure. Higher income persons, however, express a lower willingness to pay when holding worse expectations about household and national economy prospects. If any (or both) type of economic prospect(s) improves, so does the WTP for higher current-income individuals. This pattern is also consistent with lowering either household prospects or national prospects (or both) in low current-income situations: the predicted value of WTP decreases with lower national and/or household economic prospects in the low-current income scenario (left-hand side of Figure 5).

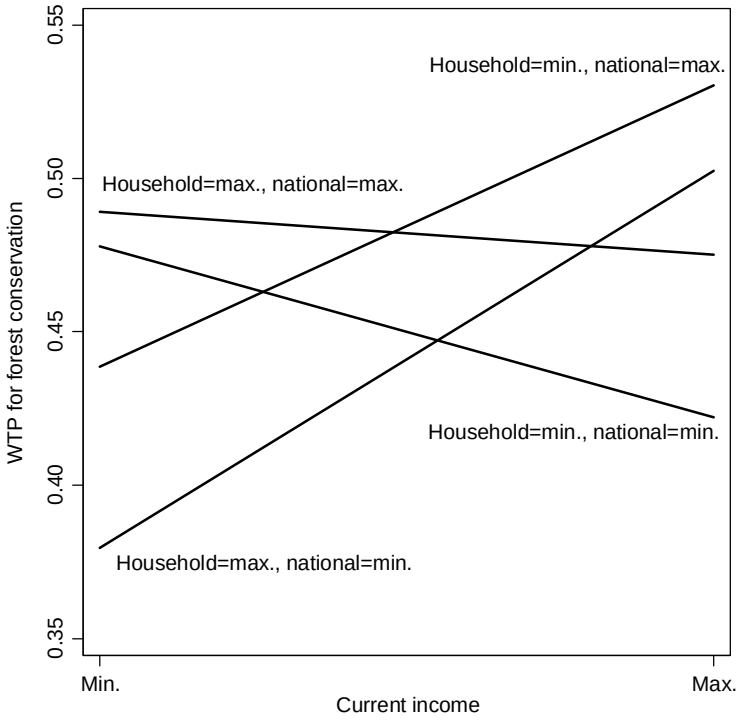

Figure 5: Predicted WTP, contingent on perceived economic prospects

5. Concluding comments

The purpose of this study was to examine the economy-environment trade-off argument in a setting that should be conducive to finding empirical support for this claim. This setting is characterized by an emerging economy context, a severe economic recession, and an environmental policy area (climate change, deforestation) that is associated with rather high short-term opportunity costs and long-term benefits. This setting should induce individuals to discount future benefits and focus on present costs. These conditions are likely to make the economy-environment trade-off publicly salient and should, as a result, make those citizens who are economically worse off and more pessimistic about their own and their country's economic prospects less worried about environmental risks and less willing to support and pay for policies addressing those risks.

Because economic recessions have different impacts on individuals within any given country it is important to study the implications of economic conditions at that level of analysis, rather than by merely correlating macro-level economic performance data with average national environmental risk perceptions and environmental policy support among the mass public over time. That is, ideally, we need evidence both for the macro level and the micro level. The studies by Mildenberger and Leiserowitz (2017) and Kachi et al. (2015) do so, whereas the Kahn and Kotchen (2011) and Scuggs and Benegal (2012) studies rely on aggregated/pooled public opinion data in comparing US states as well as the United States and some European countries. Such research could be based on panel survey data for many countries over a long time-period or at least for particular countries over several years. Such data is not available for Brazil, except one series of surveys undertaken by the Brazilian ministry of the

environment covering a few selected years in the 1992-2012 period and ending well before the current economic recession started (Ministério do Meio Ambiente, 2012). Evidently, however, survey data capturing economic conditions (perceived and stated) and environmental attitudes and preferences cannot be collected for past years. This means that, for almost all countries globally, we are limited to testing the economy-environment trade-off hypothesis with time-invariant data, which involves comparing individuals at a given point in time. In our case, however, this limitation may not be a significant problem. To the extent we cannot identify a robust correlation between economic conditions and environmental attitudes/preferences; a causal effect is unlikely to exist.

Yet another limitation is that our sample is quite representative on standard socio-demographic variables, but deviates to some extent from samples in other surveys in terms of political ideology. Moreover, the economic and political situation in Brazil has been in flux since we carried out our survey. It would thus certainly be useful to replicate our survey in Brazil to find out whether our results uphold when using more recent survey information, and perhaps also based on a sample that mimics political and economic population characteristics even more closely than our sample did for late 2015/early 2016.

Despite these limitations, we believe that our approach can provide valuable evidence concerning the empirical validity of the economy-environment trade-off claim. In particular, if we "stack the deck" in favour of the hypothesis and still are not able to find robust evidence in support, this suggests that the hypothesis is unlikely to uphold in more benign economic settings. This is what our empirical findings show. Specifically, people who are more pessimistic about national economic prospects are, however, *not* less (or more) supportive of costly environmental policy, relative to people who are more optimistic about national economic conditions. Better economic household prospects are associated with lower perceived environmental risks and stronger environmental policy support and WTP, but these effects are mostly substantively small and statistically not significant. It is worth noting that our approach, although it is based on data collected at one point in time, deals with changes over time at least indirectly, in that it captures people's current economic condition, as it has evolved over time (income, employment status), as well as future (expected) economic conditions (personal, national). The dependent variable, in turn, measures attitudes and preferences pertaining to current as well as possible future environmental problems and policies.

By-and-large, our results line up well with those two of the studies referred to at the outset that are also based on individual level data (Kachi et al., 2015; Mildenberger and Leiserowitz, 2017). They bolster these findings primarily by showing that there is only very weak evidence for an economy-environment trade-off also under generally much worse economic conditions (Brazil, as compared to Germany and the United States, for instance).

The main policy implication of our results is that, from a public opinion perspective, there is considerable room for ambitious environmental policy even under difficult economic conditions. The fact that economic conditions do not relate to people's preferences about climate policy leaves space to decision makers and practitioners to move forward with environmental policy. This finding also means that policy-makers

can, without significant risk of being punished by voters, avoid a self-fulfilling prophecy when confronted with strong rhetoric by non-green interests about an economy-environment trade-off. It also means, however, that when economic growth picks up again after a recession this may not automatically lead to stronger pro-environmental attitudes and policy preferences to the extent public environmental attitudes and preferences are weak for reasons other than economic conditions.

Appendix

Around 3,000 Brazilian residents were recruited and interviewed online. Based on propensity score matching, they were then fitted to a sample of 2,500 to produce the final dataset. YouGov, the survey firm through which we organized the survey, then raked to marginals (i.e., carried out a sample balancing) for gender, age, and education. The frame was constructed by stratified sampling from the full 2014 Americas Barometer from the LAPOP project at Vanderbilt University with selection within strata by weighted sampling with replacement. The matched cases were weighted to the sampling frame using propensity scores. The matched cases and the frame were combined and a logistic regression was estimated for inclusion in the frame. The propensity score function included age, gender, region, years of education, and frequency of internet usage. The propensity scores were grouped into deciles of the estimated propensity score in the frame and post-stratified according to these deciles. The final weights were post-stratified to match the distribution of the sampling frame on three-category age, gender, and three-category education indicators. We acknowledge the potential biases this sampling approach engenders (particularly in view of incomplete internet penetration in Brazil). However, it is widely acknowledged in current survey research that this approach provides samples and survey data of at least equivalent quality as traditional telephone or mail based recruitment into paper-and-pencil, telephone, or online-surveys, with response rates that hardly ever get beyond 5-10 percent. Table A.1 compares the socio-demographics of our sample to census and survey data from 2013/14.

Table A.1: Comparison of Socio-Demographic Characteristics of Sample and Population

	Our sample	Population	Source of population data
Political Ideology	Left: 14.01% Center-left: 7.56% Center: 11.52% Center right: 5.32% Right: 8.76% Uncertain: 52.82%	Left: 16.94% Center-left: 12.29% Center: 24.92% Center right: 13.12% Right: 17.86% Uncertain: 14.87%	Latinobarometer 2016
Education	The median value of age when respondents completed education is 19 (48% of participants completed education at between 17-19 years of age).	The median value of age when respondents completed education is 17	Latinobarometer 2016
Income	The average income is R$ 10,000.00 - R$ 20,000.00	The 2016 Brazilian average household income was R$ 29,542.17	The World Bank 2016
Gender (male: female ratio)	1:1	0.98:1 (2011 est.)	The World Factbook (CIA)
Age	The median age is 34	The median age is 31 (2011 est.)	The World Factbook (CIA)

Table A.2: Survey items for the three dependent variables (translation from Portuguese)

Climate risk perception	
1. Do you think climate change is harming people in Brazil now, will harm people in Brazil in the next few years, will not harm people in Brazil for many years, or will never harm people in Brazil?	1 Climate change does not exist 2 Never 3 Not in many years 4 In the next few years 5 Now
2. How concerned are you, if at all, that climate change will harm you personally at some point in your lifetime?	1 Climate change does not exist 2 Not at all concerned 3 Not too concerned 4 Somewhat concerned 5 Very concerned
Support for mitigating deforestation and climate change	
1. We need to preserve rainforests in Brazil even if this means less land for agriculture or construction in Brazil.	1 Strongly agree 2 Agree 3 Disagree 4 Strongly disagree
2. We need to preserve rainforests in Brazil, even if this means that the government of Brazil has to reduce government spending/investment in other areas.	1 Strongly agree 2 Agree 3 Disagree 4 Strongly disagree
3. The government of Brazil has pledged to reduce the country's emissions of carbon dioxide (CO2), which contribute to climate change (global warming), by a large amount (around 40 percent). These reductions would take place over the next five to ten years. To that end, the government plans to conserve forests and reduce deforestation in Brazil and increase the amount of electricity from hydropower, solar, and wind. To what extent do you personally support or oppose this policy?	1 Strongly support 2 Support 3 Oppose 4 Strongly oppose
4. People hold different views on whether Brazil should increase its forest conservation efforts on its own, or do so only if richer (industrialized) countries provide financial assistance to Brazil for this purpose. Which of the following statements comes closest to your own personal point of view? Brazil should increase its forest conservation efforts . . .	1 Regardless of whether richer countries provide financial assistance to Brazil 2 Only if industrialized countries (e.g. United States, Germany, Japan) provide financial assistance to Brazil 3 Brazil should not increase its forest conservation efforts
5. People hold different views on whether Brazil should reduce its carbon dioxide (CO2) emissions on its own, or reduce its emissions only if other countries do the same and provide	1 Regardless of what other countries do 2 Only if industrialized countries (e.g.

financial assistance to Brazil for this purpose. Which of the following statements comes closest to your own personal point of view? Brazil should reduce its carbon dioxide emissions . . .	United States, Germany, Japan) reduce their own emissions as well 3 Only if industrialized countries reduce their own emissions as well and provide international funding and technical support to Brazil for this purpose 4 Only if other lower income countries (e.g. China and India) reduce their own emissions as well 5 Brazil should not reduce its carbon dioxide emissions.
Willingness to pay for forest conservation 1. We need to preserve rainforests in Brazil, even if this means raising taxes in Brazil to fund forest conservation.	1 Strongly agree 2 Agree 3 Disagree 4 Strongly disagree
2. Would you personally be willing or not be willing to pay an additional R$ 30 in taxes per month over the next few years to enable Brazil to invest more in forest conservation?	1 Would be willing 2 Would not be willing
3. Would you personally be willing or not be willing to contribute R$ 100 to a large private environmental organization to support forest conservation in Brazil such as the Instituto de Pesquisas Ecológicas (IPÊ; this is an institute for environmental education and research that deals with deforestation issues in Brazil; more information is available at: www.ipe.org.br)?	1 Would be willing 2 Would not be willing
4. Would you personally be willing or not be willing to pay more for certain products related to forests, such as furniture or food, if this helped to protect forests in Brazil?	1 Would be willing 2 Would not be willing
5. We now ask you to participate in a lottery. Once this survey is completed 50 participants will be randomly selected to receive a prize of 90 pontos caracol (78BRL) each. You will be notified by e-mail if you are among the winners. At this point please select one of two types of prizes you would like to receive if you are among the winners:	1 A points prize of 90 pontos caracol (If you choose this option and win, 90 pontos caracol will be added as bonus to your account). 2 A donation to a large environmental organization that promotes forest conservation in Brazil. If you choose this option we will donate 78BRL on your behalf to the organization of your choice for a forest conservation project in Brazil. We will send you a confirmation of the respective organization.

Table A.3 shows summary statistics for the items used to construct the dependent variable for climate risk perceptions. We asked participants whether they think climate change will harm them personally, and whether climate change will harm Brazil in general. The means and standard deviations of the two variables are very close. This means that study participants' views on the personal and general harm of climate change are very similar.

Table A.3: Summary Statistics for Climate Risk Perception

Variable	Obs	Mean	Std. Dev.	Min	Max
Personal harm	2449	4.52	0.65	1	5
General harm	2449	4.55	0.63	1	5
Composite variable for risk perception	2449	9.07	1.02	2	10

The composite measure for the dependent variable capturing preferences concerning policy for climate change mitigation was constructed using polychoric correlation matrix analysis. The results are shown in Table A.4. The factor loading range is between 0.25 and 0.68.

Table A.4: Results of Polychoric Correlation Matrix Analysis for Climate Change Mitigation Support

Survey Items	Support
1. Less land for agriculture or construction in Brazil.	0.37
2. The government of Brazil has to reduce government spending/investment in other areas.	0.25
3. The government of Brazil has pledged to reduce the country's emissions of carbon dioxide (CO_2), which contribute to climate change.	0.46
4. Brazil should increase its forest conservation efforts on its own.	0.67
5. Brazil should reduce its carbon dioxide (CO2) emissions on its own.	0.68
N	2449
Eigenvalue	1.33

Notes: Survey item wordings are shown in the main part of the paper. Only a single factor resulted in an eigenvalue greater than 1 in all five latent constructs. The eigenvalue for the significant factor is reported in the last row.

Table A.5 presents summary statistics for all survey items used for constructing the dependent variable on climate change mitigation support, as well as the composite measure.

The dependent variable for willingness to pay for climate change mitigation was constructed based on polychoric correlation matrix analysis. The results are shown in Table A.6. The factor loading range is between 0.38 and 0.80.

Table A.5: Summary Statistics for Support for Climate Change Mitigation

Variable	Obs	Mean	Std. Dev.	Min	Max
Less land for agriculture	2449	3.03	0.77	1	4
Reduce government spending	2449	2.93	0.80	1	4
Reduce country's CO2	2449	3.39	0.66	1	4
Increase forest conservation	2449	2.80	0.50	1	3
Reduce CO2 on its own	2449	4.60	0.92	1	5
Support	2449	0.82	0.16	0	1

Table A.6: Results of Polychoric Correlation Matrix Analysis for Willingness to Pay

Survey Item	Willingness to pay
1. Raise taxes to fund forest conservation	0.61
2. Pay additional R$30 in taxes for climate policies	0.80
3. Pay R$100 to ENGO	0.67
4. Pay more for forest products	0.71
5. Lottery	0.38
N	2449
Eigenvalue	2.12

Notes: only a single factor resulted in an eigenvalue greater than 1 in all five latent constructs. The eigenvalue for the significant factor is reported in the last row.

Table A.7 presents summary statistics for all survey items used to construct the composite willingness to pay measure, and for the composite measure.

Table A.7: Summary Statistics for Willingness to Pay for Climate Change Mitigation

Variable	Obs	Mean	Std. Dev.	Min	Max
Raise taxes	2449	2.28	0.88	1	4
Pay R$ 30 in taxes	2449	0.38	0.48	0	1
Contribute R$ 100 to an ENGO	2449	0.30	0.46	0	1
Pay more for forest products	2449	0.68	0.46	0	1
Lottery	2449	0.44	0.50	0	1
WTP	2449	0.43	0.29	0	1

Table A. 8: Survey items for economic conditions (translation from Portuguese)

1. How do you expect the national economic situation in Brazil as a whole to develop over the next three years? It will...	Become a lot worse Become somewhat worse Stay the same Become somewhat better Become a lot better
2. Do you think your household income in the next three years will...	Decrease a lot Decrease somewhat Stay the same Increase somewhat Increase a lot
3. Thinking back over the last year, what was your household's annual income?	Range: Less than R$40,000... More than R$150,000

Table A.9 shows the survey items employed in the analysis as control variables. We add to our models a wide range of potential determinants that have been identified as relevant in prior public opinion about climate change research (e.g., Geels 2013; Wiseman et al. 2013; Drews and Bergh 2015). We include two demographic variables, gender and age. Gender is a dummy variable, 1 for male and 2 for female. Age is a count variable ranging from 18 to 78 years old. We also consider education, and political ideology. Education captures the highest level of education of a participant. The categories are: no schooling, elementary school, high school, professional training, undergraduate studies, and postgraduate studies. The original item for political ideology was a categorical variable; left, center left, center, center right, right, and uncertain. We recoded this variable to dummy variables (left, center, right and uncertain) and use “uncertain” as the baseline category. Participants are likely to differ in their knowledge of environmental issues. To capture knowledge, we asked participants a question on greenhouse emissions. Also, we include an item that measures whether participants consider deforestation a crucial environmental issue in

Brazil (deforestation salience). Additional to the economic indicators we also asked participants whether they are employed (and what is their occupation) or unemployed. Hence, we included a binary variable on unemployment (1 otherwise) at the individual level. Furthermore, we included a variable that measures trust in the Brazilian government (trust). Fairbrother (2016) finds that political trust is an important factor that correlates with greater WTP, but not with environmental concern. Finally, due to the demographic differences across Brazil we included regional dummy variables (Refer to Table A.2 in the appendix for item wordings for the control variables).

Table A.9: Survey Items Used for Control Variables (translation from Portuguese)

1. What is your gender?	1 Male 2 Female
2. In what year were you born?	Select year
3. What is the highest education level you have completed?	1 No schooling 2 Elementary school 3 High school 4 Professional training 5 Undergraduate studies 6 Professional diploma (5 or 6 years of studies) 7 Postgraduate studies
4. Thinking about politics these days, how would you describe your own political viewpoint?	1 Left 2 Center-left 3 Center 4 Center right 5 Right 6 Not sure
6. Could you tell us which of the following statements you consider correct? The "greenhouse effect", as debated in international negotiations on climate change, refers to:	1 Gases in the atmosphere that trap heat 2 The Earth's protective ozone layer 3 Pollution that causes acid rain 4 How plants grow 5 Don’t know
7. In your view is deforestation in Brazil, a...	1 Very serious problem 2 Somewhat serious problem 3 Not too serious problem 4 Not a problem
8. I trust the federal government to do what is right	1 Definitely true 2 Somewhat true 3 Somewhat false 4 Definitely false

9. What is your current occupation?	1 Unemployed 2 Student 3 Household 4 Government/ Public sector 5 Farming/fisheries 6 Manufacturing/ industry 7 Services

We also provide an examination of the Gauss-Markov assumptions.

Table A.10: Gauss-Markov assumptions

Gauss-Markov assumptions	**Dependent variables** **(i.e., Risk Perception, support for climate policy, WTP for deforestation policy)**
Linearity	Linearity in parameters
Outliers	No significant outliers detected
Normality of residuals	No issues detected
Homoskedasticity	Heteroskedasticity- employed robust standard errors, results unchanged.
Multicollinearity	Variation inflation factor<5

Table A.11 shows results for the relationship between climate risk perceptions and economic conditions. Alternative 1 is an ordered logit model using the risk perceptions composite measure as the dependent variable. The results are qualitatively the same as in the OLS model shown in the main part of the paper. Due to the scaling of the dependent variable we obtain a larger coefficient for economic household prospects. That is, for a unit increase in individuals' household income prospects, climate risk perceptions decrease by 0.14 units. Alternatives 2 and 3 show the results of ordered logit regressions using the disaggregated survey questions as dependent variables. Economic household prospects have a negative and significant effect on perceived personal and general harm from climate change.

We also examined the impact of economic conditions on the individual items used to construct the composite measure of support for climate change and deforestation mitigation (Table A.12). Current income turns out to be a significant negative predictor (Alternative 2). Individuals who hold more positive views on future national economic conditions hold weaker preferences concerning forest conservation. Better household prospects and higher current income, however, make people more favourable towards reducing Brazil's $CO_{2.}$ Finally, individuals who believe that the

national economy will improve think that Brazil should reduce its CO_2 emissions regardless of what other countries do.

Table A.11: Disaggregated Results for Climate Change Risk Perceptions

	(Alternative 1) Risk perceptions	(Alternative 2) Personal harm	(Alternative 3) General harm
Household prospects	-0.14***	-0.13***	-0.08**
	(0.04)	(0.04)	(0.04)
National prospects	-0.04	-0.05	-0.04
	(0.04)	(0.04)	(0.04)
Current income	0.01	-0.01	0.05***
	(0.01)	(0.01)	(0.02)
Left	0.41***	0.33***	0.37***
	(0.12)	(0.13)	(0.13)
Center	-0.09	-0.05	-0.13
	(0.09)	(0.10)	(0.10)
Right	0.11	-0.01	0.23
	(0.14)	(0.15)	(0.16)
Age	0.01***	0.01***	0.01**
	(0.00)	(0.00)	(0.00)
Gender	0.05	0.15*	-0.03
	(0.08)	(0.08)	(0.09)
Education	0.12***	0.09**	0.10**
	(0.04)	(0.04)	(0.04)
Salience of deforest.	0.74***	0.74***	0.49***
	(0.08)	(0.08)	(0.08)
Unemployment	0.09	0.09	0.01
	(0.09)	(0.10)	(0.10)
Trust	0.04	0.23***	-0.13*
	(0.06)	(0.07)	(0.07)
Knowledge	0.01	-0.16*	0.22**
	(0.08)	(0.08)	(0.08)
North	-0.02	0.09	-0.02
	(0.15)	(0.17)	(0.17)
North East	-0.05	0.09	-0.12
	(0.15)	(0.16)	(0.17)
South	0.01	0.10	-0.08
	(0.15)	(0.17)	(0.17)
South East	-0.03	0.08	-0.10
	(0.14)	(0.15)	(0.15)
N	2449	2449	2449
pseudo R^2	0.025	0.032	0.025

Notes: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Due to ordinal dependent variables, the Alternatives are ordered logit models. The baseline category for the left, center, and right variables is the "uncertain".

Table A.12: Disaggregated Results for Support for Climate Change and Deforestation Mitigation

	(Alternative 1) Less land for agriculture	(Alternative 2) Reduce government spending	(Alternative 3) Reduce the country's CO_2	(Alternative 4) Increase forest conservation	(Alternative 5) Reduce CO2 on its own
Household prospects	-0.02	0.05	0.17***	0.07	0.04
	(0.04)	(0.04)	(0.04)	(0.06)	(0.05)
National prospects	-0.04	-0.12***	-0.07*	-0.03	0.09*
	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)
Current income	0.02	-0.02*	0.06***	-0.03*	-0.02
	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Left	0.24**	0.27**	0.26**	0.06	-0.10
	(0.12)	(0.12)	(0.12)	(0.18)	(0.16)
Center	0.07	-0.00	0.07	-0.24*	-0.51***
	(0.10)	(0.09)	(0.10)	(0.14)	(0.13)
Right	-0.01	-0.16	0.05	-0.21	-0.29
	(0.14)	(0.14)	(0.15)	(0.20)	(0.19)
Age	-0.01	0.01	0.01***	0.01	0.02***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)
Gender	-0.39***	0.04	-0.32***	0.13	0.06
	(0.08)	(0.08)	(0.08)	(0.12)	(0.11)
Education	0.06	0.00	0.11***	0.21***	0.18***
	(0.04)	(0.04)	(0.04)	(0.06)	(0.06)
Salience of deforest.	0.48***	0.40***	0.61***	0.52***	0.61***
	(0.08)	(0.08)	(0.08)	(0.09)	(0.09)
Unemployment	-0.11	0.01	-0.02	0.22*	0.30**
	(0.10)	(0.10)	(0.10)	(0.14)	(0.13)
Trust	0.02	0.25***	0.01	-0.31***	-0.32***
	(0.06)	(0.06)	(0.06)	(0.09)	(0.08)
Knowledge	0.13*	-0.06	0.47***	0.22*	0.31***
	(0.08)	(0.08)	(0.08)	(0.11)	(0.11)
North	-0.12	-0.20	-0.04	0.53**	0.39**
	(0.16)	(0.16)	(0.16)	(0.22)	(0.20)
North East	-0.13	0.03	0.12	0.17	0.41**
	(0.15)	(0.15)	(0.16)	(0.21)	(0.19)
South	0.13	-0.26*	0.33**	0.25	0.59***
	(0.15)	(0.15)	(0.16)	(0.22)	(0.20)
South East	0.03	-0.20	0.29**	0.43**	0.57***
	(0.14)	(0.14)	(0.14)	(0.19)	(0.17)
N	2449	2449	2449	2449	2449
pseudo R^2	0.016	0.013	0.045	0.033	0.039

Notes: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ All Alternatives are ordered logit. The baseline category for the left, center, and right variables is the "uncertain".

Additionally, we examined the impact of economic conditions on the individual items used to construct the willingness to pay measure (Table A.13). Alternative 1 is an ordered logit model due to the scaling of the dependent variable. Regarding the

willingness to pay additional taxes to fund forest conservation, we find that individuals with a more positive view of their anticipated household income are more willing to pay (Alternative 1). When asked whether she/he was willing to pay an additional R$ 30 in taxes per month for forest conservation (Alternative 2), none of the economic factors had an effect. In Alternative 3, which like Alternative 2 is a logit model, we examine contributions of R$100 to an ENGO. We find that people who believe that the national economy will get better in the next years are more likely to contribute to an environmental NGO. We also asked study participants whether they would be willing to pay higher prices for products related to forests. 68% of the participants answered positively. We find that people who believe in the improvement of their own as well as the country's economic situation are more willing to pay more for forest related products. The logit model results in Alternative 5 show that wealthier participants are more likely to donate to an ENGO. Additionally, participants who believe that the national economy will improve in the near future also are more likely to donate money to an ENGO. This finding is rather encouraging. Although study participants do not show high levels of trust in the Brazilian government during recession, they are nonetheless willing to donate money to an environmental NGO.

Table A.13: Disaggregated Results for Willingness to Pay

	(Alternative 1)	(Alternative 2)	(Alternative 3)	(Alternative 4)	(Alternative 5)
	Raise taxes	Pay R$30 in taxes	Contribute R$100 to an ENGO	Pay more for forest related products	Lottery
Household prospects	0.08**	0.03	0.05	0.12***	-0.04
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
National prospects	0.01	0.03	0.07*	0.07*	0.13***
	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)
Current income	-0.02	0.00	0.02	0.01	0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Left	0.32***	0.21	0.18	0.35**	-0.19
	(0.11)	(0.13)	(0.13)	(0.14)	(0.13)
Center	0.05	0.07	0.16	0.06	0.24**
	(0.09)	(0.11)	(0.11)	(0.11)	(0.10)
Right	-0.24*	-0.03	0.08	-0.05	0.06
	(0.14)	(0.16)	(0.17)	(0.16)	(0.15)
Age	-0.00	-0.01***	-0.02***	-0.01**	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Gender	0.25***	0.05	-0.03	0.32***	0.01
	(0.08)	(0.09)	(0.09)	(0.09)	(0.09)
Education	-0.02	0.07*	0.06	0.06	0.12***
	(0.04)	(0.04)	(0.05)	(0.05)	(0.04)
Salience of deforest.	0.18**	0.30***	0.13	0.33***	0.39***
	(0.08)	(0.09)	(0.09)	(0.08)	(0.09)
Unemployment	-0.06	-0.09	-0.18	-0.04	0.12
	(0.10)	(0.11)	(0.11)	(0.11)	(0.11)
Trust	0.55***	0.42***	0.19***	0.19***	-0.00
	(0.06)	(0.07)	(0.07)	(0.07)	(0.07)
Knowledge	0.05	0.06	0.00	0.07	0.29***
	(0.08)	(0.09)	(0.09)	(0.09)	(0.08)
North	-0.10	-0.12	-0.01	0.04	-0.17
	(0.15)	(0.17)	(0.18)	(0.18)	(0.17)
North East	0.16	0.05	0.24	0.20	-0.10
	(0.15)	(0.17)	(0.17)	(0.18)	(0.17)
South	-0.14	-0.17	-0.34*	-0.14	-0.09
	(0.15)	(0.17)	(0.18)	(0.18)	(0.17)
South East	-0.02	-0.12	-0.20	-0.02	-0.15
	(0.13)	(0.15)	(0.16)	(0.16)	(0.15)
Constant		-1.42***	-0.77*	-0.58	-2.52***
		(0.43)	(0.45)	(0.43)	(0.43)
N	2449	2449	2449	2449	2449
pseudo R^2	0.025	0.027	0.030	0.028	0.027

Notes: Standard errors in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01. Alternative 1 is an ordered logit model. The other alternatives are logit models. The baseline category for the left, center, and right variables is the "uncertain".

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