Climate Policy

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/tcpo20

Public support for carbon taxation in Turkey: drivers and barriers

Ayse Uyduranoglu & Serda Selin Ozturk

To cite this article: Ayse Uyduranoglu & Serda Selin Ozturk (2020) Public support for carbon taxation in Turkey: drivers and barriers, Climate Policy, 20:9, 1175-1191, DOI: 10.1080/14693062.2020.1816887

To link to this article: https://doi.org/10.1080/14693062.2020.1816887

CLIMATE POLICY
2020, VOL. 20, NO. 9, 1175–1191
https://doi.org/10.1080/14693062.2020.1816887

Taylor & Francis
Taylor & Francis Group

RESEARCH ARTICLE

Public support for carbon taxation in Turkey: drivers and barriers

Ayse Uyduranoglu and Serda Selin Ozturk

Faculty of Business Administration and Centre for Environmental Studies, Istanbul Bilgi University, Eyup, Istanbul, Turkey

ABSTRACT

The Paris Agreement aims to limit the increase in the global mean temperature to well below 2°C to avoid the severe impacts of climate change. To achieve this target, mitigation efforts in emerging economies through carbon pricing are critical, as they are cost effective and generate revenue. However, carbon pricing policies may not be politically feasible owing to low levels of public support. Therefore, investigation of the factors that affect public support for carbon pricing is crucial. Through a face-to-face survey of a representative sample of the Turkish population, we provide evidence for the drivers of, and barriers to, public support for one form of carbon pricing, that is, a potential carbon taxation. Our results suggest that there are numerous factors influencing support for carbon taxation. Among these, awareness of global warming, the perception of the effectiveness of carbon taxation, and carbon taxation adopted by other countries are the most important factors in terms of their marginal effect on support for the policy. If people have heard about global warming, they are more likely to support carbon taxation. The perception that carbon taxation is an effective policy to address climate change leads to increased public support. Moreover, the presence of carbon taxation in other countries positively influences support. However, an unanticipated result is that the use of carbon taxation revenues for mitigation and adaptation projects is not a statistically significant factor influencing public support. The reason for this may be the perception of the effectiveness of carbon taxation.

Key policy insights

- The perception that carbon taxation is an effective policy for decreasing the use of energy and addressing climate change increases public support for the policy.
- Concerns about global air pollution and climate change make the public more supportive of carbon taxation.
- The implementation of carbon taxation by other countries leads to greater public support for such a policy.
- However, concerns related to competitiveness and the regressive nature of carbon taxation negatively affect support.
- In contrast with the literature, an interesting finding is that the use of taxation revenues for mitigation and adaptation projects has no statistically significant impact on support.

ARTICLE HISTORY
Received 18 February 2020
Accepted 26 August 2020

KEYWORDS
Climate change; Turkey; carbon taxation; public support; mitigation

1. Introduction

To avoid the severe and irreversible impacts of climate change, the Paris Agreement sets a target to limit the increase in the global mean temperature to well below 2°C, if possible to 1.5°C, above pre-industrial levels. However, evidence shows that current greenhouse gas (GHG) emission mitigation efforts are not consistent with achieving this target (IPCC, 2014; UNEP, 2019). Therefore, in order to ensure that the objectives set by the Paris Agreement are met, substantial emission cuts are needed (for a detailed discussion, see UNEP, 2019); in particular, the participation of emerging economies with rising GHG emissions is indispensable.

CONTACT Ayse Uyduranoglu ayse.uyduranoglu@bilgi.edu.tr Faculty of Business Administration and Centre for Environmental Studies, Istanbul Bilgi University, Kazım Karabekir Caddesi, No: 2/13, 34060, Eyup, Istanbul, Turkey

Turkey is an emerging economy with a trend of rapidly increasing GHG emissions. Turkey's total GHG emissions increased by 140.1% between 1990 and 2017, placing the country among the world's top 20 largest GHG emitters (Turkish Statistical Institute, 2020). It is also worth pointing out that according to Turkey's Nationally Determined Contribution (NDC) submitted in the run-up to the Paris Conference in 2015, the country plans to cut GHG emissions by up to 21% below the business-as-usual (BAU) scenario by 2030, starting from 2020 (Karapinar et al., 2019). This target, however, has been deemed 'critically insufficient' and inconsistent with limiting global warming to 2°C (Climate Action Tracker, 2020). Moreover, Turkey remains the only G20 country that has not ratified the Paris Agreement to date. To achieve much deeper reductions in GHG emissions and contribute to global abatement efforts, international pressure is likely to increase on all countries, including emerging economies such as Turkey (Jagers et al., 2019), to implement climate change mitigation strategies with higher targets and apply carbon pricing policies.

Climate change is deemed a negative externality that leads to an enormous external cost (Burke et al., 2015; Pretis et al., 2018; Stern, 2006). The role of pricing policies in closing the gap between social and external costs has been debated in the literature since 1920 (Baranzini et al., 2017; Pigou, 1920; Vickrey, 1963). Carbon taxation is one such pricing policy, promoted by many researchers for its effectiveness (e.g. Baranzini & Carattini, 2014; Baranzini & Carattini, 2017; Carattini et al., 2018; Lucas, 2017; Stavins, 1997; Sumner et al., 2009; Weiztman, 1974). Moreover, carbon taxation is relatively simple and easy to administer, and can cover all major emitting sources compared with emissions trading (Aldy & Stavins, 2012; Baranzini et al., 2017; Carattini et al., 2018; Gevrek & Uyduranoglu, 2015). However, in practice, the implementation of carbon taxation remains rather limited, with only 26 countries imposing carbon taxes; this limited implementation is due mainly to low levels of public support and political feasibility (World Bank, 2019).[1] Real-world examples of such opposition can be found in various countries: Swiss voters rejected a carbon-energy tax proposal on fossil fuels in 2000 (Thalmann, 2004), along with a tax proposal aimed at replacing the existing value-added tax on non-renewable energy sources with an energy tax in 2015 (Carattini et al., 2017a). Washington state citizens twice opposed proposals to implement a carbon tax in 2016 and 2018 (Carattini et al., 2019). Strong protests, known as 'the Yellow Vest Movement', across France in 2018 led to the suspension of fuel tax increases aimed at abating carbon emissions (Maestre-Andres et al., 2019).

Given that public support is of significance for the introduction of carbon taxation, it is necessary to identify the factors that positively and negatively affect levels of public support. In recent years, numerous studies have investigated the determinants of public support for carbon taxation, mainly in developed countries (e.g. Crowley, 2017; Dreyer & Walker, 2013; Jagers & Hammar, 2009; Rabe & Borick, 2012; Thalmann, 2004). The results from the existing literature indicate that distributional impact on households with low income, fear of hindering competitiveness, distrust in governments in relation to the use of potential carbon taxation revenues, and perception of climate change and of the effectiveness of carbon taxation are the main reasons for low public support (Baranzini et al., 2017; Baranzini & Carattini, 2017; Carattini et al., 2017b; Hammar & Jagers, 2006; Kallbekken & Aasen, 2010; Kallbekken & Saelen, 2011; Thalmann, 2004). The analysis of public support for the implementation of carbon taxation warrants attention from researchers in countries with emerging economies also, considering that the contribution of these countries is ultimately essential to achieving the target set by the Paris Agreement.

Compared to research undertaken in developed countries, research on carbon abating policies in Turkey is rather limited. Whilst several researchers, using a general equilibrium model, have investigated the impact of carbon pricing policies on macroeconomic parameters (Akın-Olcum & Yeldan, 2013; Karapinar et al., 2019; Telli et al., 2008), others have focused on support for environmental protection (Franzen & Vogl, 2013; Gelissen, 2007), citizens' willingness to pay for abating carbon emissions (Adaman et al., 2011; Ertor-Akyazı et al., 2012) and preferences for carbon pricing policies (Gevrek & Uyduranoglu, 2015). Among the studies investigating either voluntary or compulsory payments (or contributions) by households to abate carbon emissions in Turkey, only Gevrek and Uyduranoglu (2015) refer to the term 'carbon tax' and explore public preferences for various policies, including green taxes[2] that can be implemented to address climate change. Their results indicate that green taxes are the second least preferred policy with only 10% support. Even though other policies included in their study and literature can potentially be as effective as green taxes to address climate change, green taxes, including carbon taxes, are theoretically superior to them in the sense that they generate revenues

that can be used to promote environmental projects, including the utilization of renewable energy sources. This study further contributes to the existing literature on support for carbon abating policies in emerging economies. We extend the discussion to some crucial factors that may also influence public support and have not been included by previous studies, such as the perception of the effectiveness of policy instrument, the implementation of the same policy instrument by other countries and the contribution of an emerging economy to international mitigation efforts in the context of carbon taxation (e.g. Adaman et al., 2011; Carlsson et al., 2012; Ertor-Akyazı et al., 2012; Franzen & Vogl, 2013; Fischer et al., 2011; Gelissen, 2007; Gevrek & Uyduranoglu, 2015). We believe that our findings provide valuable insights for policy makers in Turkey to tailor carbon taxation in order to ensure public support, and thus political feasibility. However, whether the same findings can be obtained in other emerging economies remains to be investigated.

Based on data from a face-to-face survey of 714 individuals from urban areas in Turkey, we analyse a set of factors that may positively or negatively influence public support for a potential carbon taxation in Turkey: perception of environmental problems including climate change; perception of the effectiveness of carbon taxation to address climate change; belief in the need for international efforts and the participation of Turkey in these efforts; presence of carbon taxation in other countries; and concerns related to competitiveness and the potentially regressive nature of carbon taxation. We also investigate how the use of taxation revenues for mitigation and adaptation policies influences support levels. Gender, age, parenthood, income and education are considered as individuals' characteristics.

This study is structured as follows. The following section provides brief information on Turkey's climate policy. Section 3 describes data collection, the questionnaire used, and descriptive statistics. Section 4 introduces the econometric model and presents results. Section 5 is devoted to discussion relating our findings to the existing literature in the field. Section 6 draws conclusions.

2. Climate policy in Turkey

Turkey, as an OECD country, was listed among the Annex I and Annex II countries of the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 that were required to mitigate their GHG emissions and to assist developing countries most vulnarable to climate change. However, Turkey insisted on the recognition of its special circumstances, claiming that it was not a developed country like other OECD countries. After lengthy debates, Turkey's special circumstances were recognized with decision 26/CP.7 in Marrakesh in 2001 and its name was removed from Annex II. After this development, Turkey became a party to the UNFCCC in 2004, and ratified the Kyoto Protocol in 2009 with no mitigation commitments between 2008 and 2012, the first period of the protocol. Turkey's only specific obligation was to monitor and report on GHG emissions from all sources during this period. This, unfortunately, led to limited progress in addressing climate change (for a detailed discussion, see Turhan et al., 2016).

The Ministry of Environment and Urbanization released the Turkish National Action Plan on Climate Change in 2011 containing the priorities and targets in all sectors to address climate change. The Action Plan also emphasized the establishment of a national emission trading system (ETS) by 2015 and its linkage with other regional and global carbon markets in operation. Unfortunately, the market establishment of the ETS did not occur as scheduled. However, intensive work is being undertaken by the Ministry of Environment and Urbanisation in collaboration with Partnership for Market Readiness (PMR) and World Bank Group to expedite the establishment of an ETS in Turkey. It is worth pointing out that the planned ETS will only cover emissions from companies with intensive energy use, and not regulate other sources of emissions such as road transportation, from which emissions are increasing (EEA, 2016). In addition to the establishment of the ETS, to achieve the 21% reduction target planned by NDC, Turkey plans to increase the utilization of renewable energy sources by 1% annually (Karapinar et al., 2019).

Taxation, as mentioned in the previous section, has not received much support from the public among other stated policy options[3] to address climate change (Gevrek & Uyduranoglu, 2015). There may be several reasons for this low support; including the high share of consumption taxes accounting for 43% of total tax revenues (OECD, 2019), and the imperfect information associated with the costs of other stated policies (Jagers & Hammar, 2009; Kallbekken & Aasen, 2010; Lucas, 2017) that can also be implemented effectively to address

climate change, but place a burden on limited budget resources. On the other hand, despite being an unfavourable policy option, carbon taxation can have two important roles to promote an effective climate policy in Turkey. First, it can cover pollution sources not regulated by the ETS and thus serve to increase the effectiveness of the ETS in mitigating emissions. Second, it could accelarate the transition from a high carbon economy to a low carbon one by generating revenues that could be used for the further utilization of renewable energy sources, as Turkey has a very high renewable energy potential (Ministry of Energy and Natural Resources, 2020). The expanded utilization of renewable energy sources would enable Turkey to set higher mitigation targets.

3. Data

3.1. Data collection and questionnaire

The data were collected through face-to-face interviews conducted in April 2019 with the assistance of the Fraktol Research Company, a well-known research company located in Istanbul, at respondents' homes. The survey was conducted with 714 individuals aged 18 years and over, who were randomly selected from 12 cities, representing all the official regions of Turkey and including the three major cities Istanbul, Ankara, and İzmir. Respondents were informed that there were no right or wrong answers, and that we were only interested in their preferences and opinions. The questionnaire was pilot-tested on 40 individuals to ensure that respondents fully understood the questions and concepts therein. The results from the pilot test indicated that respondents did not have any difficulty grasping the questions. Thus, we were able to conduct the survey without making any revisions to the questions.

The questionnaire consisted of three parts. The first part constituted questions to assess respondents' awareness of environmental problems and their perceptions of climate change, whilst the second part contained questions related to carbon taxation such as its effectiveness, perceived concerns surrounding carbon taxation, preferences for the use of taxation revenues and public support for carbon taxation. The third part sought to obtain data on the socio-economic characteristics of respondents. The English translation of the questionnaire is provided in the Appendix.

It is also worth pointing out that we confined our survey to urban areas due to our limited research grant. However, it would be interesting to explore how people living in rural areas perceive climate change and mitigation policies, since they rely largely upon the agricultural sector for a living, and this is one of the most vulnerable sectors to climate change.

3.2. Descriptive statistics

Table 1 presents the sample's socioeconomic characteristics, as determined using the questionnaire. It reveals that half of respondents are male. The average age of respondents was 37.5 years. Respondents with no education accounted for 6.8% of the sample, whilst respondents with higher education represented 27.2% of the

Table 1. Descriptive statistics.

Variable	Definition	Sample Statistics	Population Statistics
Gender (%)	Males	52.8	50.4
Age (years)	Mean age	37.5	39.9
Employment (%)	Employed people	46.7	46.4
Education (%)	No education	6.8	8.5
	Primary education	23.6	24.2
	Lower secondary education	20.6	23.9
	Higher secondary education	27.2	24.8
	Tertiary education	21.8	18.6
Marital status (%)	Married	60.8	63.2

Note: All demographic data, except the employment variables, were obtained from the 2011 Turkish Statistical Institute (TURKSTAT) Population Statistics for individuals between 18 and 65 years of age. The population statistics on the employment variable were obtained from the TURKSTAT Household Labor Survey for December 2011.

sample. 46.7% of the sample were in full- or part-time employment. Married respondents comprised 60.8% of the sample. Nearly 39% of the sample resided in the three major Turkish cities of Istanbul, Ankara, and Izmir.

Table 1 also compares the socioeconomic characteristics of the sample used in the analysis with those of the general Turkish population. The sample was a good representative of the Turkish population in general. There was only one difference, namely, between the distribution of education levels of our sample and that of the population. However, for both the dependent variable and all the explanatory variables, to provide robustness, we excluded all observations for respondents who answered 'I do not know' to any of the questions. Therefore, in total, 426 observations were included in the analysis. When only these observations were taken into account, the distribution of our sample was much closer to that of the overall Turkish population.

Based on the propositions provided in the literature for the use of potential carbon taxation revenues (Klenert et al., 2018; Kocthen et al., 2017), respondents were given the option of ten different expenditure categories and asked to choose their top three preferences. Table 2 reports these categories and the number of respondents according to their top three preferences. The numbers in Table 2 do not add up to 426, since we include individuals' top three preferences. As can be seen from Table 2, among the stated expenditure categories, respondents were in favour of earmarking revenues generated for the development of environmental projects aimed at both mitigation and adaptation to climate change. This finding is consistent with the existing literature (Baranzini & Carattini, 2017; Kocthen et al., 2017). Respondents also supported other earmarking purposes such as compensation for losses incurred by groups vulnerable to climate change and recycling the revenue to the public in equal amounts. The allocation of the revenues directly to the public budget was the least preferred option by respondents among the stated allocations. One possible explanation for this result is low trust in government use of taxation revenues (Beuermann & Santarius, 2006; Hammar & Jagers, 2006). Even though public debt and other expenses are paid off from the public budget, the transparency provided by earmarking increases support. The public will be in a position to observe how revenues are spent in a visible way, believing that the government makes good use of carbon taxation revenues.

4. Econometric model and results

Since we have more than two categories, we used the ordered logit regression model with proportional odds (or parallel lines) assumption to estimate factors that may affect respondents' support for the potential carbon taxation. We also estimated ordered logit without this assumption but the model predicts negative probabilities for 116 observations. Therefore, it is not an appropriate model choice for our data set. We derived our dependent variable from the answers to the question of whether respondents support carbon taxation in the questionnaire (question 9). The ordered logit model for an ordinal response Y_i with C categories with a set of $C-1$ equations where the cumulative probabilities $g_{ci} = P(Y_i \leq y_c|x_i)$ are related to a linear predictor $x_i'\beta$ through the following logit function:

$$\text{logit}(g_{ci}) = \text{logit}(g_{ci}/(1-g_{ci})) = \alpha_c - x_i'\beta,\ c = 1, 2, \ldots., C-1 \quad (1)$$

Table 2. The use of carbon taxation revenues.

Where to spend revenue generated from a potential carbon taxation	Number of respondents
Contribute to the development of renewable energy sources such as solar and wind power	246
Contribute to funds to be used for the development of policies aimed at adaptation to climate change	188
Contribute to funds to be used for compensating those who are likely to lose their jobs owing to the transition to a low-carbon economy	146
Contribute to social security payments that are currently paid by employers and employees	146
Grants to low-income individuals, firms, and sectors that are most vulnerable to the impacts of climate change.	144
Reduction in income taxes	119
Improvements to public transportation	105
Use for paying off public debt	91
Uniform lump-sum transfers to households	91
Direct allocation to the general public budget	39
Others	11

where the parameters α_c, called thresholds or cutpoints, are in an increasing order. Furthermore, x_i, $i = 1, 2, \ldots, 17$ are the explanatory variables, which may be drivers of, or barriers to, public support for the proposed carbon taxation. Table 3 represents all the variables, how they are constructed from the survey questions, and also the number of 1s in the data set, if the variable is binary, and the mean of the variable if it is not.

Respondents who were in favour of the proposed carbon tax accounted for 40% of the sample used in the analysis. Among the respondents, 94% thought that the problem of global warming exists, whilst 89% of them were concerned about climate change. Furthermore, a high proportion of the respondents, accounting for 79%,

Table 3. Independent and dependent variables.

Variable Name	Question	Description	Data points equalling 1 or mean value
Support	To what extent do you support carbon taxation imposed as 15-20% of your energy bill to address climate change?	Binary variable, = 1 if strongly support or support	173
Most important problem	In your opinion, which of the following is the most important environmental problem?	Binary Variable,=1 if local air pollution or global air pollution and climate change	140
Active role	In your opinion, which of the following should have a more active role in protecting the environment within the national borders?	Binary variable, = 1 if citizens or Firms	149
Global warming	Do you think the problem of global warming exists?	Binary variable, = 1 if yes	401
Climate change	To what extent are you concerned about climate change?	Binary variable, = 1 if absolutely concerned or concerned	381
International cooperation	To what extent do you agree that international cooperation is needed to address climate change?	Binary variable, = 1 if strongly agree or agree	338
Contribution to international cooperation	To what extent do you agree that Turkey should contribute to international efforts toward mitigating climate change?	Binary variable, = 1 if strongly agree or agree	335
Effective policy	To what extent do you believe that carbon taxation is potentially an effective policy?	Binary variable, = 1 if strongly believe or believe	222
Reduction in energy use	To what extent do you believe that carbon taxation mentioned in question 8 will lead to a reduction in the amount of energy you are using?	Binary variable, = 1 if strongly believe or believe	192
Hinder competitiveness	If implemented, to what extent do you believe that carbon taxation would hinder Turkey's international competitiveness?	Binary variable, = 1 if strongly believe or believe	187
Negative effect on low income	If implemented, to what extent do you believe that carbon taxation would negatively affect people with low incomes?	Binary variable, = 1 if strongly believe or believe	339
Carbon taxation by other countries	In addition to potential carbon taxation in Turkey, if the use of carbon taxation spreads globally, to what extent would your support for national carbon taxation increase?	Binary variable, = 1 if absolutely increase or increase	201
Use of revenues	Because carbon tax is a new tax, the government will generate extra revenue from its implementation. Which of the following are your top three preferences for the use of generated revenues?	Binary variable, = 1 if they contribute to the development of renewable energy sources such as solar and wind power; or contribute to funds to be used for developing policies aimed at adaptation to climate change	311
Carbon footprint	Have you heard of term 'carbon footprint'?	Binary variable, = 1 if yes	66
Gender	Male or female	Binary variable, = 1 if male	225
Child	Do you have a child?	Binary variable, = 1 if yes	238
Income	Household income level of respondents	Takes increasing values starting from 1 for each higher income level in the question	Mean value 8.3 (between 3501-4000TL)
Education	Respondent's education level	Takes increasing values starting from 1 for each higher education level in the question	Mean value 4.8 (between middle school and high school)

believed that international co-operation is needed to address climate change, and that Turkey should contribute to international mitigation efforts. The number of respondents who preferred the revenues to be used for climate change-related projects aimed at both mitigation and adaptation was also high, accounting for 73% of the sample. Respondents who believed that carbon taxation would adversely affect people with low incomes also represented a large proportion of the data set, accounting for 80% of the sample. However, only one-third of the respondents believed that local or global air pollution and climate change are among the most important environmental problems. Moreover, respondents who believed that citizens and firms should play a more active role than government, municipalities, environmental organisations/civic society, media and others listed in question 2 of the questionnaire in protecting the environment only represented one-third of our data set. The distribution for the rest of the predictors was more balanced.

Table 4 also presents Pearson correlation coefficient values for all variables used in the model. Although some correlations are significant at 5% and some at 10%, there is no strong correlation between the explanatory variables, which may cause severe multi-collinearity problem effects.[4]

We summarize our findings for the ordered logit regression model in Table 5. A test of the full ordered logistic regression model for analysis of public support, with all seventeen predictors against a constant-only model, is statistically significant at even the 0.1% level with 6, $p<0.000$. Furthermore, the McFadden R-Squared statistic for the model is around 0.228. These results indicate that our predictors are effective in explaining the factors that may affect public support for the proposed carbon taxation.

Based on the estimated coefficients of the variables, first of all, limit values for 'support' and 'strongly support' are significant at 1% significance level and for 'do not support' significant at 10% significance level. The estimated coefficient values, which also indicate the ordering of the marginal effects, show that awareness of global warming, perception of carbon taxation as an effective policy to address climate change, and the implementation of carbon taxation by other countries were found to be the most effective drivers of public support for a potential carbon tax. Furthermore, if people believed that local or global air pollution and climate change are among the most important environmental problems and if they were concerned about climate change, they were more likely to support carbon taxation. If respondents also believed that international cooperation is necessary to address climate change, their level of support increased. Moreover, those who believed that there would be a decrease in the use of energy as a result of carbon taxation were also more likely to support it. However, if respondents believed that carbon taxation may hinder Turkey's competitiveness, or that carbon taxation would have a negative effect on people with low incomes, their support diminished. In terms of the socioeconomic and demographic characteristics, having a child and higher income level had significant positive effects. Respondents with a child, as can be seen from Table 5, were more concerned about climate change and, therefore, their support for the proposed carbon taxation to mitigate climate change increased. Our results also indicate that respondents with higher incomes showed greater support for carbon taxation.

5. Discussion

It is crucial for policy makers to gain a good understanding of the drivers of, and barriers to, public support for carbon taxation in order to design policies that receive adequate support from the public and are, therefore, politically feasible. Our main findings allow us to draw various policy implications for policy makers. Concerns about climate change positively influence support levels: people who perceive this issue as the most important environmental problems support carbon taxation as indicated in the literature (e.g. Drews & van den Bergh, 2016). These findings demonstrate the importance of public awareness in that lack of information may act as an obstacle to shaping effective carbon pricing policies (Lucas, 2017). Because climate change is a complex issue with no obvious immediate impacts, people tend to believe that severe impacts would not affect them immediately but at some time in the future (Lucas, 2017). Thus, in order to raise public awareness about climate change, explicit information on the impacts of climate change should be made available to the public through the use of communication tools such as internet and media coverage (Akter & Bennett, 2011; Franzen & Vogl, 2013; Gevrek & Uyduranoglu, 2015).

Table 4. Correlation coefficient values.

Correlation	Support	Most important problem	Active role	Global warming	Climate change	International cooperation	Contribution to international cooperation	Effective policy	Reduction in energy use	Hinder competitiveness	Negative effect on low income	Carbon taxation by other countries	Use of revenues	Carbon footprint	Gender	Child	Income	Education
	1																	
Most important problem	0.154**	1																
Active role	0.095*	0.053	1															
Global warming	0.125**	0.068	−0.068	1														
Climate change	−0.073	0.013	0.012	0.142**	1													
International cooperation	0.221**	0.024	0.009	0.144**	0.07	1												
Contribution to international cooperation	0.198**	−0.001	−0.05	0.065	0.007	0.498**	1											
Effective policy	0.563**	0.04	0.023	0.041	−0.024	0.103*	0.177**	1										
Reduction in energy use	0.499**	0.12	0.117**	−0.035	−0.057	0.078	0.127**	0.358**	1									
Hinder competitiveness	−0.038	0.096*	0.036	−0.021	−0.019	−0.051	−0.047	0.081	0.045	1								
Negative effect on low income	0.115**	−0.005	0.03	0.096	0.034	0.115**	0.148**	−0.054	−0.056	0.143**	1							
Carbon taxation by other contries	0.597**	0.06	0.096*	0.036	−0.042	0.145**	0.171**	0.369**	0.429**	−0.002	−0.128**	1						
Use of revenues	0.051	−0.059	0.136**	0.051	0.066	0.068	0.057	0.116**	0.009	−0.08	0.151**	0.003	1					
Carbon footprint	0.016	0.087	0.04	0.052	−0.043	0.138**	0.002	−0.057	−0.062	0.013	0.104	0.011	0.1	1				
Gender	0.044	0.071	0.042	−0.056	−0.095	0.017	−0.068	0.007	0.053	0.012	0.023	−0.002	−0.013	−0.037	1			
Child	−0.016	−0.093	−0.102*	0.019	0.079	−0.045	0.021	−0.019	−0.088	−0.005	−0.005	−0.098*	−0.051	−0.116**	−0.016	1		
Income	0.061	0.047	0.103*	0.015	−0.028	0.036	−0.022	0.046	0.077	−0.058	0.088	0.086	0.182**	0.181**	−0.028	−0.371**	1	
Education	0.174**	0.036	0.194**	0.02	−0.036	0.073	0.045	0.017	0.173**	0.143**	0.168**	0.21**	0.225**	0.156**	0.071	−0.137**	0.288**	1

Note: '***', '**', and '*' represent significance at the 1%, 5%, and 10% significance levels, respectively.

Table 5. The ordered logit regression model estimation results.

Variables	Coefficient	Standard Error	*P*-value
Most important problem	**0.487****	0.203	0.017
Active role	0.250	0.203	0.218
Global warming	**0.948****	0.436	0.030
Climate change	**−0.587***	0.311	0.059
International cooperation	**0.489***	0.276	0.076
Contribution to international cooperation	0.306	0.278	0.271
Effective policy	**1.630*****	0.229	0.000
Reduction in energy use	**0.945*****	0.26	0.000
Hinder competitiveness	**−0.350***	0.199	0.078
Negative effect on low income	**−0.463***	0.256	0.070
Carbon taxation by other countries	**1.332*****	0.239	0.000
Use of revenues for mitigation and adaptation policies	−0.197	0.212	0.352
Carbon footprint	−0.008	0.264	0.974
Gender	−0.017	0.191	0.930
Child	**0.543*****	0.207	0.009
Income	**0.050***	0.029	0.079
Education	0.022	0.079	0.781
Limit (Do not support)	**1.314***	0.677	0.052
Limit (Support)	**3.807*****	0.702	0.000
Limit (Strongly support)	**6.363*****	0.753	0.000
Pseudo R-squared	0.228		
LR statistic	**256.125*****		0.0000

Note: '***', '**', and '*' represent significance at the 1%, 5%, and 10% significance levels, respectively.

We find that perception of the effectiveness of carbon taxation is an important determinant of public support. In other words, those who perceive carbon taxation as an effective policy, i.e. creating incentive effects, are more likely to support it. This finding is confirmed by previous research (Garling & Schuitema, 2007; Steg et al., 2006). It is also important to note that the public will face the immediate consequences of carbon taxation through increased energy prices (Carattini et al., 2017b), whilst being unable to immediately perceive improved environmental quality. This may prevent the public from appreciating the benefits and co-benefits associated with carbon taxation. Therefore, prior to the permanent implementation of carbon taxation, the use of a trial period with the reported immediate co-benefits, such as improved air quality, may further strengthen public perception of the effectiveness of carbon taxation. In other words, when citizens are fully informed of the improvements associated with carbon taxation, they are more likely to begin to favour it. This argument was supported by congestion pricing in Stockholm (Eliasson, 2008; Eliasson et al., 2009; Eliasson & Jonsson, 2011; Hensher & Li, 2013). Having experienced improvements to the environment as well as reduced congestion during the congestion charge trial period, the majority of the Stockholmers voted for the permanent implementation of the congestion charge scheme. This shows that support for pricing policies increases with positive experiences. Thus, a trial period may be useful in garnering greater support from the public for the permanent implementation of carbon taxation.

Our findings indicate that the regressive nature of carbon taxation and competitiveness concerns decrease public support, as already discussed in the literature by various researchers (e.g. Baranzini et al., 2017; Carattini et al., 2018; Thalmann, 2004). These concerns can be easily alleviated through carefully designed taxation policies. Tax thresholds, which allow the essential use of energy to be tax-free, in particular, the use of natural gas for domestic purposes, may be of use in mitigating concerns about distributional impact, leading to increased public support (Drews & van den Bergh, 2016; Pezzey & Jotzo, 2013; Zhang & Baranzini, 2004). When tax thresholds are not applicable because of upstream taxation, which is the case for electricity and fuel used by households and vehicle owners respectively**,** the appropriate use of taxation revenues can play an important role in addressing concerns associated with distribution. Revenue recycling can prevent the poor from being adversely affected by the implementation of carbon taxation. Revenue recycling may be designed and implemented in various ways such as lump-sum transfers to people with low incomes (Carattini et al., 2018). It is also worth pointing out that, unless climate change is addressed through effective polices including carbon taxation, the most severe consequences would be experienced by the poor, who are more vulnerable

to its impacts (Leichenko & Silva, 2014; Lucas, 2017). To alleviate the fear associated with loss of competitiveness, polluting industries with extensive energy consumption should be provided with initial exemptions, and gradual increases in tax rates should be applied to enable such industries to adjust to carbon taxation by swicthing to cleaner technologies. A similar policy was applied in Phase I and II by the European Union ETS by allocating free allowances to firms with the extensive use of energy to address the potential competitiveness impacts (Dechezlepretre & Sato, 2017). However, it is true that such a policy leads to a trade-off between the effectiveness of carbon taxation and public support. To overcome this problem, tax exemptions should gradually be removed as people become more familiar with the effectiveness of carbon taxation in other fields covered by taxation such as transportation through their self experiences, and environmental improvements regularly reported by policy makers. An encouraging evidence on carbon taxation can be given from British Columbia where support for carbon taxation increased with positive experiences despite a threefold increase in the tax rate in only 7 years (Murray & Rivers, 2015). In addition to these policies, border tax adjustments could also address competitiveness concerns (Lucas, 2017). Such strategies may positively affect public support by alleviating the business sector's concerns; if not successfully implemented, beliefs that carbon taxation would hinder competitiveness may result in industry campaigns against such taxes, and vested interests may prevent their introduction (Thalmann, 2004). It is also worth pointing out that the impact of environmental regulations on competitiveness appears to be small and transitory (Aldy & Pizer, 2015; Dechezlepretre & Sato, 2017).

A number of studies show that earmarking carbon tax revenues increases public support (e.g. Dresner et al., 2006; Kallbekken & Aasen, 2010; Kallbekken & Saelen, 2011; Steg et al., 2006). Earmarking tax revenues for environmental purposes is especially significant when carbon taxation is not deemed an effective policy to trigger behavioural changes, and thus to not address climate change sufficiently (Dresner et al., 2006; Kallbekken & Saelen, 2011). Nonetheless, unexpectedly, our findings do not coincide with the literature, and indicate that the use of revenues for mitigation and adaptation projects has no statistically significant impact on public support. Perception of the effectiveness of carbon taxation may be the reason for this: when the public perceive carbon taxation to be an effective policy that adequately serves its primary aim, they may not be so sceptical of the motivations of policy makers for its introduction. Thus, the use of revenues does not influence their support. In our study, we find that the impact of perceptions of carbon taxation on public support is positive. Moreover, perceived effectiveness of carbon taxation was found to be one of the most important determinants of its marginal effect on public support. However, further investigation is warranted to clarify why the use of taxation revenues for environmental purposes does not have a significant impact on public support levels.

The perception of climate change as a global problem, and the belief that Turkey should contribute to international efforts to mitigate climate change, are important determinants of public support for carbon taxation. The increased implementation of mitigation policies, in the form of carbon taxation, by countries worldwide positively affects support for a potential carbon taxation in Turkey. The global spread of the use of carbon taxation would help prevent carbon leakage and free-riding. Therefore, our finding seems plausible and further enhances the effectiveness of carbon taxation in abating GHG emissions, thereby positively influencing public support.

Finally, in terms of socio-demographic factors, in addition to having a child, respondents with higher incomes were more likely to support carbon taxation. Those with higher incomes may have greater disposable income and, therefore, be less affected by the introduction of additional taxes and will be in position to pay more for a better environment (Franzen & Vogl, 2013; Gelissen, 2007).

6. Conclusion

In accordance with the Paris Agreement, limiting the increase in the global mean temperature to well below 2°C is critical in order to avoid the severe and irreversible impacts of climate change. The participation of emerging economies with rapidly rising GHG emissions, for example through the introduction of effective carbon pricing policies, is essential for the success of global mitigation measures. In this study, we explore the drivers of, and barriers to, a potential carbon taxation in Turkey, an emerging economy experiencing substantial increases in GHG emissions.

Our findings are consistent with the literature, and suggest that increasing public awareness on climate change, the need for international co-operation, increased implementation of carbon taxation worldwide, and the effectiveness of carbon taxation to address climate change will serve to garner greater public support for carbon taxation in Turkey. Policy makers may use a range of communication tools and campaigns to raise awareness of these issues. Policy makers should also report the co-benefits of carbon taxation to the public on a regular basis, in order to further enhance public perception of its effectiveness. To overcome concerns about the regressive nature of carbon taxation, carbon taxes could be implemented with thresholds, allowing the essential use of energy to be tax-free. If thresholds are not possible due to upstream taxation, people with low income could be compensated by the use of taxation revenues in various ways. To address competitiveness issues, tax rates should be increased gradually with some exemptions for industry. Such a policy will allow firms to explore low carbon alternatives, and to invest in cleaner technologies. In the meantime, people may be more convinced that carbon taxation is an effective policy to address climate change and increase their support. Only one of our findings does not coincide with the existing literature, in that the use of taxation revenues for developing mitigation and adaptation projects has no statistically significant impact on levels of public support. Although the reason for this inconsistency might lie in the perception of the effectiveness of carbon taxation, this finding certainly warrants further research in the context of exploring public opinion in relation to climate change mitigation policies in Turkey.

Notes

1. Public opposition is not only an impediment to the introduction of carbon taxation, but also affects the level of current carbon pricing. Even if carbon taxes are implemented in practice in some countries, their current level, with almost half of the emissions priced at less than US$10/tCO$_2$e is far from the suggested levels, i.e. US$40-80/tCO$_2$ by 2020 and US$50-100/tCO$_2$, required to meet the target set by the Paris Agreement (World Bank & Ecofys, 2018; High-level Commission on Carbon Prices, 2017).
2. Using a choice experiment, they mainly focus on public preferences for the attributes of carbon taxes rather than the factors that influence support level.
3. The other policy options are as follows: (i) organising public campains to promote environmental awareness; (ii) enacting regulations that aim at protecting the environment; (iii) providing individuals and firms with subsidies for environmentally friendly activities; (iv) integrating climate change education into curriculum**.**
4. We also checked Variance Inflation Factors (VIFs) and observed that there was no significant variance increase in coefficent standard errors due to multicollinearity.

Acknowledgments

This study was supported by Istanbul Bilgi University: [Grant number 2018.02.009]. We are grateful to the Fraktol RW Company for their assistance with data collection. We also would like to thank Prof. Sevil Acar, anonymous referees and editor for their constructive comments. Any errors are our own.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This study was supported by Istanbul Bilgi University: [grant number 2018.02.009].

References

Adaman, F., Karalı, N., Kumbaroğlu, G., Or, I., Özkaynak, B., & Zenginobuz, U. (2011). What determines urban households' willingness to pay for CO_2 emission reductions in Turkey: A Contingent valuation survey. *Energy Policy*, *39*(2), 689–698. https://doi.org/10.1016/j.enpol.2010.10.042

Akın-Olcum, G., & Yeldan, E. (2013). Economic impact assessment of Turkey's post-Kyoto vision on emission trading. *Energy Policy*, *60*, 764–774. https://doi.org/10.1016/j.enpol.2013.05.018

Akter, S., & Bennett, J. (2011). Household perceptions of climate change and preferences for mitigation action: The case of the carbon pollution reduction scheme in Australia. *Climatic Change*, *109*(3-4), 417–436. https://doi.org/10.1007/s10584-011-0034-8

Aldy, J. E., & Pizer, W. A. (2015). The competitiveness impacts of climate change mitigation policies. *Journal of Association of Environmental and Resource Economists*, *2*(4), 565–595. https://doi.org/10.1086/683305

Aldy, J. E., & Stavins, R. N. (2012). The promise and problems of carbon pricing: Theory and experience. *The Journal of Environment and Development*, *21*(2), 152–180. https://doi.org/10.1177/1070496512442508

Baranzini, A., & Carattini, S. (2014). Taxation of emission of greenhouse gases: The environmental impacts of carbon taxes. *Global Environmental Change Handbook of Global Environmental Pollution*, *1*, 543–560. https://doi.org/10.1007/978-94-007-5784-4_90

Baranzini, A., & Carattini, S. (2017). Effectiveness, earmarking and labelling: Testing the acceptability of carbon taxes with survey data. *Environmental Economics and Policy Studies*, *19*(1), 197–227. https://doi.org/10.1007/s10018-016-0144-7

Baranzini, A., van den Bergh, J. C. J. M., Carattini, S., Howarth, R. B., Padilla, E., & Roca, J. (2017). Carbon pricing in climate policy: Seven reasons, complementary instruments, and political economy consideration. *Wiley Interdisciplinary Reviews: Climate Change*, *8*(4), 1–17. https://doi.org/10.1002/wcc.462

Beuermann, C., & Santarius, T. (2006). Ecological tax reform in Germany: Handling two hot potatos at the same time. *Energy Policy*, *34*(8), 917–929. https://doi.org/10.1016/j.enpol.2004.08.045

Burke, M., Hsiang, S. M., & Miguel, E. (2015). Global non-linear effect of temperature on economic production. *Nature*, *527*(7577), 235–239. https://doi.org/10.1038/nature15725

Carattini, S., Baranzini, A., Thalmann, P., Varone, F., & Vöhringer, F. (2017a). Green taxes in a post-Paris world: Are millions of nays inevitable? *Environmental Resource Economics*, *68*(1), 97–98. https://doi.org/10.1007/s10640-017-0133-8

Carattini, S., Carvalho, M., & Fankhauser, S. (2018). Overcoming public resistance to carbon taxes. *Wiley Interdisciplinary Reviews Climate Change*, *9*, e531. https://doi.org/10.1002/wcc.531

Carattini, S., Kallbekken, S., & Orlov, A. (2019). How to win public support for a global carbon tax. *Nature*, *565*(7739), 289–291. https://doi.org/10.1038/d41586-019-00124-x

Carattini, S., Levin, S., & Tavoni, A. (2017b). *Cooperation in the climate commons*. Technical Report 259, Grantham Research Institute, on Climate Change and the Environment, London.

Carlsson, F., Kataria, M., Krupnick, A., Lampi, E., Lofgren, A., Qin, P., Chung, S., & Sterner, T. (2012). Paying for mitigation: A multiple country study. *Land Economics*, *88*(2), 326–340. https://doi.org/10.3368/le.88.2.326

Climate Action Tracker. (2020). https://climateactiontracker.org/countries/turkey/

Crowley, K. (2017). Up and down with climate politics, 2013-2016: The repeal of carbon pricing in Australia. *Wiley Interdisciplinary Reviews: Climate Change*, *8*, e458. https://doi.org/10.1002/wcc.458

Dechezlepretre, A., & Sato, M. (2017). The impacts of environmental regulations on compepetitiveness. *Review of Environmental Economics and Policy*, *11*(2), 183–206. https://doi.org/10.1093/reep/rex013

Dresner, S., Dunne, L., Clinch, P., & Beuermann, C. (2006). Social and political responses to ecological tax reform in Europe: An introduction to the special issue. *Energy Policy*, *34*(8), 895–904. https://doi.org/10.1016/j.enpol.2004.08.043

Drews, S., & van den Bergh, J. C. J. M. (2016). What explains public support for climate policies? A review of empirical and experimental studies. *Climate Policy*, *16*(7), 855–876. https://doi.org/10.1080/14693062.2015.1058240

Dreyer, S. J., & Walker, I. (2013). Acceptance and support of the Australian carbon policy. *Social Justice Research*, *26*(3), 343–362. https://doi.org/10.1007/s11211-013-0191-1

EEA. (2016). *Explaining road transport emissions- A non-technical guide*. Luxembourg.

Eliasson, J. (2008). Lessons from the Stockholm congestion charging trial. *Transport Policy*, *15*(6), 395–404. https://doi.org/10.1016/j.tranpol.2008.12.004

Eliasson, J., Hultkrantz, L., Nerhagen, L., & Smidfelt Rosgvist, L. (2009). The Stockholm congestion-charging trial 2006: Overview of effects. *Transportation Research Part A*, *43*, 240–250. https://doi.org/10.1016/j.tra.2008.09.007

Eliasson, J., & Jonsson, L. (2011). The unexpected "yes": Explanatory factors behind the positive attitudes to congestion charges in Stockholm. *Transport Policy*, *18*(4), 636–647. https://doi.org/10.1016/j.tranpol.2011.03.006

Ertor-Akyazı, P., Adaman, F., Ozkaynak, B., & Zenginobuz, U. (2012). Citizen's preferences on nuclear and renewable energy sources: Evidence from Turkey. *Energy Policy*, *47*, 309–320. https://doi.org/10.1016/j.enpol.2012.04.072

Fischer, A., Peters, V., Vavra, J., Neebe, M., & Megyesi, B. (2011). Energy use, climate change and folk psychology: Does sustainability have a change? Results from a qualitative study in five European countries. *Global Environmental Change*, *21*(3), 1025–1034. https://doi.org/10.1016/j.gloenvcha.2011.04.008

Franzen, A., & Vogl, D. (2013). Two decades of measuring environmental attitudes: A comparative analysis of 33 countries. *Global Environmental Change*, *23*(5), 1001–1008. https://doi.org/10.1016/j.gloenvcha.2013.03.009

Garling, T., & Schuitema, G. (2007). Travel demand management targeting reduced private cars use: Effectiveness, public acceptability and political feasibility. *Journal of Social Issues*, *63*(1), 139–153. https://doi.org/10.1111/j.1540-4560.2007.00500.x

Gelissen, J. (2007). Explaining popular support for environmental protection a multilevel analysis of 50 nations. *Environment and Behavior*, *39*(3), 392–415. https://doi.org/10.1177/0013916506292014

Gevrek, Z. E., & Uyduranoglu, A. (2015). Public preferences for carbon tax Attributes. *Ecological Economics*, *118*, 186–197. https://doi.org/10.1016/j.ecolecon.2015.07.020

Hammar, H., & Jagers, S. C. (2006). Can trust in politicians explain individuals' support for climate policy? The case of CO_2 tax. *Climate Policy*, *5*(6), 613–625. https://doi.org/10.1080/14693062.2006.9685582

Hensher, D. A., & Li, Z. (2013). Referendum voting in road pricing reform: A review of the evidence. *Transport Policy*, *25*, 186–197. https://doi.org/10.1016/j.tranpol.2012.11.012
High-level Commission in Carbon Prices. (2017). *Report of the high-level commission on carbon prices*. World Bank.
IPCC. (2014). *Fifth Assessment report-mitigation of climate change*. Technical Report.
Jagers, S. C., & Hammar, H. (2009). Environmental taxation for good and for bad: The efficiency and legitimacy of Sweden's carbon tax. *Environmental Politics*, *18*(2), 218–237. https://doi.org/10.1080/09644010802682601
Jagers, S. C. , Martinsson, J., & Matti, S. (2019). The impact of compensatory measures on public support for carbon taxation: An experimental study in Sweden. *Climate Policy*, *19*(2), 147–160. https://doi.org/10.1080/14693062.2018.1470963
Kallbekken, S., & Aasen, M. (2010). The demand for earmarking: Results from a focus group study. *Ecological Economics*, *69*(11), 2183–2190. https://doi.org/10.1016/j.ecolecon.2010.06.003
Kallbekken, S., & Saelen, H. (2011). Public acceptance for environmental taxes: Self-interest, environmental and distributional concerns. *Energy Policy*, *39*(5), 2966–2973. https://doi.org/10.1016/j.enpol.2011.03.006
Karapinar, B., Dudu, H., Geyik, O., & Yakut, A. M. (2019). How to reach an elusive INDC target: Macro-economic implications of carbon taxation and emission trading in Turkey. *Climate Policy*, *19*(9), 1157–1172. https://doi.org/10.1080/14693062.2019.1635875
Klenert, D., Mattauch, L., Combet, E., Edenhofer, O., Hepburn, C., Rafaty, R., & Stern, N. (2018). Making carbon pricing work for citizens. *Nature Climate Change*, *8*(8), 669–677. https://doi.org/10.1038/s41558-018-0201-2
Kocthen, M. J., Turk, Z. C., & Leiserowitz, A. A. (2017). Public willingness to pay for a US carbon tax and preferences for spending revenue. *Environmental Research Letters*, *12*(9), 094012. https://doi.org/10.1088/1748-9326/aa822a
Leichenko, R., & Silva, J. A. (2014). Climate change and poverty: Vulnerability, impacts and alleviation strategies. *Wiley Interdisciplinary Reviews: Climate Change*, *2014*(5), 539–556. https://doi.org/10.1002/wcc.287
Lucas, G. M. (2017). Behavioral public choice and the carbon tax. *Utah Law Review*, *1*, 115–158.
Maestre-Andres, S., Drews, S., & van den Bergh, J. (2019). Perceived fairness and public acceptability of carbon pricing: A review of the literature. *Climate Policy*, *19*(9), 1186–1204. https://doi.org/10.1080/14693062.2019.1639490
Ministry of Energy and Natural Resources. (2020). https://enerji.gov.tr/enerji
Murray, B., & Rivers, N. (2015). British Columbia's revenue-neutral carbon tax: A review of the latest 'grand experiment' in environmental policy. *Energy Policy*, *86*, 674–683. https://doi.org/10.1016/j.enpol.2015.08.011
OECD. (2019). http://www.oecd.org/tax/tax-policy/revenue-statistics-turkey.pdf
Pezzey, J. V. C., & Jotzo, F. (2013). Carbon tax needs thresholds to reach its full potential. *Nature Climate Change*, *3*(12), 1008–1011. https://doi.org/10.1038/nclimate2054
Pigou, A. C. (1920). *The economics of welfare*. Macmillan and Co.
Pretis, F., Schwarz, M., Tang, K., Haustein, K., & Allen, M. R. (2018). Uncertain impacts on economic growth when stabilizing global temperatures at 1.5 or 2^0C warming. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *376* (2119), 20160460. https://doi.org/10.1098/rsta.2016.0460
Rabe, B. G., & Borick, C. P. (2012). Carbon taxation and policy labelling: Experience from American states and Canadian provinces. *Review of Policy Research*, *29*(3), 358–382. https://doi.org/10.1111/j.1541-1338.2012.00564.x
Stavins, R. N. (1997). *Policy instruments for climate change: How can national governments address a global problem*. Discussion Paper 97–11, University of Chicago Law School.
Steg, L., Dreijerink, L., & Abrahamse, W. (2006). Why are energy policies acceptable and effective? *Environment and Behavior*, *38*(1), 92–111. https://doi.org/10.1177/0013916505278519
Stern, N. (2006). *Stern review on the economics of climate change*. Stern Review Final Report.
Sumner, J., Bird, L., & Smith, H. (2009). *Carbon taxes: A review of experience and policy design consideration*. Technical Report, NREL/TP-6A2-47312, National Renewable Energy Laboratory.
Telli, C., Voyvoda, E., & Yeldan, E. (2008). Economics of environmental policy in Turkey: A general equilibrium investigation of the economic evaluation of sectoral emission reductions policies for climate change. *Journal of Economic Modelling*, *30*, 321–240. https://doi.org/10.1016/j.polmod.2007.03.001
Thalmann, P. (2004). The public acceptance of green taxes: 2 million voters express their opinion. *Public Choice*, *119*(1/2), 179–217. https://doi.org/10.1023/B:PUCH.0000024165.18082.db
Turhan, E., Cerit Mazlum, S., Sahin, U., Sorman, A. H., & Gundogan, A. C. (2016). Beyond special circumtances: Climate change policy in Turkey. *Wiley Interdisciplinary Reviews: Climate Change*, *7*. 448–460. https://doi.org/10.1002/wcc.390
Turkish Statistical Institute. (2020). Greenhouse gas emissions statistics, 1990-2017. http://www.tuik.gov.tr/PreTablo.do?alt_id=1019
UNEP. (2019). *Emission gas report*. United Nations Environment Programme.
Vickrey, W. (1963). Pricing in urban and suburban transport. *American Economic Review*, *52*(2), 452–465.
Weiztman, M. L. (1974). Price vs. Quantities. *Review of Economic Studies*, *41*(4), 477–491. https://doi.org/10.2307/2296698
World Bank. (2019). *State and Trends of carbon pricing 2019*. World Bank Group.
World Bank and Ecofys. (2018). *State and trends of carbon pricing 2018*. https://doi.org/10.1596/978-1-4648-1292-7.
Zhang, Z. X., & Baranzini, A. (2004). What do we know about carbon taxes? An inquiry into their impacts on competitiveness and distribution of income. *Energy Policy*, *32*(4), 507–518. https://doi.org/10.1016/S0301-4215(03)00152-6

Appendix 1. Questionnaires

Thank you for participating in our survey. This study is undertaken by Istanbul Bilgi University researchers to investigate public support for a potential carbon taxation that may be implemented to address climate change in Turkey. Your answers will be used only for academic purposes, and will not be shared with third parties. Please answer each question or statement, and note that there are no right or wrong answers: we are only interested in your opinions and preferences.

Part I

1. In your opinion, which of the following is the most important environmental problem?

- Local air pollution
- Global air pollution and climate change
- Soil pollution and degraded agricultural products
- Water pollution
- Increased amount of solid waste
- Noise
- Decreased biodiversity
- Deforestation and desertification
- Lack of access to organic food
- Others
- No answer or I do not know

2. In your opinion, which of the following should have a more active role in protecting the environment within national borders?

- Government
- Municipalities
- Citizens
- Firms
- Environmental organisations/civic society
- Media
- Others
- No answer or I do not know

3. Do you think the problem of global warming exists?

- Yes
- No
- No answer or I do not know

4. Have you heard of climate change?

- Yes
- No
- No answer or I do not know

5. To what extent are you concerned about climate change?

- Strongly concerned
- Concerned
- Not concerned
- Strongly not concerned
- No answer or I do not know

6. To what extent do you agree that international cooperation is needed to address climate change**?**

- Strongly agree
- Agree

- Disagree
- Strongly disagree
- No answer or I do not know

7. To what extent do you agree that Turkey should contribute to international efforts in mitigating climate change?

- Strongly agree
- Agree
- Disagree
- Strongly disagree
- No answer or I do not know

Part II

Carbon taxation

8. Climate change is a problem that occurs as a result of the increased concentration of greenhouse gas emissions released into the atmosphere through the use of fossil fuels (coal, oil, and natural gas). Unless addressed adequately, climate change poses a serious threat to the future of humanity. Carbon emissions account for a significant share of total global greenhouse gas emissions. To tackle climate change, the government may implement carbon taxation to create behavioural changes and to promote electricity generation from renewable sources in the medium- to long term. To what extent do you believe that carbon taxation can be potentially an effective policy for mitigating carbon emissions?

- Strongly believe
- Believe
- Do not believe
- Strongly do not believe
- No answer or I do not know

9. To what extent do you support carbon taxation that would be imposed as 15–20 per cent of your energy bill, to address climate change?

- Strongly support
- Support
- Do not support
- Strongly do not support
- No answer or I do not know

10. To what extent do you believe that carbon taxation mentioned in question 8 will lead to a reduction in the amount of energy you are using?

- Strongly believe
- Believe
- Do not believe
- Strongly do not believe
- No answer or I do not know

11. If implemented, to what extent do you believe that carbon taxation would hinder Turkey's international competitiveness?

- Strongly believe
- Believe
- Do not believe
- Strongly do not believe
- No answer or I do not know

12. If implemented, to what extent do you believe that carbon taxation would negatively affect people with low incomes?

- Strongly believe
- Believe
- Do not believe
- Strongly do not believe
- No answer or I do not know

13. If other countries were to implement taxation, to what extent would your support for the proposed carbon taxation in Turkey increase?

- Strongly increases
- Increases
- Does not increase
- Strongly does not increase
- No answer or I do not know

14. Because carbon taxation is a new policy to address climate change, the government would generate extra revenue from its implementation. Which of the following are your top three preferences for the use of generated revenues?

- Contributions to the development of clean energy policies such as solar and wind power
- Use for paying off public debt
- Contributions to funds to be used for compensating those who are likely to lose their jobs because of the transition to a low-carbon economy
- Grants to low-income individuals, firms, and sectors that are most vulnerable to the impacts of climate change
- Contributions to funds to be used for developing policies aimed at adaptation to climate change
- Contribution to social security payments that are currently paid by employers and employees
- Reduction in income taxes
- Uniform lump-sum payments to households
- Improvements to public transportation
- Direct allocation to the general public budget
- Others, please specify

15. Have you heard of the term 'carbon footprint'?

- Yes
- No
- No answer or I do not know

Part III

16. What is your age?
17. What is your gender?

- Female
- Male

18. What is the highest level or degree of schooling you have completed?

- No schooling completed
- Primary school
- Lower secondary school
- High school
- Vocational studies
- University degree
- Master's and/or doctorate degree

19. What is your employment status?

- Full-time employed
- Part-time employed
- Self-employed
- Housewife
- Student
- Retired
- Not employed
- Unable to work

20. What is your monthly income?

- Less than 500 or 500 TL
- 501–1,000 TL
- 1,001–1,500 TL
- 1,501 –2,000 TL
- 2,001–2,500 TL
- 2,501–3,000TL
- 3.001–3,500TL
- 3,501–4,000TL
- 4,000 TL or more

21. What is your marital status?

- Married
- Single

22. Do you have children?

- Yes
- No