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Ready for a Carbon Tax? An Explorative Analysis of University Students' Preferences

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Summary

Greenhouse gases emissions are inexorably rising worldwide and the frequency and disruptive power of extreme weather phenomena are dramatically increasing. Although command-and-control and regulation policies have been extensively used to mitigate climate change, more effective and potentially efficient policies are needed to curb the negative externalities produced by human activities. A carbon tax could make the case, but is seldom implemented due to its assumed political unpopularity. In order to estimate the acceptability and the willingness to pay (WTP) for a carbon tax, a contingent valuation experiment was administered in USA and in Italy to a sample of 150 university students. The research is innovative both for the topic chosen, since there are no studies testing the WTP for a carbon tax in the Italian context nor comparing it with the estimates obtained for other countries, and for the methodology used to estimate the WTP, making use of random parameters logit models to obtain individual specific estimates of the median WTP. The results show that the median WTP ranges between a minimum of $161 and a maximum of $242, and varies according to the purposes proposed for the tax revenue use, the respondents' beliefs and knowledge about climate change, and some sociodemographic characteristics of the respondents (age, gender, and political affiliation). The students' preferences seem to be quite similar when the nationality of the respondents is taken into account.

Keywords: Carbon Tax, Willingness to Pay, University Students, Climate Change

JEL Classification: H31, Q580

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Ready for a Carbon Tax? An explorative analysis of university students' preferences

Abstract

Greenhouse gases emissions are inexorably rising worldwide and the frequency and disruptive power of extreme weather phenomena are dramatically increasing. Although command-and-control and regulation policies have been extensively used to mitigate climate change, more effective and potentially efficient policies are needed to curb the negative externalities produced by human activities. A carbon tax could make the case, but is seldom implemented due to its assumed political unpopularity. In order to estimate the acceptability and the willingness to pay (WTP) for a carbon tax, a contingent valuation experiment was administered in USA and in Italy to a sample of 150 university students. The research is innovative both for the topic chosen, since there are no studies testing the WTP for a carbon tax in the Italian context nor comparing it with the estimates obtained for other countries, and for the methodology used to estimate the WTP, making use of random parameters logit models to obtain individual specific estimates of the median WTP. The results show that the median WTP ranges between a minimum of $161 and a maximum of $242, and varies according to the purposes proposed for the tax revenue use, the respondents' beliefs and knowledge about climate change, and some sociodemographic characteristics of the respondents (age, gender, and political affiliation). The students' preferences seem to be quite similar when the nationality of the respondents is taken into account.

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1. Introduction

Experts argue that climate change is ongoing and that it is primarily caused by anthropic activities. According to the Intergovernmental Panel on Climate Change, an increase of greenhouse gases (GHG) in the atmosphere will boost temperatures over most land surfaces, increasing the risk of drought and the intensity of storms, including tropical cyclones with higher wind speeds. In 2017 Italy has experienced one of its driest springs in some 60 years, with rainfall totals 80 percent below normal in some parts of the country. In June 2017, scorching temperatures hit the western United States of America from Arizona to the Pacific Northwest with Las Vegas (Nevada), and Needles (CA) reaching their all-time record, 47.2°C, and 51.7°C, respectively. Forzieri et al. (2017) estimated that in the reference period 1981–2010, the annual number of fatalities caused in Italy by multiple weather-related hazards has been 698 and that the figure will increase up to almost 42,000 in 60 years. In 2005, hurricane Katrina hit New Orleans killing an estimated 1,200 people and causing more than $100 billion in damage. More recently, in Texas hurricane Harvey produced 40- to 50-inch rainfall totals, causing damages that could end up costing up $190 billion, making it the priciest natural disaster in U.S. history, equal to the combined cost of hurricanes Katrina and Sandy[1].

[1] Although hurricanes are highly complex phenomena and scientists cannot say with a fair degree of confidence to which extent they are caused by climate change, it has been proven that their impact would be significantly less damaging under the climate and sea level conditions of 100 years ago, since the storms' surge would be up to 60% lower.

Due to the increasingly frequent and disruptive extreme weather phenomena, both in Europe and in USA climate change and environmental policies aimed at curbing CO_2 emissions have been at the top of the political agenda. There have been many international agreements in this area, the most important being the United Nations Framework Convention on Climate Change, ratified to date by 195 countries. In December 2015 the Paris climate conference reached a new global agreement with an action plan to limit the global warming below 2°C above pre-industrial levels. In Europe the member states have committed to reducing emissions via the European Union's emissions trading system (ETS), which covers 11,000 power stations and industrial plants whose carbon emissions make up almost 50% of Europe's total. In USA a cap-and-trade system was instituted under the 1990 Clean Air Act, and the Regional Greenhouse Gas Initiative (RGGI), aiming at reducing CO_2 emissions to 10% below 2009 levels by 2018, was the first mandatory carbon cap-and-trade program implemented in USA. It covers about 225 facilities in the power sector and has involved ten Northeastern and Mid-Atlantic States.

Despite the efforts made not only at the international level, but also at the national level (e.g. the Chicago Climate Exchange programme launched in 2003, and the California a cap-and-trade system started in 2013), the GHG emissions trends are positive and new policies are needed in order to effectively curb climate change (De Paoli, 2015). Under this perspective a carbon tax has been envisaged as a possible solution both in USA (e.g. in 2016 the first nation's carbon tax had been proposed in Washington State), and in Italy (it was initially introduced but then suspended in 1998-1999, and has been recently proposed again both under the Italian Prime Minister, Mario Monti, and by the current Minister of Economy and Finances, Pier Carlo Padoan).

Policy makers, however, are reluctant in implementing this solution due to its expected low political acceptability. In the literature there are many studies proving the effectiveness of this policy, estimating its macroeconomic impacts and social costs, and analyzing its distributive effects. Little evidence, instead, exists on the willingness-to-pay (WTP) for, and on the political acceptability of, a carbon tax. The topic, instead, is extremely relevant since, as underlined by Kotchen et al. (2013, p.620): "Public opinion has an important influence on the success or failure of policy proposals".

The paper aims at filling this gap on the basis of a contingent valuation experiment which has been performed in Italy and in USA between May and June 2017. The experiment has involved 150 university students. The research goal is to estimate the WTP for a carbon tax, testing whether and how it would change according to how the tax revenues are used and according to the sociodemographic characteristics of the respondents, including their nationality. The research is innovative both with respect to the topic, since, to the best of our knowledge, no study exists on the preferences of the Italian citizens for a carbon tax, nor on the comparison between the preferences of USA and Italian citizens, and under the methodological point of view, since the stated choices are analyzed via a random logit model allowing us to estimate the WTP at the individual level.

The remainder of the paper is organized as follows. The next section further motivates our analysis with a brief overview of the literature dealing with environmental policies and more specifically with the WTP for a carbon tax. Section 3 reports the details of our survey design and of the data collection. Section 4 describes the econometric analysis performed and reports and discusses the results obtained. Section 5 concludes providing the policy implications of our research and describing the future research lines.

2. Literature review

GHG emissions, like many other environmental externalities, are generally regulated via "command-and-control" policies. However, although they are easy to implement, they have little flexibility, are inefficient[2], and tend to freeze the development of new technologies or virtuous behavior, since no financial incentives exist for those exceeding the control targets (Stavins, 2000). On the contrary, market-based policies, like pollution charges, allow virtually any desired level of pollution reduction at the lowest possible overall cost to society, by providing the greatest incentives to the individuals that can achieve these reductions most cheaply.

There are different kinds of pollution charges according to the tax base chosen. In particular, a carbon tax is a charge to be paid on fossil fuels' consumption that is proportional to the quantity of carbon or CO_2 emitted (Tiezzi, 2005).

Many studies have tested the effectiveness of a carbon tax. The results are mostly highly positive (Murray and Rivers, 2015, for BritishColumbia; Mori, 2012, for Washington State; Lu *et al*., 2010, for China; Gerlagh and van der Zwaan, 2006; Wissema and Dellink, 2007, and Di Cosmo and Hyland, 2013, for Ireland). The few modest or even negative results (Bruvoll and Larsen, 2004, for Norway; Rapanos and Polemis, 2005, for Greece; Lin and Li, 2011, for Norway, Sweden, Denmark, Finland and the Netherlands) are described as being due to the excessive exemptions granted to the energy-intensive industries.

A carbon tax is also the most market-efficient policy in reducing CO_2 emissions since it reduces the relative price of renewable energy and its revenues can be used to subsidize environmental protection projects (Jiang and Shao, 2014). Moreover, if a carbon tax would be added to the current gasoline taxes that are already routinely collected at the pump, no additional administrative or monitoring costs should be absorbed. Finally a per-quantity of-gasoline tax would be strongly linked to the amount of pollution emitted while using motor vehicles, since carbon dioxide emissions and quantity of gasoline consumed are highly correlated (Hsu, 2008).

Despite its superiority when compared to other environmental policies (Liu and Cirillo, 2016; Montag, 2015; Stram, 2014; Sterner, 2007; Baumol and Oates, 1988; Pearce, 1991), it is seldom implemented because it is feared to reduce national competitiveness (Wissema and Dellink, 2007; Lu *et al.*, 2010; Cingano and Faiella, 2013; Di Cosmo and Hyland, 2013; Murray and Rivers, 2015) and to regressively distort the fiscal system (Brannlund and Nordstrom, 2004; Safirova *et al*., 2004; Scott and Eakins, 2004; Wier *et al*., 2005; Kerkhof *et al*., 2008; Callan *et al.*, 2009).

Several studies, however, have proven that a carbon tax is not necessarily regressive depending on how the revenues are recycled and the exemptions are granted (Sterner, 2012; Murray and Rivers, 2015; Mathur and Morris, 2014; Bureau, 2011; Gonzalez, 2012), and no the tax base chosen. Indeed, Tiezzi (2001 and 2005) found that the carbon tax that was implemented in Italy in 1999 was not regressive, since it was levied only on transport fuels whose consumption increases with household income. More recently Faiella and Cingano (2015) proved that in Italy a carbon tax ranging between €60 and €300 per year would actually be progressive: 25% of the tax burden would be bared by the 20% richest Italian families, while only 8% of the tax would be paid by the 20% poorest families. The progressivity of the carbon tax when it is based on fuel consumption only

[2] force individuals to shoulder similar shares of pollution-control burden regardless of the relative costs to them of this burden

was already proved by Barker and Köhler (1998), and further demonstrated by Montag (2015) and Jiang and Shao (2014).

Very few studies have estimated the WTP for a carbon tax. Kotchen *et al.* (2013) interview 2034 American adults finding that their mean WTP to finance a cap-and-trade program, a carbon tax, or a GHG program, is within the range $65 - $90 per year. Being younger, having higher education and greater household income increase the stated WTP, while having a right oriented political affiliation significantly decrease it.

Akter and Bennett (2011) perform a web-based contingent valuation survey involving 600 households living in New South Wales, Australia. According to their results the WTP is in the rage $14 - $55 per month and is positively influenced by the respondents' expectations about the climate change impact on the temperature increase, by the familiarity of the respondent with the climate change phenomenon as explained by the media and by the education degree.

Sælen and Kallbekken (2010) interview a sample of 2777 people representative of the adult Norwegian population. They perform a choice experiment proposing additional fuel taxes ranging from $0 to $0.5 and find that, if the tax revenue is earmarked for environmental measures, the average WTP is $0.14 per liter. They also ask which gasoline and diesel tax reform would be preferred if there was a referendum (Kallbekken and Sælen, 2011), finding that concern for the ongoing climate change, believing that fuel tax has an effect on climate change, trusting the government and having a higher education degree significantly positively influence the tax acceptability, in line with the results found by Thalmann (2004). Moreover, concerns about the consequences of the tax to the respondents (higher cost of fuel consumption, car access, availability of transport alternatives to private car) and on the distribution effect of the tax have little influence on its acceptability.

Hsu (2008) conducts a survey in the Greater Vancouver, British Columbia area, involving almost 800 individuals with the aim of assessing the acceptability of a fuel tax of $0.5 per liter. The respondents turned out to be much more willing to pay a carbon tax when the proceeds are used to fund technological research or are recycled. Having a higher education level and being a female is also found to positively affect the willingness to pay, while being a commuter and owing a car produce the opposite impact.

Viscusi and Zeckhauser (2006) interview 250 graduate students in law and public policy in Boston via a contingent valuation survey. The median WTP to avoid global warming is $0.50 per gallon and 3% of income. According to the authors the WTP is affected by the magnitude of scientific uncertainty since as the likely consequences of climate change become more uncertain, the respondents' gets higher.

Hersch and Viscusi (2006) examine the WTP for a gasoline tax using data from the 1999 Eurobarometer survey over a sample 14,000 individuals. The authors' results prove that respondents over age 65 were half as likely to be willing to pay more for gasoline and, on average, were willing to pay just over one-third as much as were people aged 15–24. Also the degree to which the respondent is worried about global warming, is informed about environmental problems and believes that climate change will affect his own health plays a positive and significant role in increasing the WTP.

3. Sample, questionnaire and data

Two surveys were conducted via face-to-face personal interviews. The first one was performed in May 2017 at the University of Northern Colorado (Greeley, Colorado, USA), while the second one was administered one month later, in June 2017, at the University of Trieste (Trieste, Italy). Popular gathering places within each campus were chosen as sampling locations: the canteen, the libraries, the bus stops, the entrance of the buildings hosting each faculty.

Table 1 Description of the sample by major and nationality

Major	USA	Italy
Humanistic Studies	49%	29%
Economics	17%	31%
Medical Sciences	8%	19%
Engineering and Technical Sciences	10%	15%
Biological Sciences	17%	6%

The sample comprises 150 students currently attending all the major programs offered by each institution, 75 for each University (Table 1). University students represent a very specific segment of the population that need to be separately studied since they are more environmental sensitive than the average, and are supposed to draw the environmental agenda of the future. Although the sample size is small, the research proves how valuable the proposed methodology is.

Table 2 Sociodemographic characteristics of the sample by nationality

Variable	USA	Italy
Gender (male)	49%	57%
Age: 18 – 19	23%	6%
Age: 20 – 21	53%	29%
Age: 22 – 23	14%	40%
Age: >23	10%	25%
Family income: <=$ 20.000	71%	57%
Family income: >$ 20.000	9%	16%
Family income: missing values	20%	27%
Political party: left	32%	15%
Political party: right	16%	8%
Political party: missing values	52%	77%
Residential location (urban vs. rural)	81%	54%

Table 2 reports the sociodemographic characteristics of the respondents by nationality. The sample is evenly composed by male and female. Most of the students interviewed are 21 years old or younger; the oldest American and Italian respondents are 29 and 30 years old, respectively. The stated yearly family income is mostly below $20.000, but many students, 20% in USA and 27% in Italy, refused to give this information. Also

the political affiliation turned out to be a critical data to be collected, since 52% of the American students and 77% of the Italian students refused to answer this question. Finally the majority of the American students live in urban areas, while the Italian sample is evenly balanced with students living in rural and urban areas.

The first part of the questionnaire is focused on the respondents' beliefs about climate change. The respondent is asked to state if s/he beliefs that climate change is happening, similarly to the first item proposed by Kotchen et al. (2013) and by Akter and Bennett (2011), and to what extent s/he beliefs that climate change is caused by human activities. In fact, according to the literature (Moser and Dilling, 2007; Schade and Schlag, 2003), guilty feelings about how human lifestyle is affecting the climate increase self-consciousness and motivate people to adopt mitigating measures and environmental friendly behavioral changes. Although the majority of the sample stated to believe that climate change is actually taking place (93% and 99% of the American and Italian students, respectively), 21% of the American students were not convinced that the main cause of climate change is associated to human activities, while only 8% of the Italian students had the same perception.

The second part of the questionnaire is designed as a contingent valuation[3] exercise, asking the respondents to state the maximum amount of money they would be willing to annually pay to reduce by 17%[4] the GHG emissions by 2020. The GHG reduction target, the time horizon and the money values proposed on a 9-level scale, going from $0 to $475 or more, are those used by Kotchen *et al*. (2013) which is a benchmarking research for this topic. Our research, however, substantially differs from Kotchen's, since our goal is to test if the WTP changes according to how the tax revenues are used, in the vein of the research conducted by Hsu (2008) and Kaplowitz and McCright (2015), and not according to the policy used to collect the money, that is a carbon tax, rather than cap-and-trade or regulation. Cap-and-trade and regulation, in fact, are already used both in US and in Italy, while carbon tax is not implemented yet, but is periodically proposed as an additional instrument to curb climate change.

Since we wanted to test whether the tax would be more politically acceptable if the proceeds are used to reduce existing taxes (as proposed by Pearce, 1991), to finance and support policies aimed at mitigating the environmental impact of human activities, or to reduce the use of non-renewable energy, we collected the respondents' WTP via four different questions. The first time we asked the WTP for a generic carbon tax. The second time we asked the WTP for a carbon tax whose revenues would be used to finance research and development of new technologies for renewable energy. The third time we asked the WTP for a carbon tax whose revenues would be used to mitigate climate change impacts (for example reforestation), or to support environmental friendly behaviors (for example switching from private car to public transport or car-sharing). The fourth time we asked the WTP for a carbon tax whose revenues would be used to reduce the regressive impact of the policy via a revenue recycling scheme.

Very few students refused to pay the proposed carbon tax ranging between 5% of the sample, if the revenues are used to mitigate the climate change effects, and 14%, if the revenues are used to mitigate distributional effects.

[3] Mitchell and Carson (1989) and Hanemann (1994) provide a detailed description of the pros and cons of the contingent valuation methodology and are invaluable guidelines on how to implement it reducing at minimum the intrinsic hypothetical bias potentially affecting the data collected.

[4] Reduction proposed in 2009 by the American Clean Energy and Security Act (ACES) and in 2010 by the American Power Act (APA).

Figure 1 Stated WTP distribution by nationality and by tax revenues use

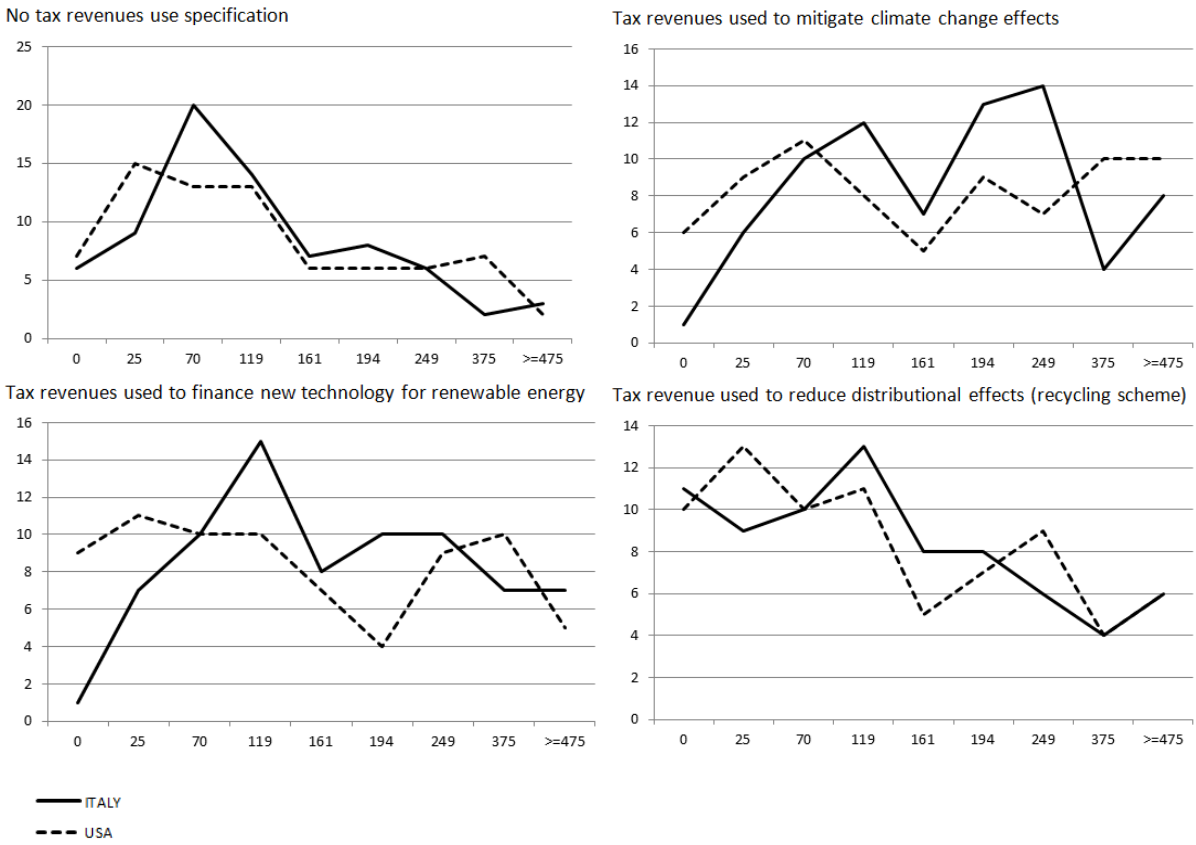

Figure 1 illustrates the stated WTP according to respondents' nationality and to the use of the carbon tax revenue. The frequency of the students willing to pay the tax tends to decrease as the values proposed in the scenario characterized by the recycling scheme increase, while it is bell shaped in the other scenarios, with the highest frequencies ranging between $70 and $249 according to the sample nationality and to the revenue use specification.

Finally, the respondents stating that they would never pay any amount of money, no matter what the use of the tax revenue was, were asked to motivate their choices. Only one Italian student turned out to be a "protest bidder", stating that he did not trust politicians to spend environmental taxes solely on environmental measures. The American "protest bidders", instead, were five and justified their choices stating that they were concerned about the potential impact that the tax could produce on the competitiveness of the economic system, that they did not trust the government promises of using the revenues for environmental purposes or that they simply did not want to pay taxes at all.

Although most of the reasons given by the "protest bidders" are in line with the results already found by Hsu (2008), none of the students stated that they were concerned about the potential regressive impact of the tax, substantially differing with the stream of literature identifying the distributional impact of the carbon tax as the main obstacle to its implementation and the main cause of its unpopularity.

4. Results and discussion

An econometric analysis of the stated WTP has been performed in order to detect how the sociodemographic characteristics of the respondents and the earmarking of the tax revenues explain the stated preferences of the respondents.

In the vein of the methodology proposed by Kristrom (1990) to model and evaluate welfare measures on the basis of discrete response data, we specified the utility functions for accepting to pay (U_YES) rather than refusing to pay (U_NO) the amounts proposed as follows:

$$U_YES = B_{TAX_AMOUNT}*TAX_AMOUNT + \beta_{REVENUE_MITIGATION}*REVENUE_MITIGATION + \beta_{REVENUE_ENERGY}*REVENUE_ENERGY + \beta_{EXISTANCE_CLIMATE_CHANGE}*EXISTANCE_CLIMATE_CHANGE + \beta_{HUMAN_RESPONSABILITY}*HUMAN_RESPONSABILITY + B_{MALE}*MALE + B_{AGE}*AGE + B_{HUMANISTIC}*HUMANISTIC + B_{ECONOMICS}*ECONOMICS + B_{MEDICAL}*MEDICAL + B_{BIOLOGICAL}*BIOLOGICAL + B_{LEFT_PARTY}*LEFT_PARTY + B_{RIGHT_PARTY}*RIGHT_PARTY$$

$$U_NO = \beta_{CONSTANT}*ONE$$

To estimate the parameters of the utility functions we used three mixed logit models: one model for the American students, one for the Italian students, and one aggregate model for the sample as a whole. In the aggregate model the parameters have been distinctively specified for each of the two subsamples (they are "subsample specific"). The aggregate model has been estimated to compare the parameters obtained for the American and the Italian respondents controlling for the potential difference of the scale parameter.

The dependent variable of the mixed logit models is a dummy equal to one if the respondent states to be willing to pay the amount proposed and zero otherwise. We collected 32 observations for each respondent since, for each of the four policy scenarios, we proposed 8 amounts: $25, $70, $119, $161, $194, $249, $375, $475.

The explanatory variables are: the amounts proposed (TAX_AMOUNT), the tax revenues earmarking (REVENUE_MITIGATION, REVENUE_ENERGY), the respondents' believes about the existence of (EXISTANCE_CLIMATE_CHANGE) and the human responsibility for (HUMAN_RESPONSABILITY) climate change, the sociodemographic characteristics of the respondents (MALE, AGE), the major of the attended university program (HUMANISTIC, ECONOMICS, MEDICAL, BIOLOGICAL), and the respondents' political affiliation (LEFT_PARTY, RIGHT_PARTY).

All the parameters of the models are fixed, except for the carbon tax one which has been specified as a random parameter with a symmetrical triangular distribution constrained to be negative[5]. This procedure allowed us to

[5] The triangular distribution was chosen because it avoids excessively and unrealistic large absolute values of the random parameter. More specifically, we allowed the mean of the distribution to be a free parameter, β, but we fixed the two

better take into account the heterogeneity of the students' preferences, substantially improving the goodness of fit of the models, still preserving its meaningfulness (no positive values for this parameter are allowed).

On the basis of the estimation of the random parameter distribution (expected value and spread) and of the choices made by each respondent, it has been possible to estimate the value of the carbon tax parameter (B_{TAX_AMOUNT}) at the individual level.

The mixed logit models have been specified in order to account for the repeated observations collected from each respondent.

The aggregate model included an error component controlling for the potential different scale of the American and the Italian subsample. Since the standard deviation of the error component was not statistically significant, implying that the scale parameters of the two subsamples do not differ, it has been removed from the specification of the aggregate model described in Table 3.

endpoints of the parameter distribution (defining the range of the triangular density function) to be equal to 0 and 2β, respectively. It implies that the mean of the distribution of the random parameter is a free parameter, while the variance is not.

Table 3 Mixed logit models estimated on the basis of the stated WTP (Standard Error in brackets)

Description of the independent variables and of the estimated parameters β	American Subsample	Italian Subsample	Aggregate Model	
			USA	Italy
CONSTANT	3.27* (0.59)	5.99* (4.01)	4.99* (1.88)	4.69* (4.10)
TAX_AMOUNT: Amount of the carbon tax ($, expected value of the triangular distribution)	-0.01* (0.00)	-0.05* (0.00)	-0.38* (0.00)	-0.05* (0.00)
REVENUE_MITIGATION: Tax revenue used to mitigate climate change effects (dummy)	0.73* (0.13)	2.10* (0.22)	1.52* (0.19)	2.12* (0.22)
REVENUE_ENERGY: Tax revenue used to finance technology for renewable energy (dummy)	0.32* (0.13)	1.78* (0.21)	0.62* (0.18)	1.79* (0.21)
EXISTANCE_CLIMATE_CHANGE: Belief about existence of climate change (dummy: 1=yes; 0=no)		3.59* (1.21)		3.48* (1.25)
HUMAN_RESPONSABILITY: Belief about human responsibility for climate change (ordinal categorical variable from 0=not responsible to 3=highly responsible)	0.30* (0.05)		0.53* (0.12)	
MALE: Gender (dummy: 1=male; 0=female)	0.25* (0.12)	-1.55 (0.37)	0.43 (0.33)	-1.67* (0.38)
AGE	0.20* (0.03)	0.08* (0.09)	0.35* (0.09)	0.05 (0.09)
HUMANISTIC: Major Humanistic Studies (dummy, reference level Engineering and Technical Sciences)	-0.51* (0.09)	-0.91* (0.45)	-0.72* (0.26)	-1.13* (0.48)
ECONOMICS: Major Economics (dummy, reference level Engineering and Technical Sciences)	-0.19* (0.12)	-0.62 (0.39)	-0.23 (0.36)	-0.89* (0.43)
MEDICAL: Major Medical Sciences (dummy, reference level Engineering and Technical Sciences)	0.31 (0.15)	-0.96* (0.44)	0.84* (0.53)	-1.13* (0.48)
BIOLOGICAL: Major Biological Sciences (dummy, reference level Engineering and Technical Sciences)	0.39* (0.12)	2.49* (0.93)	0.11 (0.40)	3.19* (1.06)
LEFT_PARTY: Political party: left (dummy, reference level no answer)	0.42* (0.09)	-0.93 (0.41)	0.64* (0.25)	-0.95* (0.41)
RIGHT_PARTY: Political party: right (dummy, reference level no answer)	-0.42* (0.09)	0.93 (0.41)	-0.64* (0.25)	0.95* (0.41)
N. Obs.	2400	2400	4800	
Adj.Rho^2	0.56	0.59	0.79	

Note: * statistically significant estimates

Columns 1 and 2 of Table 3 report the results obtained separately analyzing the answers given by the American and the Italian respondents; columns 3 and 4 report the results of the subsample specific parameters obtained estimating the aggregate model.

All the models fit the data very well (adjusted Rho^2 ranging from 0.56 to 0.79). The parameters have the expected sign and the majority of them are statistically significant. The estimates obtained for the aggregate model are consistent with those obtained for each subsample.

The constant is positive meaning that, everything else being equal, the respondents are not willing to pay additional taxes.

The expected value of the distribution of the tax parameter is negative, implying that the higher the value of the tax the smaller the willingness to pay it. However, comparing the segment specific parameters obtained with the aggregate model, it is possible to state that the Italian respondents are less sensitive to the amount of the tax than the American ones (the expected marginal disutility for the tax amount is 0.05 for the Italian subsample, while it is 0.38 for the American subsample).

The revenue use specification significantly influences the acceptability of paying the tax, in line with the results obtained by Kaplowitz and McCright (2015), Kallbekken and Sælen (2011), Sælen and Kallbekken (2010) and Hsu (2008). Both the American and the Italian respondents are more willing to pay the tax if the revenues are used to mitigate the negative impacts of the climate change, or to finance new technologies for the development of renewable energy sources, rather than to finance recycling schemes or general government spending. Analyzing the parameters obtained with the aggregate model it is also possible to conclude that the impact of the revenue use is much larger for the Italian respondents. The absolute value of both the "MITIGATION" and the "ENERGY" parameter is larger for the Italian subsample than for the American one: 2.12 vs. 1.52, and 1.79 vs. 0.62, respectively. However the difference between the two tax scenarios is larger for the American subsample than for the Italian one, indeed the absolute value of the difference of the "MITIGATION" and the "ENERGY" parameter is 0.9 for the American students while it is 0.3 for the Italian ones.

The respondents' beliefs about climate change existence and human responsibility increase the probability of being willing to pay the tax, in line with the conclusions of Akter and Bennett (2011), Kallbekken and Sælen (2011) and Moser and Dilling (2007). The first parameter (3.48) is statistically significant and positive for the Italian respondents, while the second one (0.53) is statistically significant and positive for the American respondents.

Only for the Italian subsample being a female increases the probability of willing to pay the tax (-1.67), in line with the stream of the literature according to which women are more environmental sensitive than men (Stern *et al.*, 1993).

Also the respondents' age plays a role in the choice between willing to pay and not willing to pay a hypothetical carbon tax. As the respondents get older, the propensity to pay the tax increases, similarly to the results found by Rienstra *et al.* (1999). This result, that is relatively stronger for the American subsample than for the Italian one (0.35 vs. 0.05), might be due to a general higher awareness of older students with respect to global economic, political, social and environmental issues. It is not in contrast with what found by Hersch and Viscusi (2006) according to which environmental sensitivity is negatively correlated to age, since our sample includes only young people, most of which are younger than 21.

The major chosen for the attended university programme influences the willingness to pay of the respondents, but in a quite different way when comparing the results obtained for the two subsamples. In both cases studying Humanistic Sciences systematically reduces the probability of willing to pay the tax, but opting for Medical Sciences positively impacts the choices of the American students, while negatively affects the choices

of the Italian ones. Moreover, but only for the Italian students, studying Biological Science increases the students' willingness to pay, while studying Economics decreases it.

Finally for the American students having a left political affiliation positively impact the willingness to pay a carbon tax, while the opposite holds true for the Italian students. According to Carl and Fedor (2016) around the world the relationship between political ideology and system forms or revenue uses is mixed. Right-leaning or center governments use carbon taxes rather than cap and trade and use at least two-thirds of carbon revenues to be recycled to the public or otherwise used in non-earmarked general funds, while left-leaning governments use both carbon system forms, that is carbon tax and cap-and trade, and are mixed in their revenue use, both "green spending" and general funds. It is however quite surprising that in Italy the left voters seem to be less concerned about the environment than the right voters. We have two interpretations for this result, on the one hand the number of students refusing to state their political affiliation was particularly high in the Italian case study and it might have distorted the results, on the other hand there could be a positive correlation between being a left voter and having a lower income. Unfortunately the extremely high percentage of missing responses on the income level and on the political affiliation did not allow us to test this hypothesis. In fact we included the income variable in the mixed logit models, but for the above mentioned reason it never turned out statistically significant.

On the basis of the parameters of the aggregate mixed logit model illustrated in Table 3 (column 3 and 4) and of the individual specific estimates of the "TAX AMOUNT" parameter, it has been possible to calculate the amount of the tax according to which the individual probability of willing to pay the tax is equal to 0.5. The calculated amount is the estimated individual specific median WTP.

Averaging the individual median values over the two subsamples we allowed us to obtain the sample median WTP by nationality, as reported in Table 4. We opted for estimating the median instead of the mean WTP because, as pointed out by Kristrom (1990), it is robust towards tail-behavior (i.e. observations far off the median), and is consistent to evaluate policy acceptability issues.

Table 4 Median WTP ($) for a Carbon tax by nationality and by tax revenue use specification

	No use specification or recycle scheme		Mitigate climate change effects		Finance new technology for renewable energy	
	USA	Italy	USA	Italy	USA	Italy
Min.	18	25	44	52	29	48
Max.	662	1017	946	1543	780	1462
Stand. Dev.	137	144	187	215	157	204
Average	172	161	242	246	201	233

The average median WTP of the two subsamples is quite similar and ranges between a minimum of $161 to a maximum of $242. The largest difference is found with respect to the third policy scenario in which the tax revenues are hypothetically used to finance new technologies aimed at improving the development of renewable energy sources. In this case the WTP of the American students is smaller than the Italian one.

The results reported in Table 4 allow us to conclude that for both subsamples the acceptability degree of a carbon tax is a fairly high. Under this perspective the political agenda recently approved in USA foreseeing a drastic reduction of the government support in favor of environmental policies might not properly reflect the preferences of the young electorate. Our estimates are somewhat larger than those found by Kotchen et al. (2013) according to which the median WTP for a generic carbon tax in USA is equal to $81. The difference, however, is most probably due to the fact that our sample comprises exclusively university students, having a higher education attainment which is associated with greater WTP, as already found by Hersch and Viscusi (2006). Moreover, the policy scenarios for which we obtained the highest WTP comprise environmental oriented uses of the tax revenues which, as proven by Hsu (2008), tends to significantly increase the tax acceptability and the WTP for it. Instead, in the research proposed by Kotchen *et al.* (2013), the earmarking of the tax revenues was not specified.

Finally we estimated the percentage of students that would be willing to pay the carbon tax if it were set equal to $100 per year. It is found that the percentage of students in favor of the tax would be in the range between 60% and 83% in the Italian case study, and between 64% and 73% in the US case study, according to the hypothesized earmarking scenario.

5. Conclusions

GHG emissions are increasing despite the efforts made to regulate and control their production. According to the scientific literature (De Borger *et al.*, 2001), a carbon tax could be an effective policy to reduce CO_2 emissions and to curb climate change. Contrary to what generally thought, the tax does not necessarily produce negative impacts on the economic performance of a country and, if imposed on fuel rather than energy consumption, could even avoid the distributional problems advocated by its detractors[6].

The real issue preventing the introduction of a carbon tax in both countries is its presumed low acceptability. The economic and social literature, however, proves that if the tax revenues are used for environmental purposes, the acceptability degree of this otherwise unpopular policy could significantly increase (Kallbekken and Saelen, 2011; Hsu et al., 2008; Schade and Schlag, 2003).

Unfortunately there are no studies estimating the WTP for the Italian context, or comparing it with the WTP of other countries. Our research aims at filling this gap and finds that the number of "protest bidders" is on average extremely low, one for the Italian subsample, and 5 for the American one, and in both cases the main reason of the stated refuses to pay is the mistrust that the tax would be spent solely on environmental measures. The policy implication is that, since tax payers hold ''a view of taxes solely as a means of raising revenue, rather than in terms of their incentive effects'' (Dresner et al., 2006a), it would be of paramount importance to give a strong and consistent message on how the carbon tax revenue would be used before the tax is introduced, and to choose a destination that is strongly linked to climate change mitigation initiatives.

[6] In Italy, fuel consumption is already heavily taxed but, as proven by Beria *et al*. (2012), the negative externalities produced by road transport in urban areas are much larger than the taxes currently paid. Since in Italy 74% of total daily trips are performed in urban contexts (ISFORT, 2017[6]), a carbon tax would on average increase the efficiency of the system. Similar conclusions could be drawn for the USA where fuel taxes are much lower than in Italy and are far from internalizing all the negative externalities produced by road transport.

According to our econometric analysis the Italian and the American students that have been interviewed have a median WTP which is quite similar and ranges between a minimum of $161 and a maximum of $242 (in between the estimates found by Kotchen *et al*., 2013, and Hersch and Viscusi, 2006). The results are based on a small and segment specific sample, so that caution should be used extending them to other countries or to the population as a whole, but they testify the potential acceptability of this policy.

The estimated values of the WTP differ according to destination proposed for the tax revenue, being much higher if used for mitigating the climate change effects, which further stresses the importance of properly earmarking the tax in order to increase its political support. Moreover, as Carl and Fedor (2016) suggest, the use the tax revenue for environmental purposes could reduce the political pressure to modify or even cancel it over time. Indeed, if the revenues are constrained to visible budgetary ends which are extensively politically supported, like "green purposes", then any change should preserve the back-end revenue stream, limiting the possibility of modify or cancel it out. Finally, while local climate phenomena and climate change may not offer sufficient policy support overtime, since they are affected by intertemporal variation, planetary feedbacks, and other countries' emission levels, carbon revenues are: publicly visible, reportable year-to-year, and politically immediate, that is better able to demonstrate the mitigation policy effectiveness.

Despite the evidence reported in the literature, which is confirmed by our results, most of the carbon taxes currently levied are refunded or used in general funds (Pereira *et al.*, 2016), since they offer "revenue certainty" which is more easily administered by governments. In Italy, for example, the most recent fuel tax increments have been introduced to collect funds aimed at mitigating the 2009 and 2012 earth-quakes damages.

The potential distributive impact of a carbon tax, instead, is not perceived by our sample as being particularly problematic. According to our econometric analysis the acceptability of the tax and the WTP for it does not substantially differ if the revenues are used for general purposes rather than if they are redistributed to lower income households. The respondents seem to believe that protecting the environment is a long-term goal that is somewhat superior to the short-term issue of the welfare distribution and the uneven burden of the tax, similarly to the evidence reported by Kallbekken and Sælen (2011) and Sælen and Kallbekken (2010). This result, however, should be further studied, since it could be due to the specific sociodemographic characteristics of our sample. University students could have weaker budget constrains than their parents or the rest of the population, and this could at least partially explain the result obtained.

A very important factor influencing the respondents' preferences is their knowledge about climate change: the more they believe that climate change exist and is caused by human activities, the higher is their WTP for a carbon tax (in line with the evidence reported by Kotchen et al., 2013; Akter and Bennett, 2011; Viscusi and Zeckhauser, 2006; Hersch and Viscusi, 2006). This result has an important policy implication, in fact before introducing a carbon tax it would be necessary to fully explain to the tax payers by how much GHG emissions are growing over time, what their main sources are and how these polluters can change the climate and impact the environment. It means that the successful implementation of a carbon tax strictly depends on the information campaign that should be organized largely in advance before the tax is levied.

The political orientation of the respondents seems to play a role on the stated WTP, somewhat in line with our expectation in USA, where the left oriented voters are more prone to be willing to pay da tax, less so in Italy

where, apparently and quite surprisingly, the opposite holds true. This result, however, should be further studied and analyzed, since the number of students that refused to state their political affiliation, or did not have a political affiliation at all, was extremely high, especially for the Italian subsample. In fact, at least in Europe, and Italy makes no exception, the disengagement process of young people in politics is strong and increasing (Maggini, 2016). The results however prove that when dealing with environmental issues politicians should carefully target younger voters whose preferences might differ from what expected.

Our research is innovative both for the topic chosen, since there are no studies testing the WTP for a carbon tax in the Italian context nor comparing it with the WTP expressed in other countries, and for the methodology used to estimate the WTP, making use of random parameters logit models to obtain individual specific estimates of the median WTP. The main drawback of our research, however, is that it is based on a small sample. The experiment results, however, are in line with the very few studies available on this topic (although referring to other countries) and prove the value of the methodology used both to collect the data and to analyze them.

Since knowing the preferences of tax payers and the factors influencing them would give an enormous advantage to policy makers on how to properly design and promote a carbon tax in order to guarantee its successful implementation, future research efforts will be made to expand the sample to other segments of the Italian population and to increase the number of people interviewed.

6. References

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), 417-436.

Bajo-Buenestado, R. (2016). Evidence of asymmetric behavioral responses to changes in gasoline prices and taxes for different fuel types. Energy Policy, 96, 119-130.

Baranzini, A., Goldemberg, J., Speck, S. (2000) A future for carbon taxes. Ecological Economics 32 (3),395–412.

Barker, T., Köhler, J. (1998) Equity and ecotax reform in the EU: achieving a 10 percent reduction in CO2 emissions using excise duties. Fiscal Studies 19(4), 375–402.

Baumol, W.J., Oates, W.E. (1988) The Theory of Environmental Policy, vol. 23, second ed. Cambridge University Press, New York.

Beria, P., Grimaldi, R., Ponti, M. (2012) Comparison of social and perceived costs of road transport in Italy, Economics and policy of energy and the environment, 2: 85-112.

Brannlund, R., Nordstrom, J. (2004) Carbon tax simulations using a household demand odel. European Economic Review 48, 211–233.

Bruvoll, A., Larsen, B.M. (2004) Greenhouse gas emissions in Norway: do carbon taxes work? Energy Policy 32(4), 493–505.

Bureau, B. (2011) Distributional effects of a carbon tax on car fuels in France. Energy Economics 33(1), 121–130.

Callan, T., Lyons, S., Scott, S., Tol, R. S., & Verde, S. (2009). The distributional implications of a carbon tax in Ireland. Energy Policy, 37(2), 407-412.

Carl, J., & Fedor, D. (2016). Tracking global carbon revenues: A survey of carbon taxes versus cap-and-trade in the real world. Energy Policy, 96, 50-77.

Cingano, F., Faiella, I. (2013). La tassazione" verde" in Italia: l'analisi di una carbon tax sui trasporti. Banca d'Italia, n. 206 (www.bancaditalia.it)

Conefrey, T., FitzGerald, J.D., Malaguzzi Valeri, L., Tol, R.S.J. (2012) The impact of a carbon tax on economic growth and carbon dioxide emissions in Ireland. Journal of Environmental Planning and Management, 1–19.

De Paoli, L. (2015) The fight against climate change: some proposals for action for Italy in Europe. Economics and Policy of Energy and the Environment, 1: 9-27.

Di Cosmo, V., & Hyland, M. (2013). Carbon tax scenarios and their effects on the Irish energy sector. Energy Policy, 59, 404-414.

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. EnergyPolicy 34(8), 895–904.

Faiella, I., Cingano, F. (2015). La tassazione verde in Italia: l'analisi di una carbon tax sui trasporti. Green taxation in Italy: an assessment of a carbon tax on transport, Economia pubblica, 2: 45-90.

Forzieri G, Cescatti A, e Silva FB, Feyen L. Increasing risk over time of weather-related hazards to the European population: a data-driven prognostic study. Lancet Planet Health 2017; 1: e200–08.

Gerlagh, R.,van der Zwaan, B. (2006) Options and instruments for a deep cut in CO2 emissions: carbon dioxide capture or renewables, taxes or subsidies? The Energy Journal 27(3), 25–48.

Gonzalez, F. (2012) Distributional effects of carbon taxes: the case of Mexico. Energy Economics 34(6), 2102–2115.

Hanemann, M. (1994) Valuing the environment through contingent valuation. Journal of Economic Perspectives 8, 19–43.

Hersch, J., & Viscusi, W. K. (2006). The generational divide in support for environmental policies: European evidence. Climatic Change, 77(1-2), 121-136.

Hsu, S. L., Walters, J., & Purgas, A. (2008). Pollution tax heuristics: An empirical study of willingness to pay higher gasoline taxes. Energy Policy, 36(9), 3612-3619.

IPCC (2014). Climate Change 2014: Mitigation of Climate Change . Exit Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J.

Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Jiang, Z., & Shao, S. (2014). Distributional effects of a carbon tax on Chinese households: A case of Shanghai. Energy Policy, 73, 269-277.

Kallbekken, S., & Sælen, H. (2011). Public acceptance for environmental taxes: Self-interest, environmental and distributional concerns. Energy Policy, 39(5), 2966-2973.

Kallbekken, S., Aasen, M. (2010) The demand for earmarking: results from a focus group study in Norway. Ecological Economics 69(11), 2183–2190.

Kaplowitz, S. A., & McCright, A. M. (2015). Effects of policy characteristics and justifications on acceptance of a gasoline tax increase. Energy Policy, 87, 370-381.

Kerkhof, A. C., Moll, H. C., Drissen, E., Wilting, H. C. (2008) Taxation of multiple greenhouse gases and the effects on income distribution: a case study of the Netherlands. Ecological Economics 67(2), 318–326.

Kotchen, M. J., Boyle, K. J., & Leiserowitz, A. A. (2013). Willingness-to-pay and policy-instrument choice for climate-change policy in the United States. Energy Policy, 55, 617-625.

Kristrom, B. (1990) Valuing environmental benefits using the contingent valuation method. An Econometric Analysis, Umeå Economic Studies No. 219, Department of Economics, University of Umeå, ISSN: 0348-1018, ISBN: 91-7174-481-9.

Lin, B., Li, X. (2011) The effect of carbon tax on per capita CO2 emissions. Energy Policy 39(9), 5137–5146.

Liu, Y., Cirillo, C. (2016). Evaluating policies to reduce greenhouse gas emissions from private transportation. Transportation Research Part D: Transport and Environment, 44, 219-233.

Lu, C., Tong, Q., Liu, X. (2010) The impacts of carbon tax and complementary policies on Chinese economy. Energy Policy 38(11), 7278–7285.

Maggini, N. (2016) Young People's Voting Behaviour in Europe. A Comparative Perspective, Palgrave Macmillan.

Mathur, A., & Morris, A. C. (2014). Distributional effects of a carbon tax in broader US fiscal reform. Energy Policy, 66, 326-334.

Mitchell, R.C., Carson, R.T. (1989) Using surveys to value public goods: the contingent valuation method. Resources for the Future Press, Washington DC.

Montag, J. (2015). The simple economics of motor vehicle pollution: A case for fuel tax. Energy Policy, 85, 138-149.

Mori, K. (2012). Modeling the impact of a carbon tax: A trial analysis for Washington State. Energy Policy, 48, 627-639.

Moser, S., Dilling, L. (Eds.) (2007). Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change, Cambridge: Cambridge University Press, doi: 10.1017/CBO9780511535871

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.

Pearce, D.W. (1991) The role of carbon taxes in adjusting to global warming. Economic Journal 101(407),938–948.

Pereira, A. M., Pereira, R. M., & Rodrigues, P. G. (2016). A new carbon tax in Portugal: A missed opportunity to achieve the triple dividend?. Energy Policy, 93, 110-118.

Rapanos, V.T., Polemis, M.L. (2005) Energy demand and environmental taxes: the case of Greece. Energy Policy 33(14), 1781–1788.

Rienstra, S.A., Rietveld, P., Verhoef, E.T. (1999) The social support for policy measures in passenger transport. A statistical analysis for the Netherlands. Transportation Research D, 181–200.

Sælen, H.G., Kallbekken, S. (2010) A choice experiment on fuel taxation and earmarking in Norway. CICERO Working paper 2010: 02, Oslo, Norway.

Safirova, E., Gillingham, K., Parry, I., Nelson, P., Harrington, W., Mason, D., (2004) Welfare and distributional effects of road pricing schemes for metropolitan Washington DC. Research in Transport Economics 9, 179–206.

Schade, J., Schlag, B. (2003) Acceptability of urban transport pricing strategies. Transportation Research Part F (6), 45–61.

Scott, S., Eakins, J. (2004) Carbon taxes: which households gain or lose? ERTDI Report Series 20. Environmental Protection Agency, Johnstown Castle.

Stavins, R. N. (2000). Market-based environmental policies. Public policies for environmental protection, 31, 32.

Stern, P.C., Dietz, T. ,Kalof, L. (1993) Value orientations, gender, and environmental concern. Environment and Behavior 25, 322–348.

Sterner, T. (2007). Fuel taxes: An important instrument for climate policy. Energy policy, 35(6), 3194-3202.

Sterner, T. (2012). Distributional effects of taxing transport fuel. Energy Policy, 41, 75-83.

Stram, B. N. (2014). A new strategic plan for a carbon tax. Energy Policy, 73, 519-523.

Thalmann, P. (2004) The public acceptance of green taxes: 2million voters express their opinion. Public Choice 119, 179–217.

Tiezzi, S. (2001) The welfare effects of carbon taxation on Italian households. Working Paper 337, Dipartimento di Economia Politica, Universita' degli Studi di Siena.

Tiezzi, S. (2005) The welfare effects and the distributive impact of carbon taxation on Italian households, Energy Policy 33, 1597–1612

Van Heerden, J., Gerlagh, R., Blignaut, J., Horridge, M., Hess, S., Mabugu, R., Mabugu, M., (2006) Searching for triple dividends in South Africa: fighting CO2 pollution and poverty while promoting growth. The Energy Journal 27, 113–141.

Viscusi, W. K., & Zeckhauser, R. J. (2006). The perception and valuation of the risks of climate change: a rational and behavioral blend. Climatic change, 77(1-2), 151-177.

Wier, M., Birr-Pedersen, K., Jacobsen, H. K., Klok, J. (2005) Are CO2 taxes regressive? Evidence from the Danish experience. Ecological Economics 52, 239–251.

Wissema,W., Dellink, R. (2007) AGE analysis of the impact of a carbon energy tax on the Irish economy. Ecological Economics 61(4), 671–683.

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