



Willingness-to-pay and policy-instrument choice for climate-change policy in the United States

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HIGHLIGHTS

- First willingness-to-pay (WTP) estimates for actual national climate-change policy in the U.S.
- WTP does not vary among the instruments of a cap-and-trade program, a carbon tax, or a GHG regulation.
- There are differences in the characteristics of those willing to pay across policy instruments.
- No differences after controlling for opinions about whether global warming is actually happening.

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ABSTRACT

This paper provides the first willingness-to-pay (WTP) estimates in support of a national climate-change policy that are comparable with the costs of actual legislative efforts in the U.S. Congress. Based on a survey of 2034 American adults, we find that households are, on average, willing to pay between \$79 and \$89 per year in support of reducing domestic greenhouse-gas (GHG) emissions 17% by 2020. Even very conservative estimates yield an average WTP at or above \$60 per year. Taking advantage of randomized treatments within the survey valuation question, we find that mean WTP does not vary substantially among the policy instruments of a cap-and-trade program, a carbon tax, or a GHG regulation. But there are differences in the sociodemographic characteristics of those willing to pay across policy instruments. Greater education always increases WTP. Older individuals have a lower WTP for a carbon tax and a GHG regulation, while greater household income increases WTP for these same two policy instruments. Republicans, along with those indicating no political party affiliation, have a significantly lower WTP regardless of the policy instrument. But many of these differences are no longer evident after controlling for respondent opinions about whether global warming is actually happening.

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1. Introduction

The United States has experienced a changing landscape of potential policy instruments for the regulation of greenhouse-gas (GHG) emissions. Though no policy has been implemented at the national level, two recent efforts in the U.S. Congress centered on a “cap-and-trade” system of emission permits, whereby emissions would be capped at a maximum level, and firms could buy and sell pollution permits under the cap. More recently, many economists have advocated for a carbon tax on GHG emissions

(e.g., Metcalf and Weisbach, 2009; Nordhaus, 2010), citing the climate and energy benefits, ease of administration, and potential government revenues. At present, however, the attention of policymakers is focused on the prospect of GHG regulation under authority of the Clean Air Act, which called for specific standards to be promulgated by the U.S. Environmental Protection Agency (EPA) (U.S. Environmental Protection Agency, 2011a, 2011b) and are now under review as the Carbon Pollution Standard for New Power Plants (U.S. Environmental Protection Agency, 2012).

Despite variation among the policy instruments for reducing emissions, debate about climate-change policy in the United States often centers more directly on the costs of taking action. Contributing to the debate is the fact that relatively little evidence exists on the willingness-to-pay (WTP) of households in support of climate-change policy and on the political acceptability of

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different policy instruments. This paper helps fill the gap with estimates of household WTP to reduce domestic GHG emissions in the United States. The estimates are based on a stated-preference (i.e., contingent valuation) question included in two nationally representative surveys, one in 2010 and one in 2011, with a combined sample size of 2034 American adults. While acknowledging that stated-preference estimates of WTP are sometimes questioned, we believe the estimates reported in this paper make an important contribution to the literature. Stated-preference surveys are the only way to estimate total economic value, which includes use values and non-use values and considerations for future generations; and the results of our survey provide the first WTP estimates of a national climate policy that are comparable with the costs of legislative efforts that have taken place in the U.S. Congress. The estimates thus establish a useful benchmark for other studies and policy analysis.¹ The results also provide a complement to other approaches that seek to quantify the benefits of climate-change mitigation with estimates of the social cost of carbon (SCC).²

Beyond the benefit estimates themselves, the paper also contributes to the literature on policy-instrument choice. We include in the valuation question three randomized treatments for the choice of policy instrument: a cap-and-trade program, a carbon tax, and a GHG regulation. These three policy instruments have received the greatest attention and serve as the basis for most political debate, and here we investigate the ways that instrument choice affects WTP. While the costs associated with different policy instruments may differ, economic theory implies that the benefits of meeting an emissions target should be invariant to instrument choice. Whether such invariance holds is therefore an important question of political economy. We emphasize that even if one questions the magnitudes of our WTP estimates, many of our findings are of interest because they are based on relative comparisons of randomized treatments, among which any methodological biases are constant.

We find that the mean WTP of U.S. households to reduce domestic GHG emissions 17% by 2020 – that is, the near-term target specified in recent U.S. House and Senate bills – ranges between \$79 and \$89 per year for the next 10 years. We also find empirical evidence that mean WTP does not vary substantially among the policy instruments of a cap-and-trade-program, a carbon tax, or a GHG regulation. But the sociodemographic characteristics do differ among those willing to pay for emission reductions under different policy instruments. While some of these differences are explained by political party affiliation, respondent beliefs about whether climate change is actually happening are even more important for explaining differences in WTP.

The remainder of the paper is organized as follows. The next section further motivates our analysis with a brief overview of leading efforts for national climate policy in the United States. [Section 3](#) reports the details of our survey design and data collection, [Section 4](#) describes our statistical methods and reports the results, and finally, [Section 5](#) provides further discussion of the policy implications and concludes the paper.

2. Background on leading efforts for U.S. climate-change policy

On June 26, 2009 the U.S. House of Representatives passed the American Clean Energy and Security Act (ACES). Though it did not become law, the bill would have established targets for the reduction of domestic carbon-dioxide emissions and achieved them primarily through a cap-and-trade system. Among the key targets were a 17% reduction in emissions (below 2005 levels) by 2020 and an 80% reduction by 2050. In the Senate, the American Power Act (APA) was introduced as a draft bill on May 12, 2010 and also sought to establish a cap-and-trade system with similar emission targets, a 17% reduction by 2020 and a 83% reduction by 2050. A vote on the Senate bill was never taken despite much political attention during the summer of 2010.

Opposition to both the House and Senate bills tended to focus (and still does) on the economy-wide costs of reducing emissions. The Congressional Budget Office (CBO) estimates that ACES would cost the average American household \$175 per year in 2020 but reported in \$2010s ([Congressional Budget Office, 2009](#)). A comparable analysis by the EPA finds that ACES would cost households between \$74 and \$117 per year, which is the discounted average annual cost between 2010 and 2050 ([U.S. Environmental Protection Agency, 2010a](#)). In a separate study, the EPA also estimates the cost of implementing APA, with estimates ranging from \$79 to \$146 per household per year, which is again the discounted average cost between 2010 and 2050 ([U.S. Environmental Protection Agency, 2010b](#)).

Missing from the debate, however, is evidence on the economic benefits of addressing climate change through the emissions targets of such legislation. As explained in the U.S. EPA *Guidelines for Preparing Economic Analyses*, the economic benefits of an environmental policy are measured as the public's WTP to obtain the specified change in environmental quality ([U.S. Environmental Protection Agency, 2010c](#)). In what follows, therefore, we focus on estimates of household WTP to reduce domestic GHG emission 17% by 2020—that is, the near-term target specified in both the House and Senate bills. Our WTP benefit estimates are thus roughly comparable with the EPAs estimates of household costs. We say roughly comparable because the CBO and EPA estimates include the cost of emission reductions of 17% by 2020 and also further reductions of at least 80% by 2050. For purposes of comparison, therefore, our measure of WTP should be interpreted as an underestimate with respect to the ultimate emission target itself.

Currently, however, the EPA is exercising its authority under the Clean Air Act to regulate carbon dioxide as a pollutant, set targets for emission reductions, and establish mechanisms for achieving them. On March 27, 2012, the EPA announced a Proposed Carbon Pollution Standard for New Power Plants. The primary requirement of the standard is that electricity generating units must comply with an output-based emissions standard of 1000 pounds of CO₂ per MW-h of gross generation.³ The proposed standards are currently under review and underscore the need for information on the benefits of GHG emission reductions and on how public support may differ among the choice of policy instruments.

3. Methods, data, and survey design

We conducted two surveys of Americans aged 18 and older using the nationally representative online research panel of Knowledge Networks. The surveys were conducted approximately one year

¹ Carlsson et al. (2010) also conduct a contingent valuation survey to estimate WTP for climate change mitigation. The aim of their study, however, was to make comparisons of WTP among different nations (i.e., China, Sweden, and the United States), rather than to estimate WTP for an actual legislative proposal within the United States.

² See the [Interagency Working Group on the Social Cost of Carbon \(2010\)](#) for the estimate of \$21 per metric ton on CO₂ for use in regulatory impact analysis in the United States. [Greenstone et al. \(2011\)](#) also provide a useful summary.

³ See [Kotchen and Mansur \(2012\)](#) for a detailed analysis of the stringency of the EPA's proposed carbon pollution standard.

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