For Online Publication

Online Appendix to "Pricing Carbon: Evidence from Expert Recommendations"

By MORITZ A. DRUPP, FRIKK NESJE, AND ROBERT C. SCHMIDT

Online Appendix A: Methods

A.1 Additional conceptual background

Here, we provide a more detailed conceptual background to motivate our survey design. The key feature of our approach is to give experts full flexibility in determining carbon price recommendations based on their own perspectives on the various complexities of how the economy, the climate system, and climate policy interact. We call these perspectives that may draw on different levels of formalization *mental models of the climate-economy*. These can come in stylized forms, such as a specific IAM like the DICE model (Nordhaus 2019) that some experts may rely on when forming their own views on carbon prices. Yet, they can also be based on a more intuitive understanding of climate-economy interactions, on empirical estimates of the SCC, or be grounded in political economy or other feasibility considerations that are not typically part of a formal IAM. As argued elsewhere (e.g., Pindyck, 2013; Stern and Stiglitz, 2022), disagreements on carbon pricing extend beyond mere parameter sensitivities. This may relate to differences in a descriptive understanding of the climate-economy, just like subjective models of the macroeconomy have been shown to be very heterogeneous (Andre et al., 2022). Or there can be disagreements on normative issues, for example on how to balance the well-being of current and future generations (e.g., Arrow et al., 2013; Drupp et al., 2018; Freeman and Groom, 2015; Heal and Millner, 2014). That various positive and normative aspects likely inform carbon pricing recommendations is a further justification for the flexibility that our expert survey approach allows.

It is widely accepted that market failures based on externalities can be addressed with the help of prices that signal to economic actors the true (social) costs of their activities. Accordingly, the climate change externality can be corrected with the help of a price on emissions. Theoretically, the carbon price should be identical across all sectors, and across countries, in order to achieve a cost-efficient outcome. The marginal abatement costs are, then, equalized across all emitters, so that emissions are reduced where it is cheapest. In stylized climate-economy models, the appropriate global carbon price is closely tied to the *"the most important single economic concept in the economics of climate change"* (Nordhaus, 2017, p. 1518): the social cost of carbon (SCC). The SCC is defined as the change in the discounted value of global social welfare from emitting an additional unit of CO_2 (or its equivalent for other greenhouse gases). An optimal global carbon price should, thus, reflect the (discounted) net damages that result from the emission of an additional ton of CO_2 that accrue both today and in the future, evaluated along an optimal path. This depends, among other things, on physical aspects of the climate system and on economic issues that determine how climate change impacts the world economy and the well-being of people. The aggregation of damages across time also necessitates a decision on what weights to put on the welfare of people living at different points in time, including the discounting of future utilities.

As pointed out above, we can think of an individual expert having some *mental model of the climate-economy* for determining carbon price recommendations. Such a mental model may be based on an expert's theoretical and empirical considerations on, among others, climate damages, abatement options and their costs, views on discounting, political contexts and agency structures, etc. Some experts may be informed by a particular IAM (e.g., DICE, FUND or PAGE, all of which underpin governmental guidance on the SCC in the United States) or an analytic IAM that provides closed-form solutions for the SCC or a carbon price (see, e.g., Dietz and Venmans, 2019; Gerlagh and Liski, 2018; Golosov et al., 2014; Iverson and Karp, 2021; Rezai and van der Ploeg, 2016; Traeger, 2022; van den Bijgaart et al., 2016). Global carbon prices estimated according to standard cost-benefit IAMs depend, among other things, on expected climate damages, mitigation costs, and utility discount rates. Each expert may rely on different calibrations of input parameters or functional forms for key drivers. The exact mapping of input parameters and functional forms differs across IAMs (e.g., Gillingham et al., 2018). Other examples include cost-effectiveness IAMs to model pathways that achieve certain emission reduction targets, or target-constrained IAMs that trade-off mitigation costs and climate damages within the bounds of reaching a pre-specified climate target (e.g., Schultes et al., 2021; Stern and Stiglitz, 2022). Such formalized models provide examples of plausible determinants of global carbon price levels and paths. Yet, experts may also formally or intuitively consider various extensions or alternatives approaches, such as a number of real-world constraints, for instance relating to international re-distribution or a limited internalization of other externalities such as relating to innovation (e.g., Acemoglu et al., 2012; Barrage, 2018; Fischer et al., 2021; Kornek et al., 2021).

Based on these considerations, our survey was designed to capture key aspects of carbon pricing in different scenarios, starting with a scenario with a hypothetical world government that is meant to capture the idea of a global welfare optimum. See Section 2 for further details on our survey design.

A.2 Details on expert selection and survey dissemination

A.2.1 Search string (used in SCOPUS)

TITLE-ABS-KEY ("carbon pric*" OR "carbon-pric*" OR "CO2 pric*" OR "carbon tax*" OR " tax on carbon" OR "CO2 tax*" OR "carbon trad*" OR "carbon-trad*" OR "price on carbon" OR "price on CO2" OR "price per ton of carbon" OR "price per ton of CO2" OR "social cost of carbon" OR "social cost of CO2"
OR ("cap and trade" AND ("carbon" OR "CO2" OR "climate change" OR "climate policy"))
OR ("cap-and-trade" AND ("carbon" OR "CO2" OR "climate change" OR "climate policy"))
OR ("permit pric*" AND ("carbon" OR "CO2" OR "climate change" OR "climate policy"))
OR ("permit trad*" AND ("carbon" OR "CO2" OR "climate change" OR "climate policy"))
OR ("permit-trad*" AND ("carbon" OR "CO2" OR "climate change" OR "climate policy"))
OR ("emission* tax" AND ("carbon" OR "CO2" OR "climate change" OR "climate policy"))
OR ("emission* pric*" AND ("carbon" OR "CO2" OR "climate change" OR "climate policy")) OR ("emission-pricing" AND ("carbon" OR "CO2")) OR ("emission* trad*" AND ("carbon" OR "CO2" OR "climate change" OR "climate policy")) OR ("emission* permit*" AND ("carbon" OR "CO2" OR "climate change" OR "climate policy")) OR ("tax on emission*" AND ("carbon" OR "CO2" OR "climate change" OR "climate policy")))
AND (LIMIT-TO (SRCTYPE , "j")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012) OR LIMIT-TO (PUBYEAR , 2011) OR LIMIT-TO (PUBYEAR , 2010) OR LIMIT-TO (PUBYEAR , 2009) OR LIMIT-TO (PUBYEAR , 2008) OR LIMIT-TO (PUBYEAR , 2007) OR LIMIT-TO (PUBYEAR , 2006) OR LIMIT-TO (PUBYEAR , 2005) OR LIMIT-TO (PUBYEAR , 2004) OR LIMIT-TO (PUBYEAR , 2003) OR LIMIT-TO (PUBYEAR , 2002) OR LIMIT-TO (PUBYEAR , 2001) OR LIMIT-TO (PUBYEAR , 2000))

A.2.2 Text of the initial e-mail invitation

Dear NN,

We conduct an expert survey on carbon pricing and related policy design issues, such as instrument choice and distribution of revenues. We invite you to participate, as we have identified you as a potential expert based on your publications using a keywords search strategy.

Carbon pricing is key to tackling climate change. Determining appropriate carbon prices is a difficult task that is often informed by large-scale models. These are sensitive to crucial modeling and parameter choices, which are typically based on expert views. Yet, we lack a clear and representative understanding of which carbon prices experts – who may or may not work with numerical models – would indeed feel comfortable with recommending. The aim of our survey is to fill this gap by asking experts directly.

We would be most grateful if you could complete the short survey (9 questions with some sub-questions) appended in the link below:

www.soscisurvey.de/carbon-pricing-survey

Results will be published in a way that no individual participant can be identified. As two of us have demonstrated in a previous expert survey (Drupp et al. 2018, *American Economic Journal: Economic Policy*), we take greatest care in protecting personalized data.

Many thanks in advance for your valuable contribution.

Best regards,
Moritz Drupp (Hamburg), Frikk Nesje (Heidelberg and Oslo) and Robert Schmidt (Hagen)

A.3 Details on data and data cleaning

We conducted a number of survey response data cleaning steps, for example correcting or dropping a few implausible answers and swapping the responses to the price ranges questions where these were obviously reversed. A brief overview of these changes is provided below. We also show the actual changes in the price recommendations that our winsorization procedure led to.

- Double responses: We kept the first and more complete response in two cases where we had two responses from the same respondents.
- Discretion: We deleted six unfinished responses and two responses that contained clear mistakes.
- Inconsistent responses: We followed up and changed twelve responses in cases where there were obvious typos. We were also in touch with three respondents who wanted to stick with their original response. In three cases we did not adjust the responses as respondents did not reply to our follow-up or were not contactable. We deleted one response that was clearly inconsistent and where the respondent was not possible to follow up.
- Unrelatable names: We deleted eight responses with unrelatable names. In five cases we also imputed or removed the names of respondents based on information provided to us in the survey.
- Other adjustments: We adjusted the quantitative survey responses based on respondents' own additional qualitative responses in three cases. Finally, we also corrected the country for one respondent and did some imputation of recommended revenue use from the remaining survey data.

Table A.1: Descriptive overview without winsorizing

***Carbon prices** (in US$)*							
	Mean	*Median*	*Mode*	*Std.*	*Min*	*Max*	*Obs.*
Global 2020	50.26	40	50	55.22	0	500	445
Global 2030	114.98	70	50	478.95	0	10000	443
Global 2050	2495.43	100	100	47718.31	0	1000000	439
Unilateral with BCA 2020	54.72	40	50	55.39	0	500	439
Unilateral with BCA 2030	106.22	75	100	114.50	0	1000	437
Unilateral w/o BCA 2020	40.94	30	30	39.24	0	400	428
Unilateral w/o BCA 2030	77.54	50.50	50	74.17	0	500	428

Winsorizing: We winsorized 16 survey responses by replacing the two most extreme observations with the third most extreme observation, at the lower and higher end of each question related to the price level. Table A.2 contains the descriptive overview for the point recommendations after our winsorization procedure. In comparison, Table A.1 shows that the means, standard deviations and maximum values are higher before winsorization.

Table A.2: Descriptive overview

***Carbon prices** (in US$)*							
	Mean	*Median*	*Mode*	*Std.*	*Min*	*Max*	*Obs.*
Global 2020	50.26	40	50	55.22	0	500	445
Global 2030	92.40	70	50	81.94	0	500	443
Global 2050	224.36	100	100	372.85	0	4000	439
Unilateral with BCA 2020	54.34	40	50	52.55	0	417	439
Unilateral with BCA 2030	104.39	75	100	102.77	0	1000	437
Unilateral w/o BCA 2020	40.47	30	30	35.84	0	250	428
Unilateral w/o BCA 2030	77.54	50.50	50	74.17	0	500	428

***Determinants** (in % of respondents per response bin)*						
Global CO2 emission reduction target by 2050	*<20%*	*20 to <50%*	*50 to <80%*	*80 to <100%*	*≥100%*	
	3.25	11.28	28.85	47.29	9.33	461
Mitigation costs (for 80% reduction in 2050)	*<0.25%*	*.25 to <.5%*	*.5 to <1%*	*1 to <3%*	*≥3%*	
	4.92	16.78	44.74	22.15	11.41	447
Probability: 2070 damages under BAU ≥20% of GDP	*<5%*	*5 to <10%*	*10 to <20%*	*20 to <50%*	*≥50%*	
	9.77	14.09	18.18	30.91	27.05	440
Expected damages for 3°C warming in % of GDP	*<2%*	*2 to <5%*	*5 to <8%*	*8 to <12%*	*≥12%*	
	3.94	18.52	28.47	23.38%	25.69	432
Utility discount factor (weight on 2070 utility)	*<40%*	*40 to <60%*	*60 to <80%*	*80 to <100%*	*100%*	
	13.65	21.88	19.29	24.24	20.94	425

Response categories	
Quantitative responses	468
Quantitative responses (non-anonymous/verified identity)	406
Qualitative responses	176
Explained non-responses	97
Total responses	574
Expert population	2106

A.4 Details on the grouping of revenue-use options

The four grouping are: “Households”: equal lump-sum transfers to households OR transfers to particularly affected households; “Firms and tax reductions”: reduction of distortionary taxes OR grandfathering or tax cuts for firms OR transfers to particularly affected firms; “Governmental spending”: general government spending OR spending on environmental public goods OR green R&D OR subsidies for renewable energy; “International transfers”: international transfers to countries particularly affected by climate change OR international transfers to support climate policy in other countries. In addition, experts could tick an “Other” category and provide further explanations. We do not classify these here, but include those experts in the respective control groups. Online Appendix B.3 contains all associations with individual pre-specified options and the “Other” option (Table B.2).

Online Appendix B: Further results

B.1 Additional material on global carbon prices (Section 3.1)

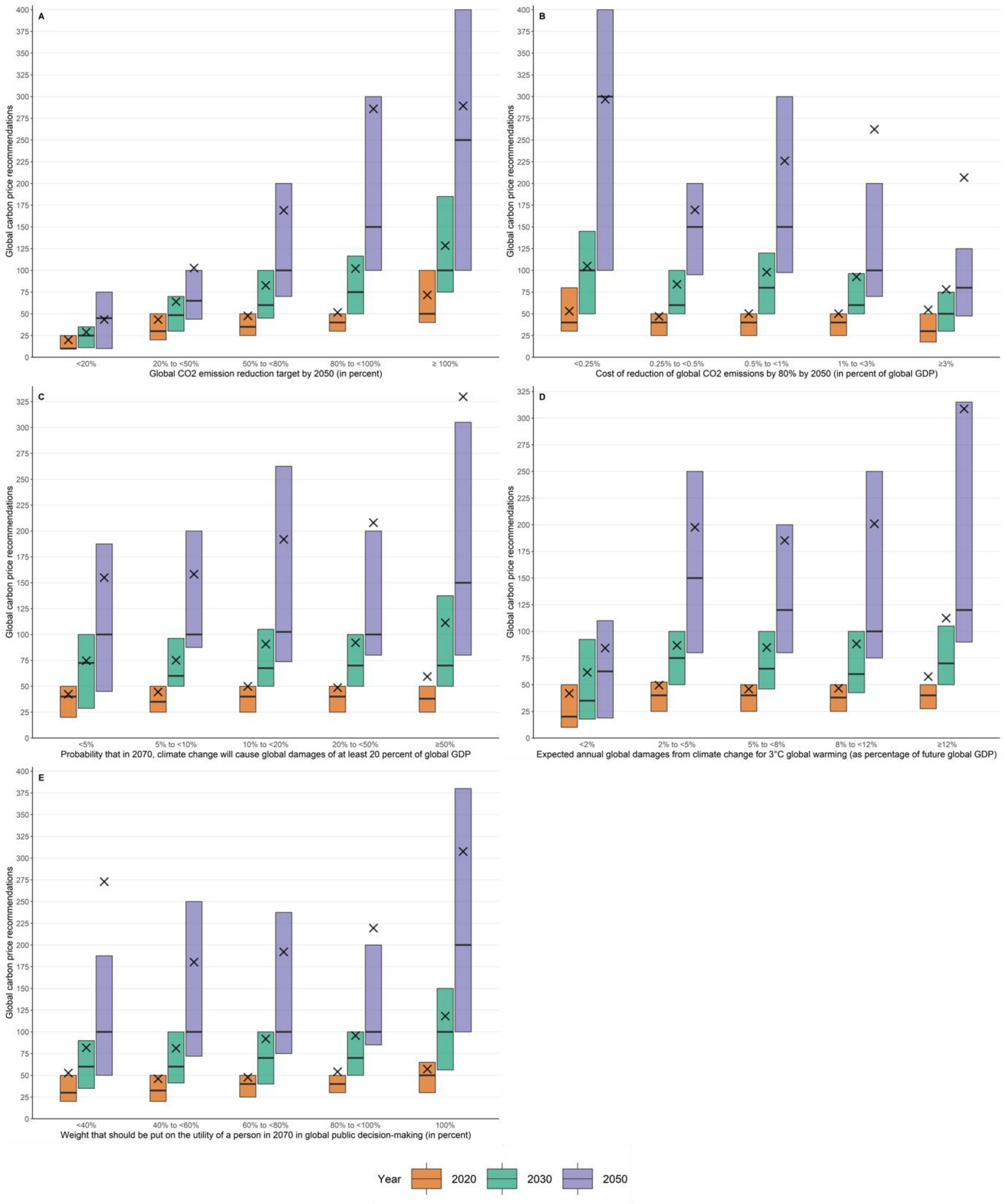


Figure B.1: Global carbon price determinants elicited as part of the survey

Notes: Boxplots of global carbon price recommendations by year. Boxes represent interquartile ranges, the black horizontal lines represent median recommendations and the multiplier signs depict mean carbon prices. Panels A – E correspond to parts (a) – (e) of survey Question 8 on “determinants”. Panel A: (a) global emission reduction target for 2050, B: emission reduction costs, C: probability of catastrophic climate change, D: damages for 3 degree warming, E: utility discount factor.

B.2 Additional material on unilateral carbon prices (Section 3.2)

Here, we quantify the "space for agreement" for the three most represented continents for 2020 (Figure B.2) and 2030 (Figure B.3) unilateral carbon price recommendations with (blue) and without BCA (brown).

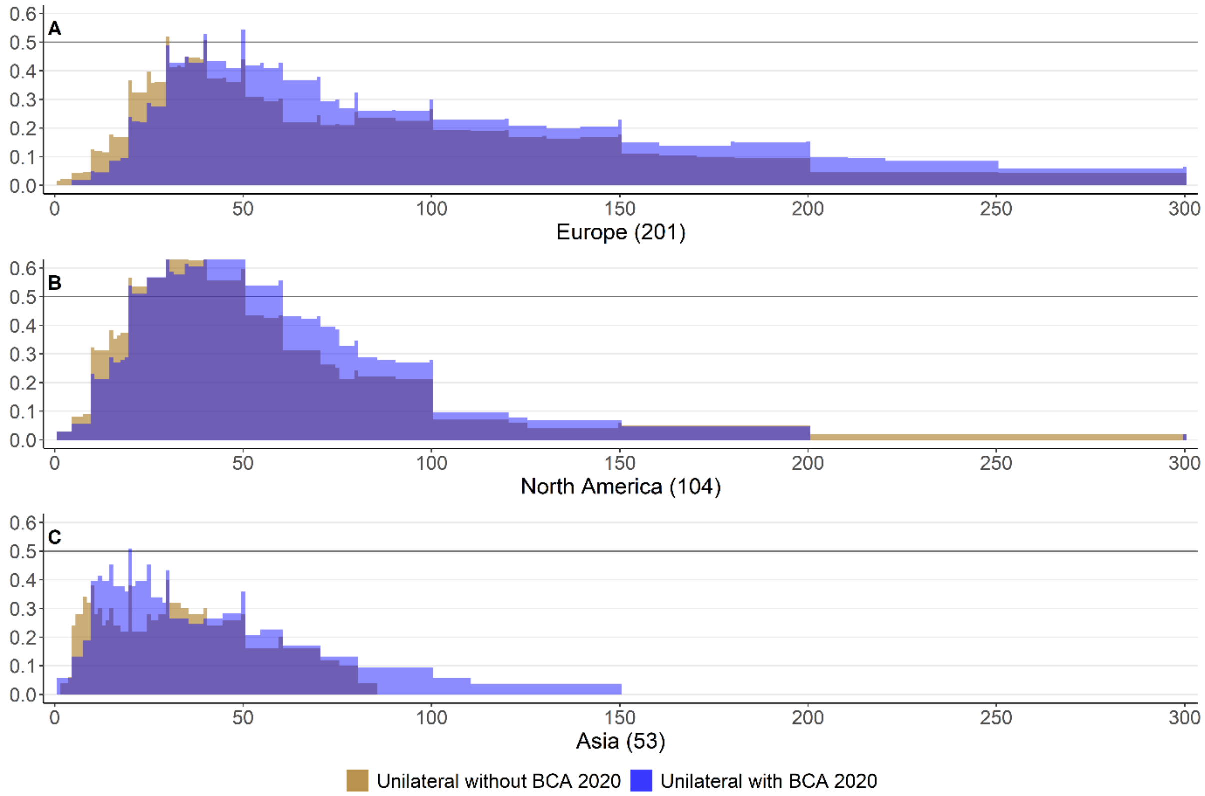


Figure B.2: Spaces for agreement on 2020 unilateral carbon prices at a continental-level

Notes: Proportion of experts for whom a certain carbon price level, varied on the horizontal axis, is contained within their acceptable range of unilateral carbon prices with BCA (blue) and without BCA (brown) in 2020 for the three continental blocks with more than 50 responses (Europe, North America and Asia). We have capped carbon prices at $300 for expositional purposes.

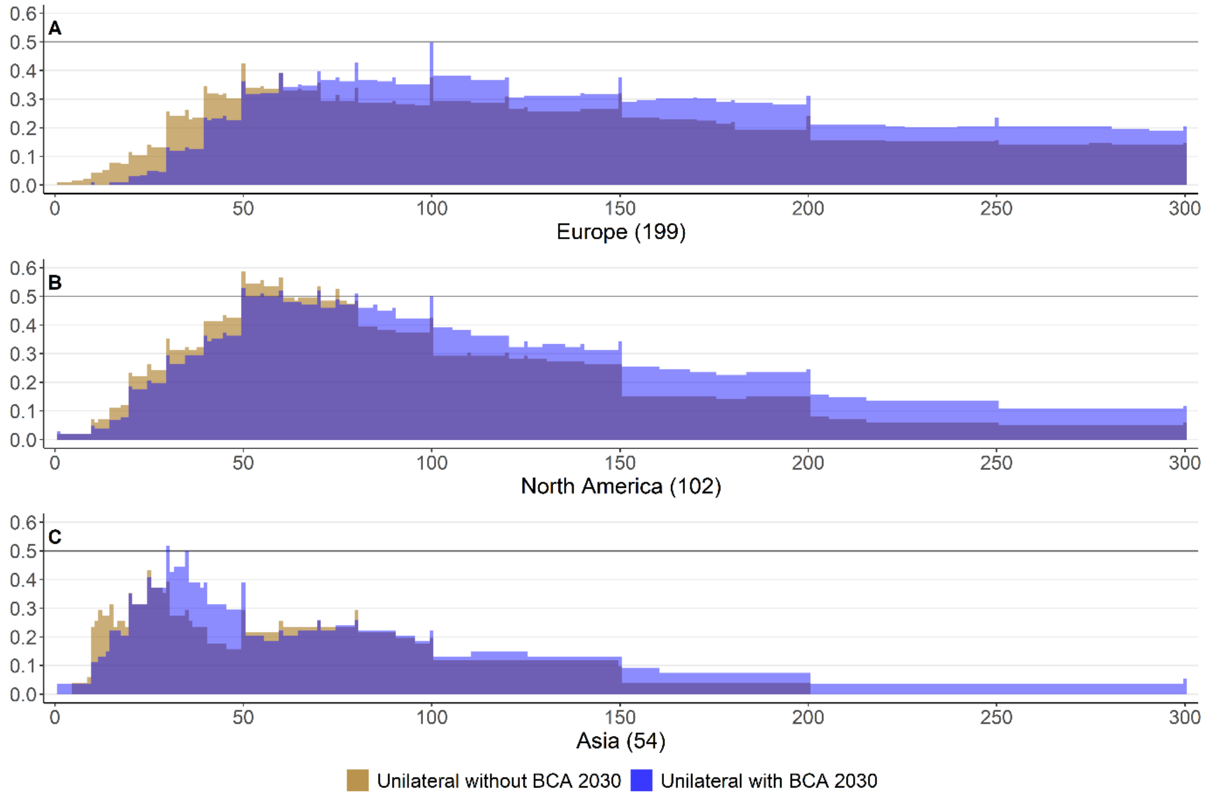


Figure B.3: Spaces for continental agreement on unilateral carbon prices

Notes: Proportion of experts for whom a certain carbon price, varied on the horizontal axis, is contained within their acceptable range of *unilateral carbon prices with* (in blue) and *without* (brown) *border carbon adjustment (BCA)* in 2030 for Europe, North America and Asia. Carbon prices at $300 for expositional purposes.

When examining the overlap in experts' acceptable ranges for 2030, we observe that BCA tends to facilitate higher agreement among experts on unilateral carbon pricing: Without BCA, no single carbon price is supported by a majority both in Europe and in Asia. In Europe, the carbon prices with the highest agreement among experts in the case without BCA are $50 and $100, contained respectively in 42.41 and 37.70 percent of experts' acceptable price ranges for 2030. In Asia, a unilateral carbon price of $25 receives the highest support in the scenario without BCA, and is acceptable for 43.14 percent. By contrast, experts in Asia can achieve some majority support with BCA: prices of $30 ($35) are supported by 51.85 (50.00) percent. Furthermore, a 2030 carbon price of $100 in Europe achieves support by 49.75 percent. Majority agreement among North American experts is possible in both scenarios, with a carbon price of $50 receiving most support.

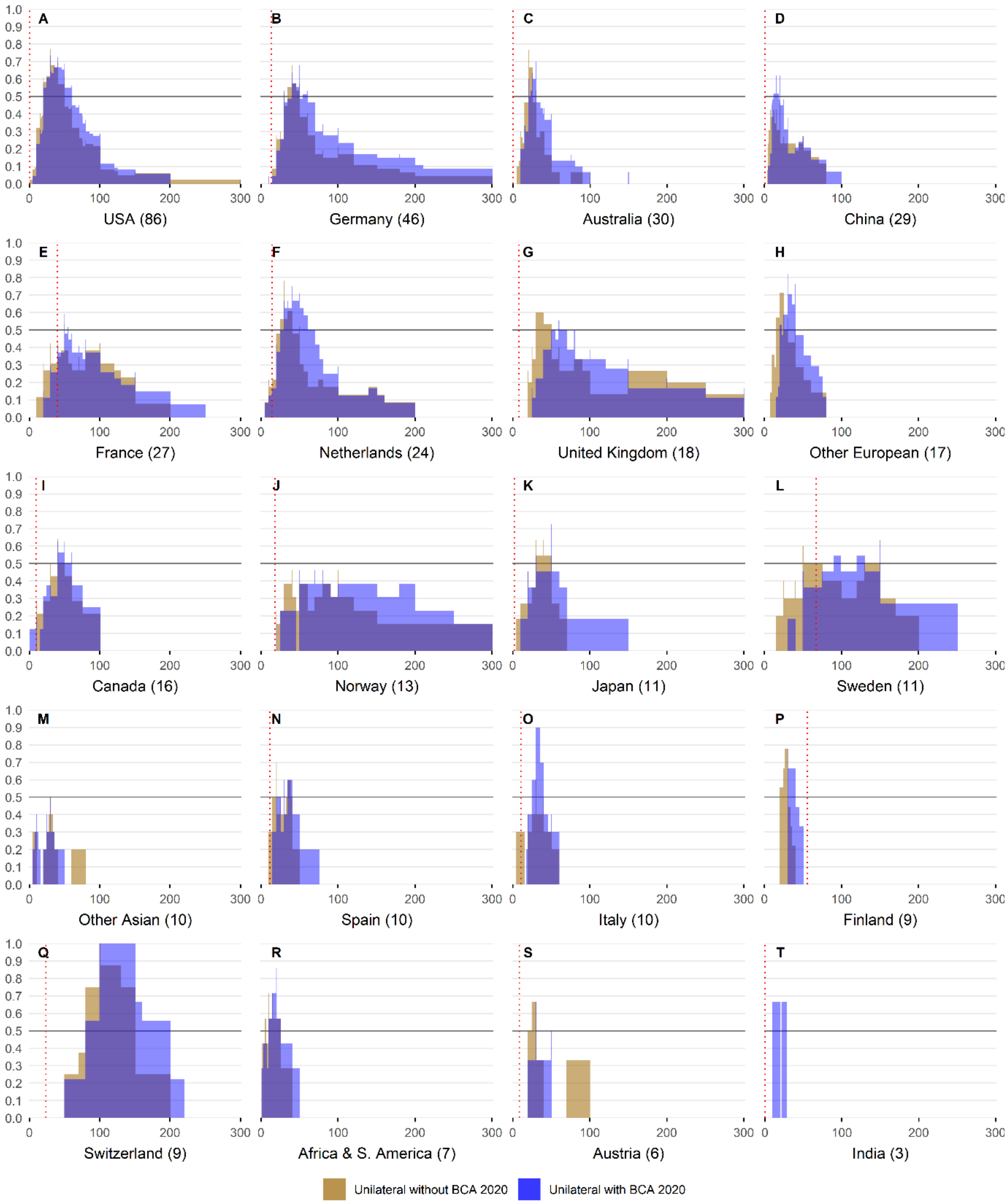


Figure B.4: Spaces for agreement on 2020 unilateral carbon prices at a country-level

Notes: Proportion of experts for whom a certain carbon price level, varied on the horizontal axis, is contained within their acceptable range of unilateral carbon prices with BCA (blue) and without BCA (brown) in 2020, for all countries or groups of countries covered in previous Figures. The red dotted line plots the existing emission-weighted unilateral carbon price in 2020. Carbon prices are capped at $300 for expositional purposes as there is no price level of majority support beyond.

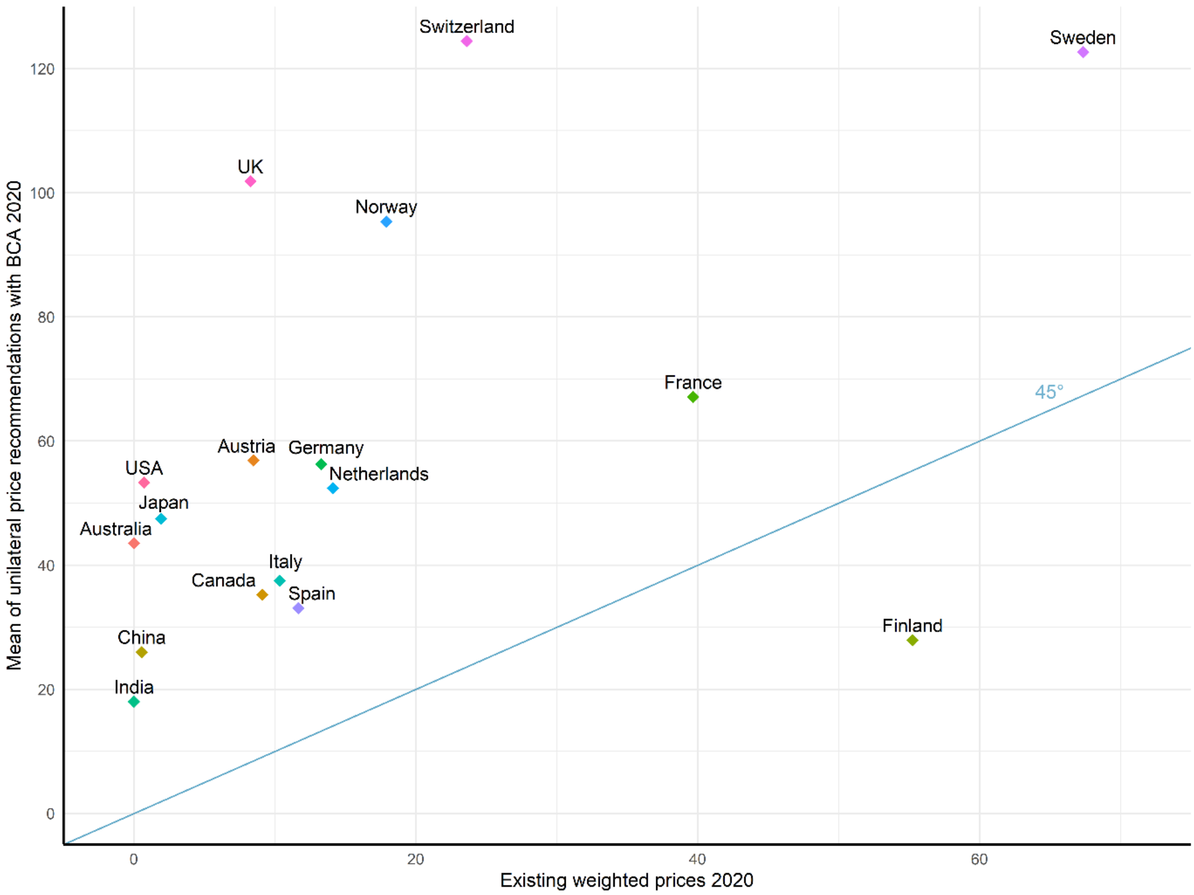


Figure B.5: Mean price recommendations by country vs. weighted implemented prices

Notes: Mean of unilateral price recommendations with BCA for 2020 (vertical axis) and existing weighted carbon prices in 2020 (horizontal axis). The vertical difference between each diamond and the 45°-line may be interpreted as the “gap” between the mean recommended and the weighted existing price for the respective country.

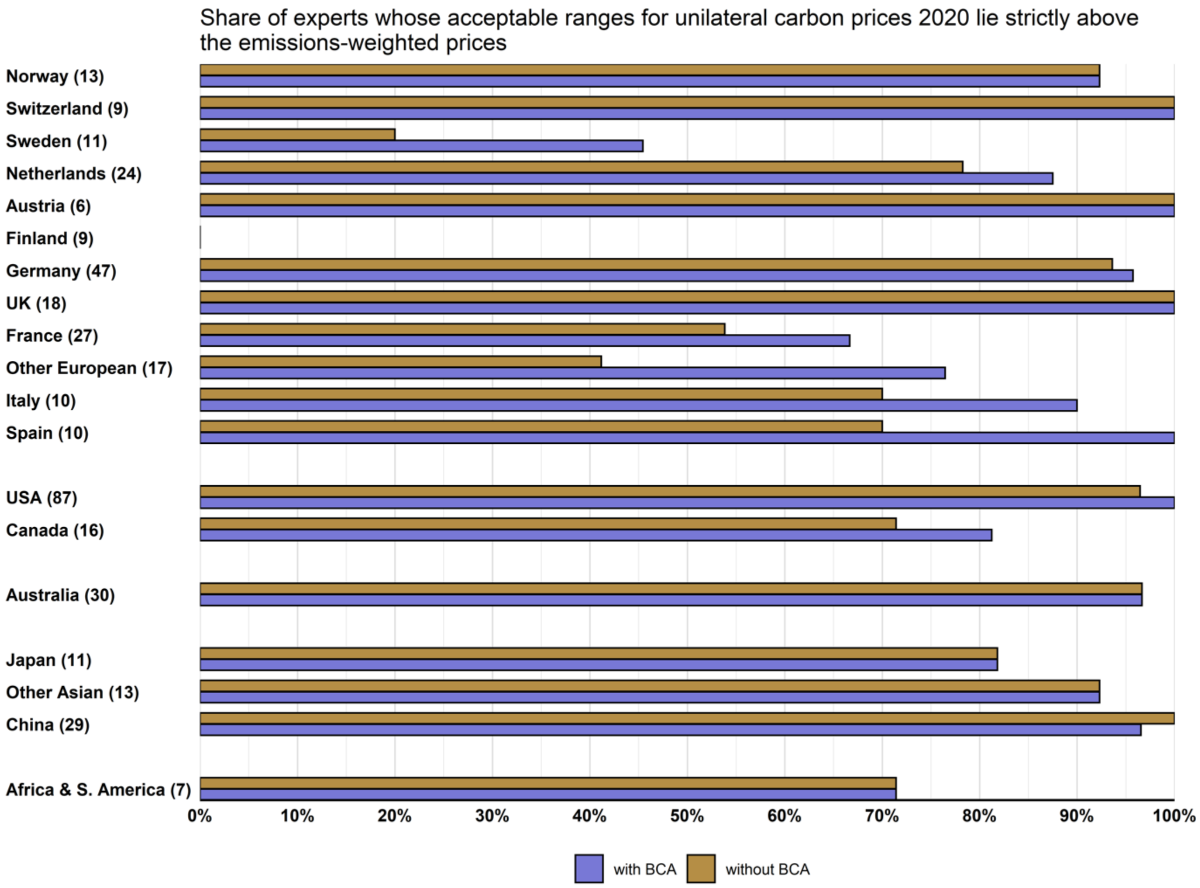


Figure B.6: Acceptable ranges of 2020 unilateral carbon prices vs. weighted implemented prices at a country-level

Notes: Share of experts whose ranges for 2020 unilateral price recommendations with BCA (blue) and without BCA (brown) lie strictly above the existing weighted carbon prices in 2020.

B.3 Details on predictors of global price recommendations (Section 4)

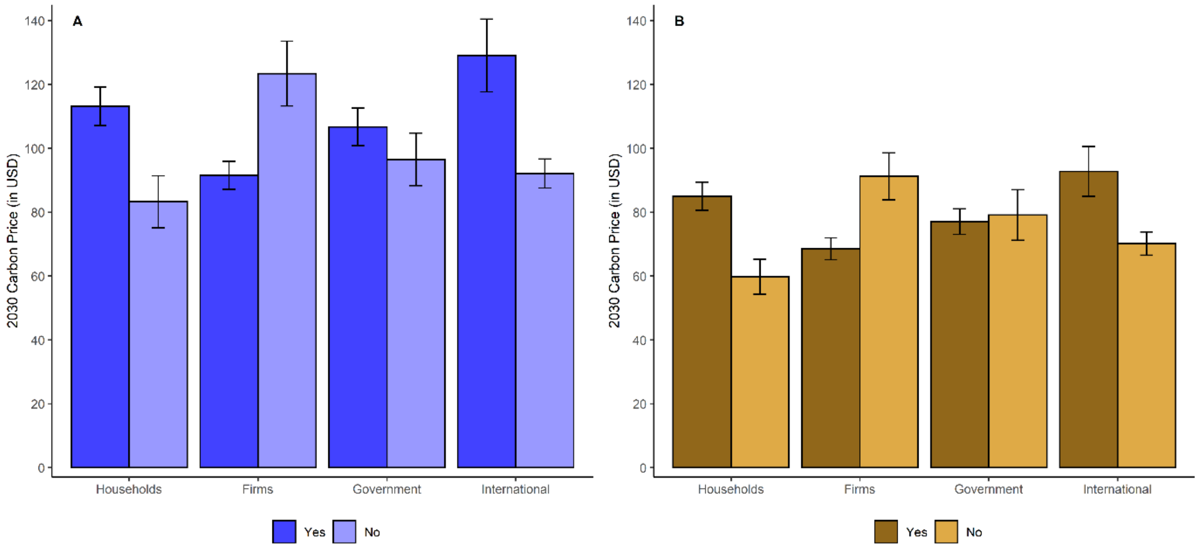
B.3.1 Survey questions on policy design issues

Table B.1: Multivariate analysis of carbon price recommendations and survey questions on policy design issues

	(1) Global price 2020	(2) Global price 2030	(3) Global price 2050	(4) Unilateral 2020 with BCA	(5) Unilateral 2030 with BCA	(6) Unilateral 2020 w/o BCA	(7) Unilateral 2030 w/o BCA
Instrument: tax (vs. not tax)	6.15 (5.21)	16.64 (7.70)	28.78 (31.96)	6.33 (5.08)	21.07 (9.81)	6.68 (3.58)	14.74 (7.04)
BCA strongly recommended	13.45 (5.21)	13.43 (7.77)	30.43 (41.34)	10.13 (4.99)	15.36 (8.82)	-2.80 (3.95)	-8.20 (7.49)
Revenue usage: households	-2.29 (7.54)	13.62 (9.47)	-18.23 (57.86)	8.20 (6.13)	28.96 (10.55)	12.56 (3.40)	27.02 (7.54)
Revenue usage: firms	-17.79 (6.00)	-29.24 (8.83)	-113.47 (41.66)	-15.20 (5.72)	-36.68 (11.22)	-9.91 (3.94)	-26.70 (8.26)
Revenue usage: government	-5.01 (6.62)	-5.98 (10.16)	-90.94 (71.65)	-1.21 (4.55)	-1.23 (10.43)	0.48 (3.89)	-6.53 (9.50)
Revenue usage: international	13.18 (6.68)	23.98 (10.00)	100.71 (50.00)	14.63 (6.48)	36.53 (12.61)	8.52 (3.96)	23.64 (9.06)
Constant	49.42 (10.26)	79.12 (16.63)	305.84 (119.18)	43.29 (7.92)	73.19 (17.56)	33.28 (5.53)	70.86 (15.00)
Observations	426	425	421	425	424	418	418
R-squared	0.049	0.066	0.041	0.052	0.086	0.060	0.082

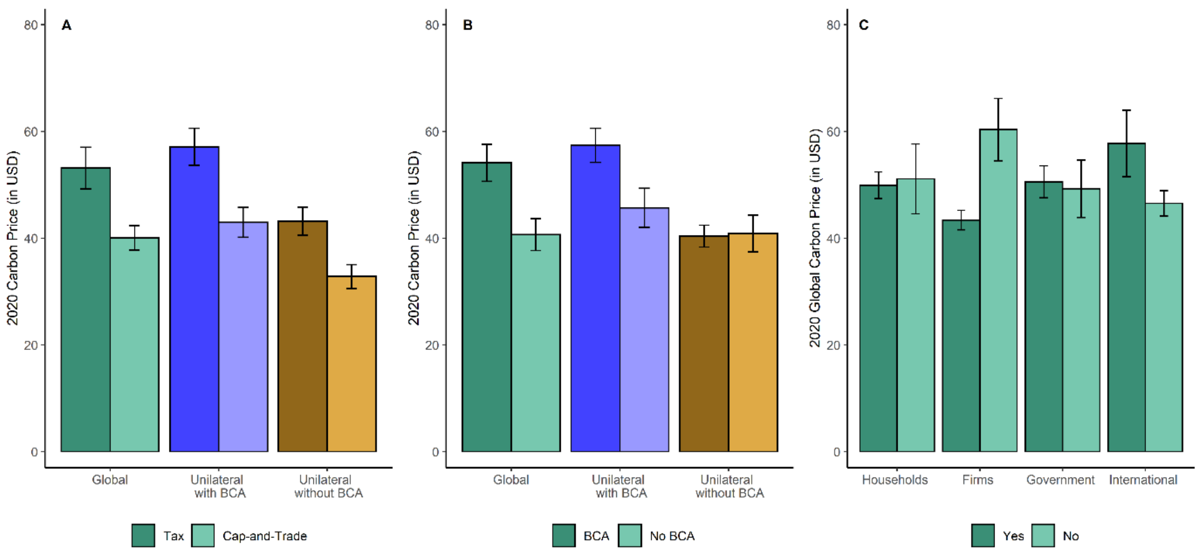
Notes: Robust standard errors in parentheses. The multivariate regressions are estimated by ordinary least squares.

Table B.1 reports the multivariate associations between carbon price recommendations and survey questions on policy design issues in the form of ordinary least squares regressions. The results are discussed in Sections 4.1 and 4.5.



<u>Figure B.7:</u> Relation between carbon prices and policy design recommendations

Notes: All panels depict relations of policy design recommendations and 2030 carbon prices, with means and standard errors. Panel A depicts how 2030 unilateral carbon price recommendations with BCA vary with recommendations on revenue use. Panel B depicts how 2030 unilateral carbon price recommendations without BCA vary with recommendations on revenue use.



<u>Figure B.8:</u> Relation between carbon prices and policy design recommendations

Notes: All panels depict relations of policy design recommendations and 2020 carbon prices, with means and standard errors. Panel A depicts how 2020 carbon price recommendations across all three scenarios vary between those recommending the use of a carbon tax versus a cap-and-trade scheme (in more transparent bars). Panel B shows the equivalent for those that strongly recommend the use of border carbon adjustment (BCA) or not, and Panel C depicts how 2020 global carbon price recommendations vary with recommendations on revenue use.

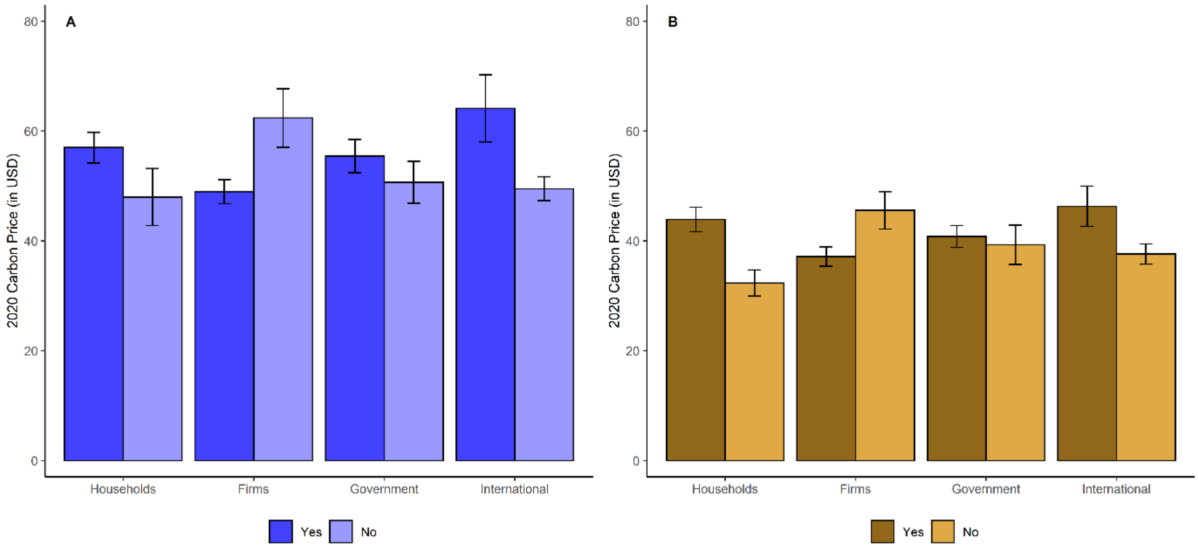


Figure B.9: Relation between carbon prices and policy design recommendations

Notes: All panels depict relations of policy design recommendations and 2020 carbon prices, with means and standard errors. Panel A depicts how 2020 unilateral carbon price recommendations with BCA vary with recommendations on revenue use. Panel B depicts how 2020 unilateral carbon price recommendations without BCA vary with recommendations on revenue use.

Table B.2: Correlation matrix of recommendations on revenue use

	Global price 2020	Global price 2030	Global price 2050	Unilateral 2020 with BCA	Unilateral 2030 with BCA	Unilateral 2020 w/o BCA	Unilateral 2030 w/o BCA
Government spending	0	-0.004	-0.048	0.029	0.017	0.042	0.011
Lump-sum transf. to households	-0.018	0.018	0.016	0.021	0.047	0.095	0.102
Transf. affected households	0.009	0.090	0.001	0.065	0.120	0.099	0.119
Reduction of distort. taxes	-0.106	-0.117	-0.108	-0.077	-0.107	-0.048	-0.086
Grandf. or tax cuts for firms	-0.056	-0.083	-0.071	-0.075	-0.082	-0.073	-0.073
Transf. particul. affected firms	-0.066	-0.076	-0.061	-0.07	-0.092	-0.091	-0.114
Spending on env. public goods	-0.015	0.047	-0.015	0.014	0.091	0.044	0.101
Green R&D	0.055	0.008	-0.053	0.044	0.004	-0.003	-0.066
Subsidies for renew. energy	-0.085	-0.071	-0.074	-0.085	-0.056	-0.049	-0.063
Internat.transf. affected countries	0.012	0.077	0.05	0.06	0.155	0.101	0.139
Internat.transf. climate policy	0.097	0.090	0.109	0.086	0.113	0.03	0.068
Other	0.175	0.150	0.279	0.115	0.096	0.110	0.130

B.3.2 Survey questions on "determinants"

Table B.3: Multivariate analysis of carbon price recommendations and survey questions on "determinants"

	(1) Global price 2020	(2) Global price 2030	(3) Global price 2050	(4) Unilateral 2020 with BCA	(5) Unilateral 2030 with BCA	(6) Unilateral 2020 w/o BCA	(7) Unilateral 2030 w/o BCA
Emission reduction target	0.54 (0.13)	0.75 (0.12)	0.85 (0.12)	0.71 (0.13)	0.87 (0.12)	0.61 (0.13)	0.79 (0.12)
Abatement cost	-0.02 (0.11)	-0.06 (0.10)	-0.13 (0.09)	-0.03 (0.10)	-0.10 (0.10)	-0.07 (0.10)	-0.11 (0.10)
Probability of 20% damages	0.07 (0.09)	0.09 (0.09)	0.07 (0.08)	0.02 (0.09)	0.05 (0.09)	-0.01 (0.10)	-0.05 (0.09)
Mean damages	-0.21 (0.11)	-0.20 (0.11)	-0.13 (0.10)	-0.18 (0.11)	-0.10 (0.11)	-0.04 (0.12)	0.04 (0.12)
Utility discount factor	0.24 (0.07)	0.25 (0.07)	0.25 (0.07)	0.30 (0.07)	0.32 (0.07)	0.31 (0.08)	0.28 (0.08)
Observations	388	388	387	386	385	380	379
Pseudo R-squared	0.0218	0.0313	0.0388	0.0325	0.0426	0.0293	0.0369

Notes: Robust standard errors in parentheses. The multivariate regressions are estimated by ordered logit to account for categorical dependent variables.

Table B.3 reports the multivariate associations between carbon price recommendations and survey questions on "determinants" in the form of ordered logit regressions. The results are discussed in Sections 4.2 and 4.5.

B.3.3 Country characteristics

This text complements the summary in Section 4.3 by investigating how carbon price recommendations relate to country-level information. Previous research by Best and Zhang (2020), Levi et al. (2020), and Levi (2021) suggests that a country's regulatory control, public belief in climate change, government effectiveness, and corruption control are positively associated with existing carbon prices, while the share of oil and coal in electricity production, fossil reserves, and per-capita CO_2-emissions are negatively associated with existing carbon prices. Yet, countries that have already implemented carbon prices are likely systematically different. Our data allows testing how country characteristics are related to carbon price recommendations also for countries that have not yet implemented carbon pricing schemes, and how implemented schemes relate to recommendations.

Figure B.10 depicts plots with linearly or quadratically fitted lines for *unilateral with* (blue) and *without* (dashed brown) *BCA* and global (thin green) 2030 carbon price recommendations based on key country characteristics. Green spikes represent the 95 percent confidence level for global carbon prices and vertical lines the mean sample values of country characteristics. GDP per capita, emission-weighted nationally implemented carbon prices (from Dolphin, 2022), mean world governance indicator rank scores, and knowledge about climate change are positively correlated (at the 1 percent level in linear regressions) with 2030 carbon price recommendations across all scenarios. For example, an increase in nationally implemented carbon prices by $1 is associated with an increase in the recommended *unilateral with (without) BCA* carbon price of $1.32 ($0.90), and with an increase in the 2030 *global* carbon price recommendation of $0.76. In contrast, the share of fossil fuels in energy consumption is negatively associated with unilateral carbon prices. These findings are broadly in line with the literature relating *existing* carbon prices with various country characteristics (e.g., Levi et al., 2020). We depict quadratic fits in case the quadratic term is significant at the 5 percent level, as is the case for knowledge about climate change across all three scenarios. Figure B.11 depicts the equivalent for 2020 carbon prices.

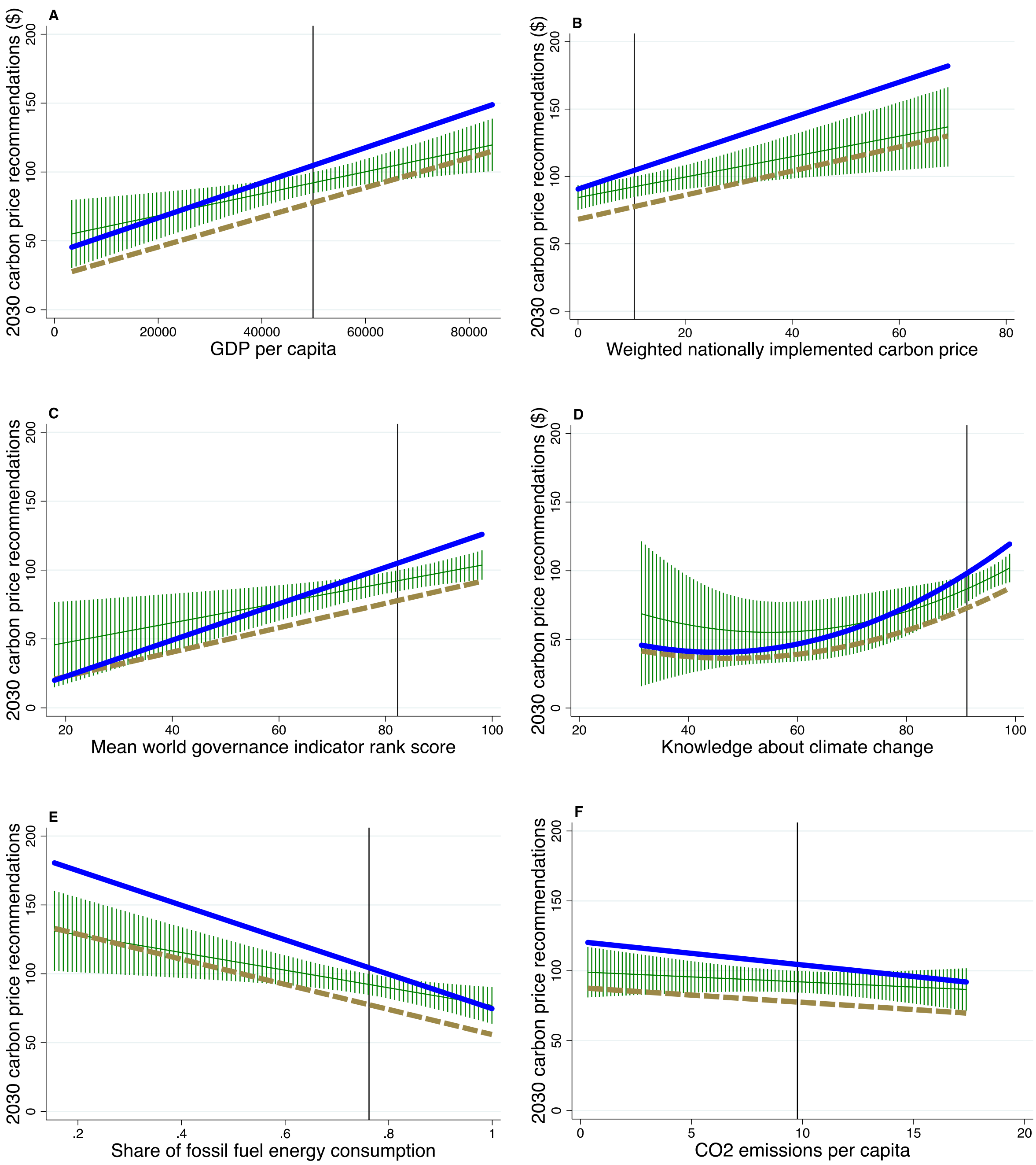


Figure B.10: Carbon price recommendations for 2030 and country characteristics

Notes: Linearly or quadratically fitted *global* (green line), *unilateral with* (blue line) and *without* (dashed brown line*) border carbon adjustment (BCA)* carbon price recommendations for the year 2030, with green spikes representing 95 percent confidence levels for global prices, based on country characteristics—from upper left to lower right: GDP per capita (Panel A), weighted nationally implemented carbon prices (B), mean world governance indicator rank scores (C), knowledge about climate change (D), fossil fuel energy consumption (E), and CO2 emissions per capita (F). The vertical black lines represent mean characteristic values in our sample.

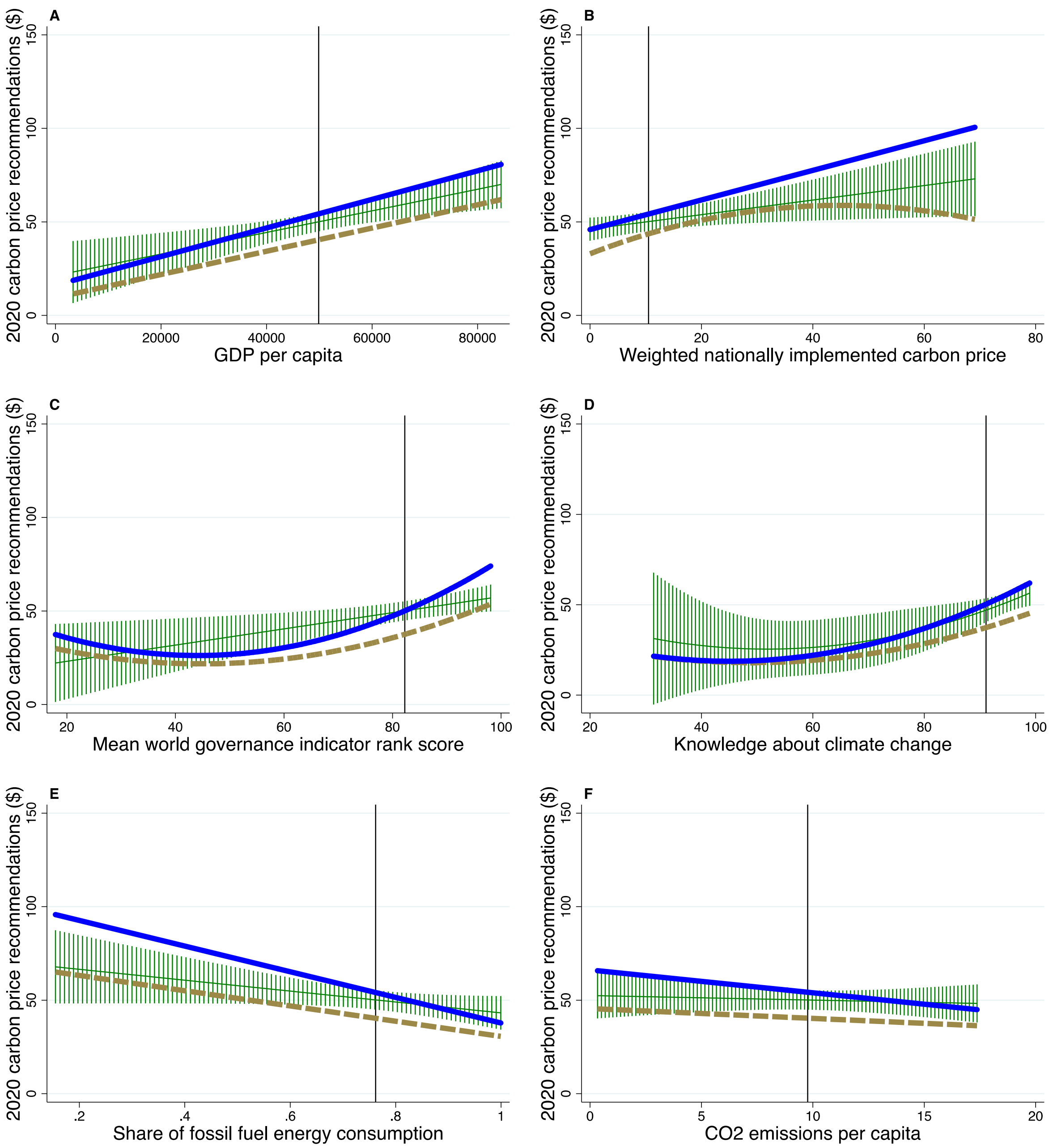


Figure B.11: 2020 carbon price recommendations for 2020 and country characteristics

Notes: Linearly or quadratically fitted *global* (green line), *unilateral with BCA* (blue line) and *unilateral without BCA* (dashed brown line) carbon price recommendations for the year 2020, with green spikes representing 95 percent confidence levels for global prices, based on country characteristics—from upper left to lower right: GDP per capita (Panel A), weighted nationally implemented carbon prices (B), mean world governance indicator rank scores (C), knowledge about climate change (D), fossil fuel energy consumption (E), and CO2 emissions per capita (F). The vertical black lines represent mean characteristic values in our sample.

We have already discussed in Section 3 that the *Glocal-wedge* becomes negative and larger (in absolute terms) with increasing GDP per capita (linear regression, p=0.003), illustrated in Panel A of Figure B.12. We have demonstrated a substantial *Glocal-wedge* with higher unilateral relative to global carbon price recommendations, i.e. the opposite of free-riding on unilateral carbon prices.[1]

Examining other country characteristics, we find that weighted nationally implemented carbon prices (Panel B of Figure B.12) and knowledge about climate change (Panel D) are negatively correlated with the absolute value of the 2030 *Glocal-wedge*, while the share of fossil fuel energy consumption (Panel E) is positively correlated (linear regressions, p<0.005 in all cases). The mean world governance indicator rank score (Panel C) exhibits an association with the 2030 *Glocal-wedge* that is borderline quadratic (p=0.056). Also when examining subgroups we find only limited evidence for free-riding, with the bottom 5 percent in terms of knowledge about climate change ($17.86; t-test: p=0.081) as a rare exception. Even among experts whose countries have not implemented any carbon price do we find a 2030 *Glocal-wedge* that does not significantly differ from zero (-$0.29; t-test: p=0.943). Results for 2020, illustrated in Figure B.13, are qualitatively similar and also suggest that there is little evidence for free-riding on unilateral carbon prices evident in expert responses.

[1] Note that the 2030 *Glocal-wedge* is positive but insignificant for the bottom 10 percent of the sample in terms of GDP per capita ($7.07; t-test: p=0.281).

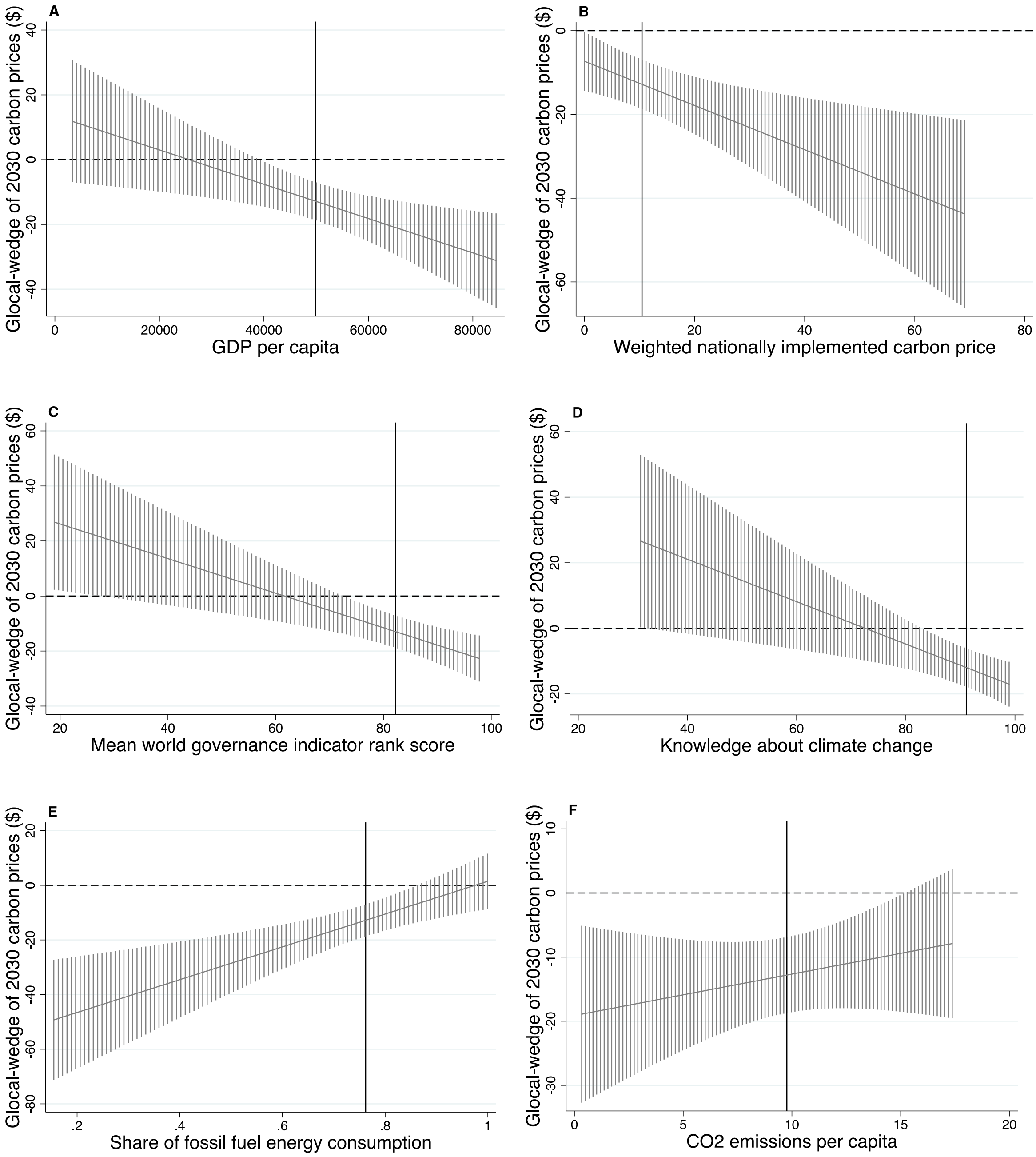


Figure B.12: Glocal carbon pricing wedge in 2030 and country characteristics

Notes: Linearly fitted Glocal-wedges for the year 2030, i.e. the difference in carbon price recommendations between the *global* and *unilateral with border carbon adjustment (BCA)* scenarios, with spikes representing 95 percent confidence intervals, based on country characteristics—from upper left to lower right: GDP per capita (Panel A), weighted nationally implemented carbon prices (B), mean world governance indicator rank scores (C), knowledge about climate change (D), fossil fuel energy consumption (E), and CO2 emissions per capita (F). The vertical black lines represent mean characteristic values in our sample.

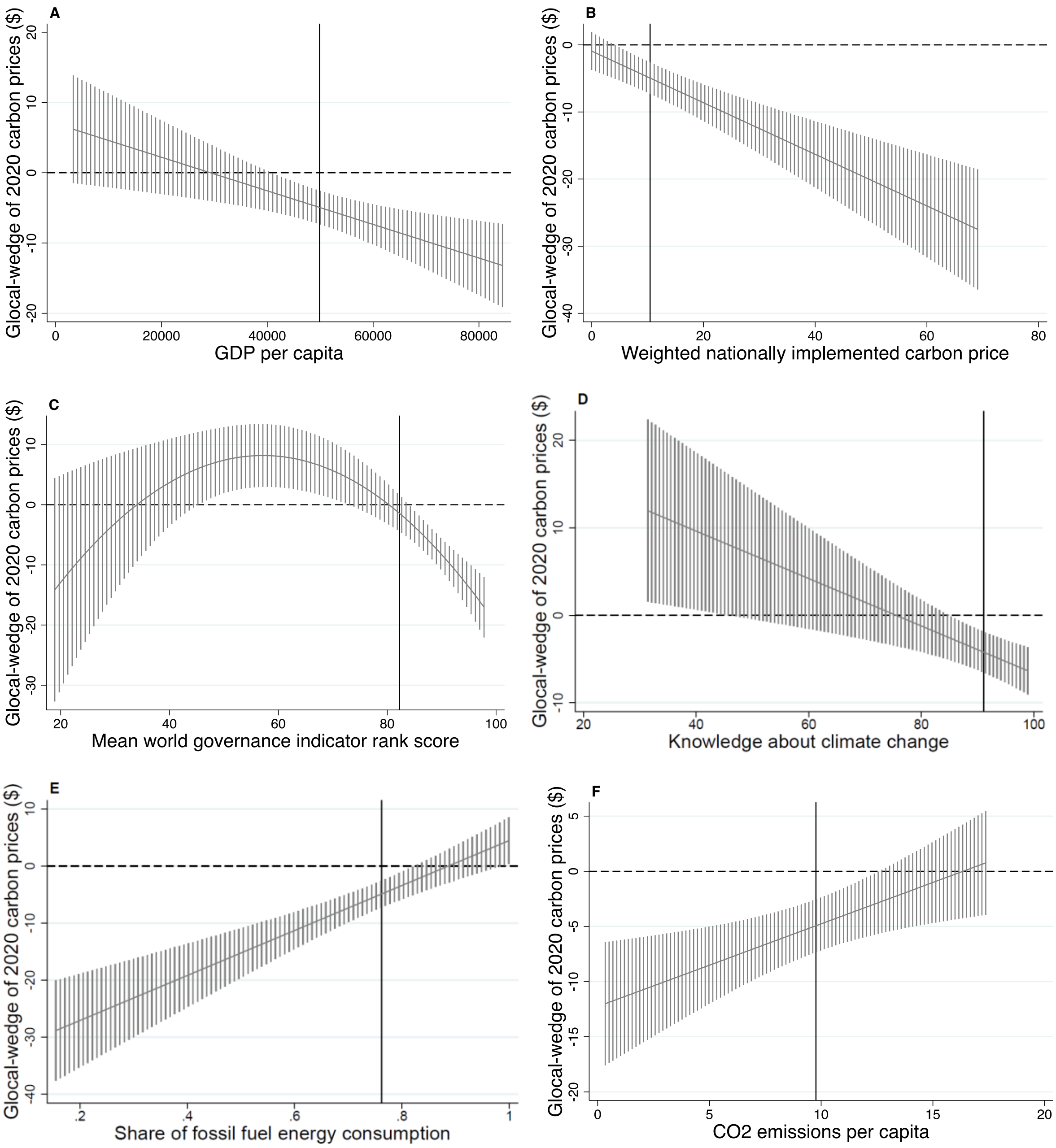


Figure B.13: 2020 Glocal carbon pricing wedge in 2020 and country characteristics

Notes: Linearly or quadratically fitted Glocal-wedges for the year 2020, i.e. the difference in carbon price recommendations between the *global* and *unilateral with border carbon adjustment (BCA)* scenarios, with spikes representing 95 percent confidence intervals, based on country characteristics—from upper left to lower right: GDP per capita (Panel A), weighted nationally implemented carbon prices (B), mean world governance indicator rank scores (C), knowledge about climate change (D), fossil fuel energy consumption (E), and CO2 emissions per capita (F). The vertical black lines represent mean characteristic values in our sample.

Table B.4: Multivariate analysis of carbon price recommendations and country characteristics

	(1) Global price 2020	(2) Global price 2030	(3) Global price 2050	(4) Unilateral 2020 with BCA	(5) Unilateral 2030 with BCA	(6) Unilateral 2020 w/o BCA	(7) Unilateral 2030 w/o BCA
CC: GDP per capita	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
CC: Weighted carbon price	0.47 (0.39)	0.55 (0.55)	0.01 (1.41)	0.53 (0.38)	0.32 (0.66)	0.19 (0.24)	0.26 (0.50)
CC: Governance index	-0.52 (0.26)	-0.40 (0.45)	-1.35 (2.04)	-0.14 (0.26)	0.08 (0.54)	-0.15 (0.18)	-0.31 (0.39)
CC: Climate change knowledge	0.50 (0.29)	0.69 (0.48)	0.45 (2.64)	0.57 (0.28)	1.16 (0.50)	0.05 (0.20)	0.26 (0.37)
CC: Fossil energy usage	26.86 (23.74)	4.94 (37.03)	7.70 (167.40)	12.76 (26.93)	-49.94 (49.82)	1.16 (20.90)	-35.95 (36.68)
CC: CO2 emissions per capita	-0.88 (0.93)	-1.14 (1.28)	-6.79 (6.81)	-1.61 (0.90)	-1.91 (1.67)	-1.17 (0.62)	-1.41 (1.17)
Constant	-4.19 (23.48)	29.64 (37.75)	138.12 (176.12)	-13.90 (25.64)	22.99 (49.16)	16.55 (19.36)	57.22 (35.27)
Observations	427	426	422	422	421	412	412
R-squared	0.037	0.039	0.015	0.095	0.073	0.088	0.072

Notes: Robust standard errors in parentheses. The multivariate regressions are estimated by ordinary least squares. CC: “country characteristics”.

Table B.4 reports the multivariate associations between carbon price recommendations and country characteristics in the form of ordinary least squares regressions. The results are discussed in Sections 4.3 and 4.5.

Table B.5: Multivariate analysis of carbon price recommendations and continent of affiliation

	(1) Global price 2020	(2) Global price 2030	(3) Global price 2050	(4) Unilateral 2020 with BCA	(5) Unilateral 2030 with BCA	(6) Unilateral 2020 w/o BCA	(7) Unilateral 2030 w/o BCA
Europe	2.51	6.03	-6.65	15.62	16.74	8.45	12.32
	(7.59)	(10.38)	(57.04)	(6.22)	(13.55)	(4.36)	(9.54)
Oceania	-14.68	-24.55	-106.38	-5.39	-24.76	-7.02	-14.92
	(8.47)	(15.45)	(59.27)	(9.58)	(20.22)	(6.59)	(15.55)
Asia	-21.39	-31.09	-119.68	-18.66	-41.51	-14.41	-31.57
	(7.22)	(11.84)	(55.58)	(5.95)	(15.20)	(4.25)	(9.44)
South America	-32.90	-32.79	-26.04	-34.57	-49.56	-29.45	-38.81
or Africa	(7.78)	(18.69)	(107.73)	(5.98)	(15.63)	(4.01)	(12.30)
Constant	53.53	95.92	253.54	49.82	104.56	39.07	77.56
	(6.60)	(8.84)	(52.32)	(4.91)	(11.86)	(3.53)	(8.09)
Observations	440	438	434	434	432	423	423
R-squared	0.030	0.030	0.015	0.064	0.044	0.066	0.047

Notes: Robust standard errors in parentheses. The multivariate regressions are estimated by ordinary least squares.

Table B.5 reports the multivariate associations between carbon price recommendations and the continent of affiliation in the form of ordinary least squares regressions.

Table B.6: Multivariate analysis of carbon price recommendations and country characteristics as well as continent of affiliation

	(1) Global price 2020	(2) Global price 2030	(3) Global price 2050	(4) Unilateral 2020 with BCA	(5) Unilateral 2030 with BCA	(6) Unilateral 2020 w/o BCA	(7) Unilateral 2030 w/o BCA
Europe	-19.51	-24.48	-126.58	-11.38	-28.04	3.50	-4.73
	(15.12)	(21.58)	(88.23)	(13.80)	(25.86)	(9.65)	(19.37)
Oceania	-14.40	-27.58	-106.43	-0.94	-22.35	3.88	5.00
	(9.997)	(18.02)	(69.57)	(11.74)	(23.91)	(8.58)	(18.09)
Asia	-23.87	-29.54	-148.10	-4.78	-17.10	8.72	5.35
	(17.26)	(25.59)	(113.01)	(16.98)	(32.11)	(12.49)	(21.52)
South America or Africa	-26.63	-22.19	-20.95	-15.79	-24.32	-5.26	-4.66
	(15.76)	(29.17)	(135.66)	(15.34)	(31.51)	(10.92)	(22.27)
CC: GDP per capita	0.000505	0.00	0.00	0.00	0.00	0.00	0.00
	(0.000393)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
CC: Weighted carbon price	0.655	0.84	1.80	0.58	0.56	0.10	0.25
	(0.484)	(0.66)	(1.79)	(0.47)	(0.80)	(0.30)	(0.62)
CC: Governance index	-0.273	0.01	0.32	-0.08	0.43	-0.21	-0.35
	(0.219)	(0.42)	(1.88)	(0.25)	(0.56)	(0.15)	(0.35)
CC: Climate change knowledge	0.370	0.56	-0.15	0.55	1.12	0.10	0.30
	(0.240)	(0.46)	(2.21)	(0.24)	(0.54)	(0.16)	(0.35)
CC: Fossil energy usage	59.35	53.00	277.80	20.94	-12.11	-12.69	-39.40
	(40.02)	(54.47)	(253.40)	(43.71)	(71.17)	(32.55)	(55.64)
CC: CO2 emissions per capita	-2.656	-3.09	-17.90	-2.86	-4.44	-0.90	-2.12
	(1.736)	(2.37)	(11.48)	(1.64)	(2.82)	(1.07)	(2.01)
Constant	1.913	23.44	83.26	-9.44	13.08	18.96	57.99
	(22.23)	(40.36)	(146.04)	(24.11)	(57.78)	(18.67)	(35.84)
Observations	427	426	422	422	421	412	412
R-squared	0.042	0.045	0.021	0.097	0.076	0.092	0.073

Notes: Robust standard errors in parentheses. The multivariate regressions are estimated by ordinary least squares.

Table B.6 reports the multivariate associations between carbon price recommendations and country characteristics as well as the continent of affiliation in the form of ordinary least squares regressions.

Table B.7: Correlation matrix of country-level information

	CC: GDP per capita	CC: Weigthed carbon price	CC: Governance index	CC: Climate change knowledge	CC: Fossil energy usage	CC: CO2 emissions per capita
CC: GDP per capita	1					
CC: Weigthed carbon price	0.103	1				
CC: Governance index	0.827	0.258	1			
CC: Climate change knowledge	0.835	0.178	0.865	1		
CC: Fossil energy usage	-0.059	-0.850	-0.138	-0.071	1	
CC: CO2 emissions per capita	0.458	-0.490	0.342	0.389	0.543	1

There is a caveat to the above, however, illustrated in Table B.7. The correlation matrix establishes that the country-level information remains highly correlated, meaning – as discussed above – that it is difficult to disentangle the effects of the global carbon price recommendation of the various sources of country-level information.

B.3.4 Observable expert characteristics

This text supplements the overview in Section 4.3 by utilizing experts' observable characteristics to study carbon price recommendations. Figure B.14 depicts results for all three carbon pricing scenarios for selected observable expert characteristics. Panel A shows a split across whether experts have published on carbon taxes or cap-and-trade schemes. Experts publishing on cap-and-trade tend to recommend lower carbon prices across all three scenarios, but insignificantly so. For instance, 2030 global carbon price recommendations for those publishing on carbon taxes are around $20 higher on average ($95.26 vs. $73.93; t-test: p=0.202). This tentatively echoes our finding from Section 4.1 based on survey results that suggested considerable differences in terms of carbon prices across those recommending the *usage* of carbon taxes versus cap-and-trade schemes for carbon pricing.

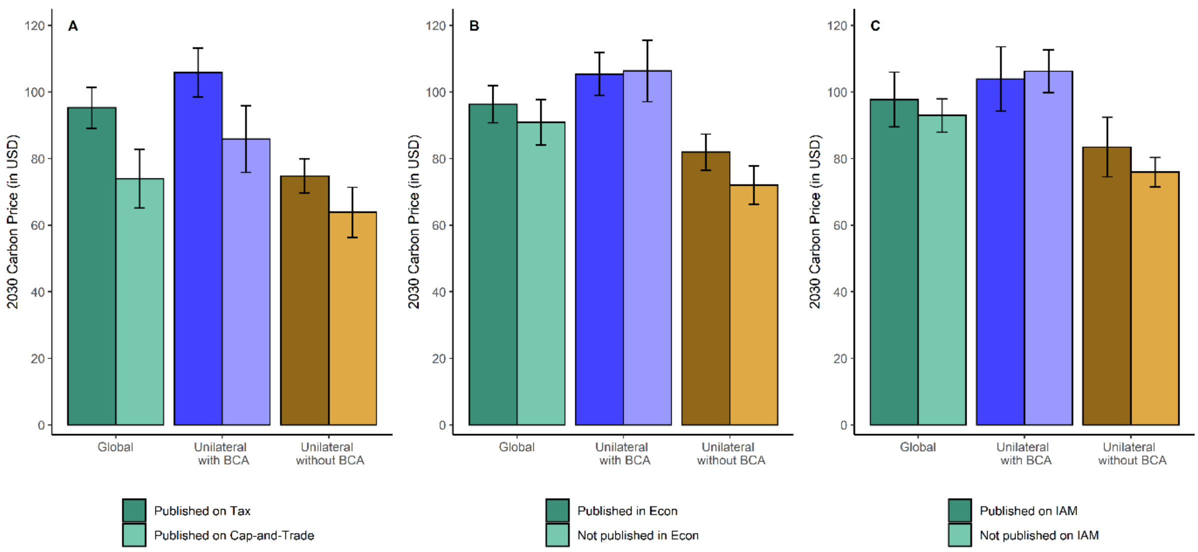


Figure B.14: Carbon price recommendations and expert characteristics

Notes: All panels depict relations of policy design recommendations and 2030 carbon prices, with means and standard errors. Panel A depicts how 2030 carbon price recommendations across all three scenarios—*global* (green) as well as *unilateral with* (blue) and *without* (brown) *border carbon adjustment (BCA)*—vary between those publishing on the use of a carbon tax versus a cap-and-trade scheme (in lighter or more transparent bars). Panel B shows the equivalent for those that publish in economics journals and not, and Panel C depicts how 2030 carbon price recommendations vary between those publishing on IAMs and not.

Panel B of Figure B.14 shows carbon price recommendations split across whether experts have published in economics journals or not. While Pindyck (2019) found that the imputed average SCC of economists is around 50 percent lower than that of non-economists, we find no considerable differences in terms of carbon price recommendations. For instance, 2030 global carbon price recommendations for those who published in economics journals are just $5 higher on average ($96.32 vs. $90.95; t-test: p=0.539). We only find that experts who have published in economics journals recommend slightly higher 2020 unilateral carbon prices without BCA ($43.66 vs. $37.13; t-test: p=0.0848). Panel C of Figure B.14 shows recommendations split across whether experts have published on IAMs or not. Again, we find no significant differences. This is also the case for count variables not depicted in Figure B.14 such as the number of publications and number of citations. Female experts tend to recommend higher carbon prices but not significantly so (e.g., 2030 global carbon prices: $107.35 vs. $91.67; t-test: p=0.205). Overall, expert characteristics exhibit only a limited correlation with carbon price recommendations.

Table B.8: Multivariate analysis of carbon price recommendations and observable expert characteristics

	(1) Global price 2020	(2) Global price 2030	(3) Global price 2050	(4) Unilateral 2020 with BCA	(5) Unilateral 2030 with BCA	(6) Unilateral 2020 w/o BCA	(7) Unilateral 2030 w/o BCA
EC: Male	-9.58	-16.39	-32.41	-9.49	-8.72	-0.93	-17.22
	(11.27)	(15.68)	(73.02)	(10.89)	(17.19)	(5.29)	(13.73)
EC: Nb. of publications	-2.40	-1.88	-9.16	-2.70	-3.46	-1.84	-3.49
	(2.06)	(2.86)	(9.53)	(2.18)	(2.93)	(1.52)	(2.82)
EC: Nb. of citations	0.04	0.03	0.16	0.04	0.02	0.02	0.05
	(0.05)	(0.06)	(0.21)	(0.05)	(0.07)	(0.03)	(0.06)
EC: Published in econ	-5.44	3.33	-32.83	-1.57	0.63	4.04	11.24
	(6.80)	(11.60)	(48.15)	(6.70)	(14.89)	(4.61)	(10.32)
EC: Nb. of econ publicat.	3.41	2.36	4.21	3.08	1.42	1.76	1.53
	(1.62)	(3.12)	(8.88)	(1.76)	(3.55)	(1.53)	(2.84)
EC: Published on IAM	1.46	7.04	-7.76	1.28	1.88	6.19	7.83
	(6.40)	(10.67)	(29.04)	(8.22)	(13.42)	(6.90)	(11.80)
EC: Published on SCC	1.35	-11.86	-54.51	5.55	-4.81	5.83	-1.14
	(7.57)	(11.82)	(31.93)	(9.00)	(14.00)	(8.65)	(13.57)
EC: Published on cap-and-tr.	-0.71	-20.92	-118.29	1.38	-30.52	-0.50	-20.63
	(7.72)	(11.99)	(39.48)	(8.22)	(16.11)	(6.63)	(11.14)
EC: Published on tax	2.61	0.04	-12.08	2.94	-9.56	-3.85	-10.45
	(6.78)	(10.44)	(46.39)	(6.50)	(14.17)	(4.62)	(10.01)
Constant	61.10	109.01	315.19	64.78	130.72	42.67	98.92
	(13.78)	(20.64)	(109.79)	(13.87)	(23.57)	(8.40)	(20.71)
Observations	382	380	378	378	376	370	369
R-squared	0.013	0.013	0.012	0.016	0.010	0.027	0.025

Notes: Robust standard errors in parentheses. The multivariate regressions are estimated by ordinary least squares. EC: "expert characteristics".

Table B.8 reports the multivariate associations between carbon price recommendations and observable expert characteristics in the form of ordinary least squares regressions. The results are discussed in Sections 4.3 and 4.5.

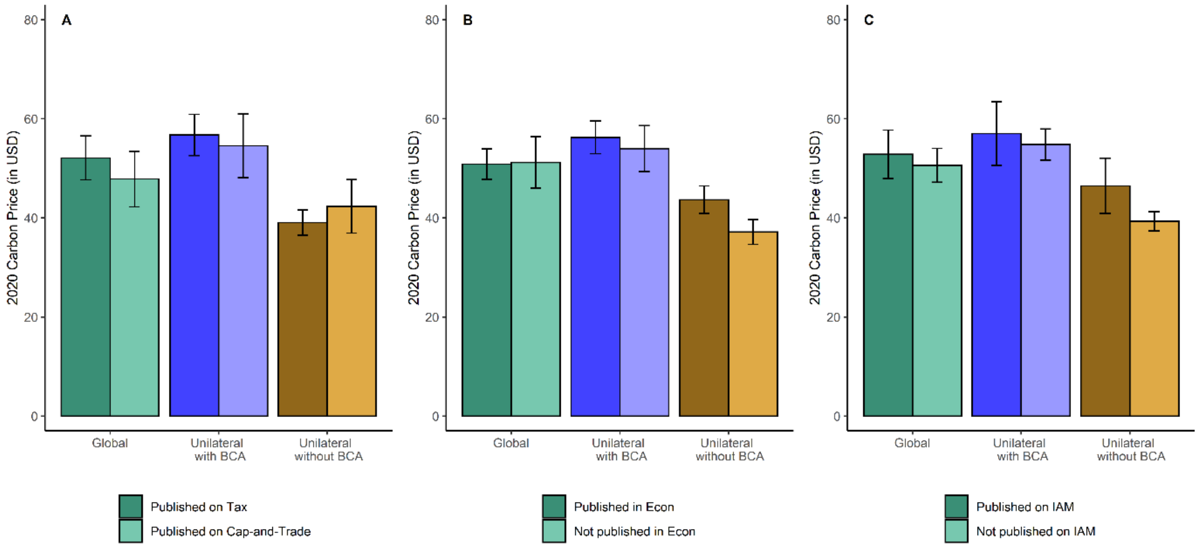


Figure B.15: Carbon price recommendations and selected observable expert characteristics

Notes: All panels depict relations of policy design recommendations and 2020 carbon prices, with means and standard errors. Panel A depicts how 2020 carbon price recommendations across all three scenarios, global (green) as well as unilateral with (blue) and without (brown) BCA, vary between those publishing on the use of a carbon tax versus a cap-and-trade scheme (in more transparent bars). Panel B shows the equivalent for those that publish in economics journals and not, and Panel C depicts how 2020 carbon price recommendations vary between those publishing on IAMs and not.

B.3.5 The data in combination

The remaining tables report the multivariate analysis when considering all four additional data sources. In addition to results discussed in Section 4.4, we provide a more detailed account of the multivariate analysis here, focusing first on global carbon price recommendations and subsequently on unilateral carbon price recommendations.

Regarding experts' recommendations for the 2020 global carbon price, we find that these variables have the expected predictive power (Table B.11). More precisely, across many specifications we see higher recommended prices from those experts supporting the introduction of BCA, recommending using part of the revenue for international transfers, providing higher ERT and discount factors, or with a home country with more knowledge about climate change. Experts who recommend using part of the revenue for transfers to firms and those who have Oceania as the continent of affiliation, on average, recommend lower 2020 carbon prices. We see, however, that whether an expert prefers carbon taxes, recommends using part of the revenue for transfers for government spending, or has published on cap-and-trade do not generally explain the mean 2020 carbon price recommendations. The same conclusions hold qualitatively for the global carbon price in 2030 – with the additions that in several specifications supporting the introduction of BCA is not always a significant predictor and that a home country with more knowledge about climate change loses explanatory power (Table B.12). For 2030, we also find that preferring a carbon tax over alternatives becomes a positive predictor and publishing on cap-and-trade a negative predictor. Further, experts' support for BCA has no explanatory power for the 2050 carbon price recommendations (Table B.13). Yet, whether an expert prefers carbon taxes over alternatives or publishes on cap-and-trade has predictive power. For global carbon price recommendations, these findings support what we established above. In this model, we confirm the results for the survey questions on policy design issues and "determinants" and also country-information. The picture is less clear for the survey questions on observable expert characteristics, but—whenever statistically significant—results align with what we discussed in Sections 4.1 and 4.4.

We also consider the same model specifications for the unilateral price recommendations, with and without BCA. For the 2020 and 2030 carbon price recommendations with BCA, we find that recommending using part of the revenue for transfers for government spending and having published on cap-and-trade do not have any predictive power (Tables B.14 and B.15). The other variables related to survey questions on policy design issues and "determinants", and also country-information give the expected results. Without

BCA, we qualitatively confirm many of the insights (Tables B.16 and B.17). Here, experts' preference for BCA are generally less predictive of price recommendations in 2020 or 2030.

Table B.9: Multivariate analysis of carbon price recommendations using all four additional data sources

	(1) Global price 2020	(2) Global price 2030	(3) Global price 2050	(4) Unilateral 2020 with BCA	(5) Unilateral 2030 with BCA	(6) Unilateral 2020 w/o BCA	(7) Unilateral 2030 w/o BCA
Instrument: tax	4.05	12.74	36.43	2.39	13.10	1.89	7.37
(vs. not tax)	(6.84)	(10.15)	(33.03)	(6.57)	(11.37)	(4.38)	(8.91)
BCA strongly	10.60	7.16	-14.93	6.68	7.71	-3.95	-13.61
recommended	(5.71)	(9.93)	(54.82)	(5.26)	(10.65)	(4.32)	(9.37)
Revenue usage:	-1.63	13.10	-37.84	11.27	25.73	12.25	22.50
households	(9.79)	(12.42)	(80.79)	(6.63)	(12.15)	(4.02)	(10.29)
Revenue usage:	-21.72	-34.77	-109.73	-20.49	-41.69	-13.35	-34.24
firms	(6.88)	(10.68)	(35.66)	(6.83)	(12.11)	(4.84)	(10.31)
Revenue usage:	-12.03	-19.86	-166.76	-1.77	-5.92	0.71	-9.37
government	(11.65)	(15.12)	(119.07)	(6.23)	(13.52)	(5.21)	(13.10)
Revenue usage:	14.76	26.04	83.79	18.05	35.95	11.72	27.25
international	(8.42)	(12.51)	(53.31)	(8.04)	(14.65)	(4.92)	(11.33)
Emission	3.08	12.95	66.32	6.05	21.82	5.61	14.20
reduction target	(5.16)	(6.79)	(26.95)	(4.62)	(8.13)	(3.04)	(6.15)
Abatement cost	1.31	0.83	7.88	0.99	-1.41	-0.31	-0.41
	(2.95)	(4.51)	(17.01)	(2.53)	(5.11)	(1.74)	(3.76)
Probability of	5.02	7.50	33.81	0.32	3.01	-2.05	-0.57
20% damages	(3.30)	(5.14)	(21.83)	(3.26)	(5.36)	(2.72)	(4.85)
Mean damages	-2.47	-0.95	11.88	-2.41	1.58	1.14	4.56
	(3.84)	(5.87)	(22.75)	(3.36)	(6.09)	(2.75)	(5.18)
Utility discount	2.04	5.74	14.19	3.44	10.62	2.98	5.98
factor	(3.09)	(3.97)	(23.35)	(2.40)	(4.61)	(1.60)	(3.53)
Europe	-4.41	-1.93	-74.06	1.84	-3.19	8.85	4.04
	(16.87)	(24.35)	(95.53)	(16.74)	(31.01)	(11.23)	(22.53)
Oceania	-10.34	-24.09	-99.91	7.51	-22.73	7.31	9.85
	(12.04)	(20.51)	(92.56)	(12.30)	(26.89)	(9.16)	(19.76)
Asia	-2.39	13.81	30.96	19.53	40.40	18.59	29.42
	(15.69)	(25.07)	(86.59)	(17.41)	(34.42)	(14.23)	(23.34)
South America	-13.15	4.30	78.60	6.13	9.58	0.64	-1.43
or Africa	(16.24)	(31.21)	(140.75)	(16.12)	(36.28)	(13.95)	(26.26)
CC: GDP per	0.00	0.00	0.01	0.00	0.00	0.00	0.00
capita	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
CC: Weigthed	0.29	0.29	-0.19	0.25	-0.02	-0.24	-0.19

carbon price	(0.58)	(0.74)	(1.97)	(0.56)	(0.94)	(0.34)	(0.69)
CC: Governance index	-0.24 (0.30)	0.14 (0.55)	-0.43 (2.07)	0.02 (0.35)	0.53 (0.72)	-0.07 (0.21)	-0.25 (0.42)
CC: Climate change knowledge	0.03 (0.28)	0.09 (0.54)	-2.08 (2.18)	0.09 (0.31)	0.39 (0.62)	-0.09 (0.23)	-0.00 (0.44)
CC: Fossil energy usage	-3.12 (39.33)	-46.90 (56.22)	-192.36 (231.04)	-29.55 (45.20)	-126.70 (78.93)	-41.22 (34.72)	-94.31 (59.49)
CC: CO2 emissions per capita	-0.17 (1.85)	1.14 (2.87)	0.28 (10.98)	-1.54 (2.00)	0.74 (3.91)	-0.60 (1.41)	-0.59 (2.60)
EC: Male	-17.30 (11.84)	-29.23 (17.95)	-98.31 (85.33)	-16.16 (11.27)	-19.89 (17.87)	-3.43 (6.20)	-23.48 (15.80)
EC: Nb. of publications	-1.71 (2.42)	-1.64 (2.98)	-5.38 (11.53)	-1.91 (2.41)	-1.50 (2.86)	-1.18 (1.62)	-2.59 (2.85)
EC: Nb. of citations	0.05 (0.06)	0.06 (0.07)	0.29 (0.29)	0.04 (0.06)	0.03 (0.07)	0.02 (0.04)	0.06 (0.07)
EC: Published in econ	3.90 (8.40)	17.51 (12.51)	24.54 (41.75)	8.00 (7.43)	17.73 (13.40)	10.68 (5.36)	22.84 (11.01)
EC: Nb. of econ publications	1.32 (1.74)	-0.44 (3.07)	-7.43 (9.89)	0.20 (1.65)	-4.15 (3.37)	-1.02 (1.38)	-2.55 (2.66)
EC: Published on IAM	6.00 (7.30)	8.11 (12.44)	-17.79 (38.24)	2.14 (7.66)	-1.49 (12.98)	5.83 (6.42)	5.30 (11.07)
EC: Published on SCC	-1.10 (8.93)	-12.70 (13.80)	-49.12 (51.07)	11.93 (8.78)	8.44 (14.28)	8.23 (7.73)	3.98 (12.65)
EC: Published on cap-and-trade	5.19 (9.48)	-10.00 (13.94)	-76.13 (47.19)	9.45 (8.75)	-16.40 (18.66)	2.63 (6.73)	-10.70 (13.04)
EC: Published on tax	5.44 (8.49)	4.49 (11.53)	10.93 (46.59)	5.58 (7.28)	-2.76 (14.31)	-1.35 (4.98)	-6.38 (10.09)
Constant	29.65 (33.92)	13.64 (59.59)	204.53 (251.87)	1.38 (35.05)	-35.67 (77.30)	16.58 (27.55)	51.16 (52.90)
Observations	319	320	319	320	320	317	316
R-squared	0.131	0.187	0.155	0.221	0.252	0.240	0.253

Notes: Robust standard errors in parentheses. The multivariate regressions are estimated by ordinary least squares.

Table B.10: Multivariate analysis of carbon price recommendations using all four additional data sources

	(1) Global price 2020	(2) Global price 2030	(3) Global price 2050	(4) Unilateral 2020 with BCA	(5) Unilateral 2030 with BCA	(6) Unilateral 2020 w/o BCA	(7) Unilateral 2030 w/o BCA
Instrument: tax (vs. not tax)	-0.05 (0.22)	0.01 (0.23)	0.24 (0.22)	0.11 (0.21)	0.19 (0.21)	-0.15 (0.22)	0.05 (0.23)
BCA strongly recommended	0.38 (0.25)	0.03 (0.25)	-0.22 (0.24)	0.26 (0.25)	0.08 (0.26)	-0.22 (0.26)	-0.46 (0.26)
Revenue usage: households	0.33 (0.26)	0.60 (0.25)	0.72 (0.26)	0.57 (0.25)	0.82 (0.26)	0.51 (0.24)	0.76 (0.26)
Revenue usage: firms	-0.62 (0.25)	-0.63 (0.24)	-0.72 (0.23)	-0.49 (0.24)	-0.66 (0.23)	-0.55 (0.25)	-0.71 (0.26)
Revenue usage: government	-0.04 (0.29)	-0.07 (0.30)	-0.05 (0.31)	0.07 (0.26)	0.23 (0.29)	0.21 (0.29)	0.19 (0.31)
Revenue usage: international	0.09 (0.27)	0.26 (0.27)	0.42 (0.24)	0.24 (0.25)	0.41 (0.26)	0.40 (0.24)	0.48 (0.25)
Emission reduct. target	0.38 (0.15)	0.58 (0.14)	0.75 (0.15)	0.45 (0.16)	0.61 (0.15)	0.47 (0.16)	0.65 (0.15)
Abatement cost	-0.04 (0.12)	-0.04 (0.12)	-0.14 (0.10)	-0.03 (0.12)	-0.09 (0.12)	0.01 (0.12)	-0.04 (0.12)
Probability of 20% damages	0.16 (0.12)	0.14 (0.11)	0.11 (0.10)	0.05 (0.11)	0.07 (0.11)	-0.04 (0.12)	-0.05 (0.11)
Mean damages	-0.27 (0.14)	-0.22 (0.13)	-0.11 (0.12)	-0.14 (0.13)	-0.07 (0.12)	-0.01 (0.15)	0.05 (0.14)
Utility discount factor	0.21 (0.08)	0.21 (0.08)	0.18 (0.08)	0.19 (0.08)	0.21 (0.08)	0.25 (0.09)	0.20 (0.09)
Europe	1.19 (0.64)	0.38 (0.93)	0.05 (0.98)	0.57 (0.73)	0.11 (0.84)	0.76 (0.71)	0.28 (0.89)
Oceania	-0.31 (0.54)	-0.89 (0.54)	-0.42 (0.56)	-0.13 (0.52)	-0.61 (0.56)	-0.06 (0.54)	-0.09 (0.55)
Asia	0.74 (0.85)	0.16 (1.06)	0.56 (1.07)	0.73 (0.81)	0.12 (0.84)	1.47 (0.87)	1.10 (0.84)
South America or Africa	0.19 (0.88)	0.71 (1.24)	1.39 (1.68)	-0.06 (0.89)	0.51 (1.11)	0.35 (1.01)	0.78 (1.18)
CC: GDP per capita	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
CC: Weighted carbon price	0.00 (0.02)	0.01 (0.02)	0.01 (0.01)	0.02 (0.02)	0.02 (0.01)	0.01 (0.02)	0.01 (0.01)
CC: Governance index	-0.02 (0.02)	0.00 (0.02)	0.01 (0.03)	-0.01 (0.02)	0.00 (0.02)	-0.01 (0.02)	-0.01 (0.02)
CC: Climate							

change knowledge	0.01 (0.02)	-0.00 (0.02)	-0.01 (0.03)	0.04 (0.02)	0.02 (0.02)	0.02 (0.02)	0.02 (0.02)
CC: Fossil energy usage	0.08 (1.40)	0.75 (1.62)	1.62 (1.66)	-0.45 (1.49)	0.67 (1.45)	-1.11 (1.36)	-0.21 (1.34)
CC: CO2 emissions per capita	0.06 (0.09)	0.01 (0.12)	-0.06 (0.13)	-0.05 (0.11)	-0.06 (0.12)	-0.02 (0.10)	-0.04 (0.12)
EC: Male	-0.34 (0.33)	-0.46 (0.35)	-0.54 (0.33)	-0.38 (0.32)	-0.60 (0.33)	-0.12 (0.29)	-0.42 (0.32)
EC: Nb. of publications	-0.07 (0.07)	-0.07 (0.06)	-0.07 (0.06)	-0.02 (0.06)	-0.05 (0.06)	-0.06 (0.05)	-0.05 (0.06)
EC: Nb. of citations	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
EC: Published in econ	0.27 (0.29)	0.24 (0.28)	0.41 (0.27)	0.22 (0.28)	0.24 (0.27)	0.31 (0.30)	0.34 (0.29)
EC: Nb. of econ publications	0.10 (0.08)	0.08 (0.08)	0.02 (0.07)	0.04 (0.08)	0.04 (0.07)	-0.01 (0.08)	0.02 (0.08)
EC: Published on IAM	0.25 (0.36)	0.38 (0.31)	0.32 (0.30)	-0.07 (0.32)	0.16 (0.29)	-0.11 (0.38)	0.08 (0.33)
EC: Published on SCC	0.48 (0.42)	0.11 (0.38)	-0.08 (0.38)	0.80 (0.42)	0.41 (0.39)	0.70 (0.43)	0.42 (0.40)
EC: Published on cap-and-trade	0.35 (0.41)	-0.06 (0.39)	-0.46 (0.38)	0.66 (0.38)	0.06 (0.39)	0.36 (0.42)	-0.02 (0.40)
EC: Published on tax	0.05 (0.25)	0.07 (0.26)	-0.09 (0.24)	0.02 (0.24)	-0.08 (0.26)	-0.10 (0.24)	-0.09 (0.25)
Observations	319	320	319	320	320	317	316
Pseudo R-squared	0.0537	0.0527	0.0640	0.0847	0.0811	0.0772	0.0741

Notes: Robust standard errors in parentheses. The multivariate regressions are estimated by ordered logit to account for categorical dependent variables.

Table B.11: Multivariate analysis of the 2020 global carbon price recommendations using all four additional data sources

	(1) Global price 2020	(2) Global price 2020	(3) Global price 2020	(4) Global price 2020	(5) Global price 2020	(6) Global price 2020	(7) Global price 2020
Instrument: tax (vs. not tax)	6.15 (5.21)	6.11 (5.60)	0.28 (0.19)	2.57 (5.50)	0.11 (0.19)	3.40 (6.12)	0.07 (0.20)
BCA strongly recommended	13.45 (5.21)	12.98 (5.58)	0.33 (0.21)	14.41 (5.68)	0.41 (0.21)	13.72 (6.16)	0.34 (0.22)
Revenue usage: households	-2.29 (7.54)	-5.82 (8.27)	0.06 (0.22)	-6.24 (8.77)	0.15 (0.23)	-6.17 (9.73)	0.21 (0.24)
Revenue usage: firms	-17.79 (6.00)	-20.26 (6.89)	-0.44 (0.20)	-20.11 (6.66)	-0.42 (0.21)	-21.78 (7.39)	-0.40 (0.23)
Revenue usage: government	-5.01 (6.62)	-7.91 (7.05)	-0.24 (0.22)	-4.87 (7.49)	-0.11 (0.22)	-6.85 (8.79)	-0.16 (0.24)
Revenue usage: international	13.18 (6.68)	12.42 (7.36)	0.00 (0.20)	13.18 (7.66)	-0.03 (0.21)	15.21 (8.29)	-0.02 (0.22)
Emission reduction target		7.72 (3.66)	0.49 (0.12)	5.50 (3.96)	0.39 (0.14)	4.81 (4.67)	0.33 (0.14)
Utility discount factor		0.34 (2.72)	0.17 (0.07)	-0.64 (2.77)	0.10 (0.07)	-0.07 (3.14)	0.15 (0.08)
Europe				2.96 (7.81)	0.36 (0.24)	0.98 (8.92)	0.31 (0.26)
Oceania				-14.49 (8.75)	-0.64 (0.39)	-20.21 (9.81)	-0.99 (0.39)
Asia				-7.71 (9.14)	-0.03 (0.51)	-11.22 (9.71)	-0.24 (0.53)
South America or Africa				-14.13 (10.60)	-0.77 (0.57)	-16.38 (11.60)	-0.80 (0.59)
CC: Climate change knowledge				0.30 (0.17)	0.02 (0.01)	0.29 (0.18)	0.02 (0.01)
EC: Published on cap-and-trade						-1.79 (6.51)	0.24 (0.37)
Constant	49.42 (10.26)	29.90 (12.56)		12.40 (21.08)		18.78 (22.99)	
Observations	426	396	396	380	380	339	339
R-squared	0.049	0.070		0.093		0.099	
Pseudo R-squared			0.0230		0.0338		0.0387

Notes: Robust standard errors in parentheses. Columns (1), (2), (4) and (6) are multivariate regressions estimated by ordinary least squares. Columns (3), (5) and (7) are multivariate regressions estimated by ordered logit to account for categorical dependent variables.

Table B.12: Multivariate analysis of the 2030 global carbon price recommendations using all four additional data sources

	(1) Global price 2030	(2) Global price 2030	(3) Global price 2030	(4) Global price 2030	(5) Global price 2030	(6) Global price 2030	(7) Global price 2030
Instrument: tax (vs. not tax)	16.64 (7.70)	17.25 (8.13)	0.39 (0.19)	11.44 (8.43)	0.19 (0.19)	11.14 (9.27)	0.12 (0.20)
BCA strongly recommended	13.43 (7.77)	10.56 (8.06)	0.03 (0.20)	13.02 (8.32)	0.10 (0.21)	10.54 (9.27)	0.01 (0.22)
Revenue usage: households	13.62 (9.47)	5.33 (10.29)	0.34 (0.21)	7.75 (11.19)	0.43 (0.22)	8.31 (12.11)	0.47 (0.23)
Revenue usage: firms	-29.24 (8.83)	-31.78 (9.53)	-0.52 (0.20)	-31.02 (9.66)	-0.46 (0.21)	-33.48 (10.65)	-0.47 (0.23)
Revenue usage: government	-5.98 (10.16)	-12.30 (10.57)	-0.23 (0.22)	-9.29 (11.16)	-0.17 (0.23)	-11.01 (12.75)	-0.16 (0.26)
Revenue usage: international	23.98 (10.00)	21.66 (10.50)	0.19 (0.21)	23.89 (10.92)	0.20 (0.21)	26.90 (11.87)	0.22 (0.23)
Emission reduction target		18.24 (4.61)	0.69 (0.12)	15.90 (5.03)	0.62 (0.13)	15.16 (5.90)	0.56 (0.13)
Utility discount factor		4.77 (3.28)	0.18 (0.07)	3.13 (3.43)	0.14 (0.07)	4.13 (3.83)	0.17 (0.08)
Europe				5.33 (11.62)	0.14 (0.24)	2.22 (13.24)	0.09 (0.26)
Oceania				-24.04 (16.66)	-0.86 (0.36)	-32.30 (18.61)	-1.13 (0.39)
Asia				0.90 (17.95)	-0.17 (0.53)	-4.22 (18.80)	-0.34 (0.54)
South America or Africa				5.41 (24.90)	0.21 (0.82)	1.79 (26.17)	0.22 (0.87)
CC: Climate change knowledge				0.47 (0.35)	0.01 (0.01)	0.50 (0.37)	0.02 (0.01)
EC: Published on cap-and-trade						-17.59 (10.05)	-0.16 (0.35)
Constant	79.12 (16.63)	17.98 (17.98)		-17.68 (39.80)		-10.50 (42.13)	
Observations	425	396	396	381	381	340	340
R-squared	0.066	0.121		0.132		0.143	
Pseudo R-squared			0.0339		0.0392		0.0422

Notes: Robust standard errors in parentheses. Columns (1), (2), (4) and (6) are multivariate regressions estimated by ordinary least squares. Columns (3), (5) and (7) are multivariate regressions estimated by ordered logit to account for categorical dependent variables.

Table B.13: Multivariate analysis of the 2050 global carbon price recommendations using all four additional data sources

	(1) Global price 2050	(2) Global price 2050	(3) Global price 2050	(4) Global price 2050	(5) Global price 2050	(6) Global price 2050	(7) Global price 2050
Instrument: tax (vs. not tax)	28.78 (31.96)	31.20 (32.80)	0.48 (0.18)	20.55 (35.10)	0.36 (0.18)	15.18 (38.72)	0.30 (0.20)
BCA strongly recommended	30.43 (41.34)	14.31 (42.38)	-0.18 (0.21)	16.36 (45.79)	-0.15 (0.22)	3.50 (51.86)	-0.30 (0.23)
Revenue usage: households	-18.23 (57.86)	-49.31 (63.25)	0.42 (0.20)	-59.17 (74.40)	0.52 (0.22)	-74.27 (82.48)	0.53 (0.23)
Revenue usage: firms	-113.47 (41.66)	-130.40 (46.41)	-0.58 (0.19)	-124.47 (43.91)	-0.54 (0.21)	-135.44 (48.68)	-0.58 (0.22)
Revenue usage: government	-90.94 (71.65)	-115.16 (78.09)	-0.21 (0.23)	-109.01 (82.49)	-0.10 (0.25)	-124.81 (96.38)	-0.08 (0.28)
Revenue usage: international	100.71 (50.00)	91.75 (50.33)	0.29 (0.19)	105.54 (54.10)	0.37 (0.20)	117.24 (58.17)	0.42 (0.21)
Emission reduction target		84.74 (21.44)	0.85 (0.12)	83.51 (25.47)	0.77 (0.13)	93.50 (31.26)	0.76 (0.14)
Utility discount factor		1.12 (20.43)	0.21 (0.07)	1.96 (22.18)	0.18 (0.07)	-0.24 (25.57)	0.17 (0.08)
Europe				-34.13 (73.14)	0.25 (0.23)	-47.77 (85.63)	0.25 (0.24)
Oceania				-118.21 (68.63)	-0.65 (0.35)	-151.33 (83.06)	-0.76 (0.37)
Asia				-61.17 (64.11)	0.11 (0.53)	-76.30 (72.63)	0.03 (0.55)
South America or Africa				55.67 (114.00)	0.83 (1.24)	30.57 (123.60)	0.91 (1.27)
CC: Climate ch. knowledge				0.11 (1.15)	0.02 (0.01)	0.01 (1.29)	0.02 (0.01)
EC: Published on cap-and-trade						-91.56 (38.23)	-0.46 (0.34)
Constant	305.84 (119.18)	80.72 (95.01)		104.99 (160.86)		153.88 (186.30)	
Observations	421	394	394	379	379	339	339
R-squared	0.041	0.086		0.093		0.107	
Pseudo R-squared			0.0441		0.0477		0.0513

Notes: Robust standard errors in parentheses. Columns (1), (2), (4) and (6) are multivariate regressions estimated by ordinary least squares. Columns (3), (5) and (7) are multivariate regressions estimated by ordered logit to account for categorical dependent variables.

Table B.14: Multivariate analysis of the 2020 unilateral carbon price recommendations with BCA using all four additional data sources

	(1) Unilateral 2020 with BCA	(2) Unilateral 2020 with BCA	(3) Unilateral 2020 with BCA	(4) Unilateral 2020 with BCA	(5) Unilateral 2020 with BCA	(6) Unilateral 2020 with BCA	(7) Unilateral 2020 with BCA
Instrument: tax (vs. not tax)	6.33 (5.08)	6.14 (5.41)	0.37 (0.18)	3.65 (5.36)	0.26 (0.19)	3.82 (5.97)	0.20 (0.20)
BCA strongly recommended	10.13 (4.99)	9.58 (5.23)	0.27 (0.23)	10.03 (5.11)	0.34 (0.22)	9.48 (5.52)	0.33 (0.23)
Revenue usage: households	8.20 (6.13)	3.13 (6.75)	0.38 (0.22)	4.86 (6.55)	0.45 (0.23)	4.82 (7.16)	0.43 (0.23)
Revenue usage: firms	-15.20 (5.72)	-15.67 (6.24)	-0.28 (0.20)	-17.41 (6.15)	-0.36 (0.21)	-18.39 (6.86)	-0.34 (0.22)
Revenue usage: government	-1.21 (4.55)	-4.68 (4.70)	-0.19 (0.21)	0.87 (4.43)	0.07 (0.21)	0.74 (5.07)	0.07 (0.23)
Revenue usage: international	14.63 (6.48)	12.31 (7.01)	0.08 (0.19)	13.79 (7.10)	0.09 (0.19)	15.39 (7.69)	0.08 (0.20)
Emission reduction target		10.74 (3.38)	0.60 (0.12)	6.68 (3.32)	0.46 (0.13)	5.93 (3.87)	0.40 (0.13)
Utility discount factor		2.55 (2.28)	0.22 (0.07)	0.96 (2.30)	0.14 (0.07)	1.18 (2.59)	0.15 (0.08)
Europe				15.36 (6.01)	0.74 (0.23)	15.88 (6.69)	0.80 (0.24)
Oceania				-6.69 (9.67)	-0.60 (0.37)	-10.07 (10.62)	-0.86 (0.36)
Asia				8.80 (8.54)	0.45 (0.52)	6.01 (8.82)	0.29 (0.53)
South America or Africa				-1.69 (10.28)	-0.65 (0.64)	-1.93 (10.58)	-0.57 (0.68)
CC: Climate ch. knowledge				0.67 (0.17)	0.05 (0.01)	0.68 (0.17)	0.05 (0.01)
EC: Published on cap-and-tr.						1.61 (6.11)	0.44 (0.34)
Constant	43.29 (7.92)	7.14 (10.66)		-48.19 (18.83)		-45.37 (19.79)	
Observations	425	398	398	382	382	341	341
R-squared	0.052	0.093		0.144		0.149	
Pseudo R^2			0.0328		0.0623		0.0701

Notes: Robust standard errors in parentheses. Columns (1), (2), (4) and (6) are multivariate regressions estimated by ordinary least squares. Columns (3), (5) and (7) are multivariate regressions estimated by ordered logit to account for categorical dependent variables.

Table B.15: Multivariate analysis of the 2030 unilateral carbon price recommendations with BCA using all four additional data sources

	(1) Unilateral 2030 with BCA	(2) Unilateral 2030 with BCA	(3) Unilateral 2030 with BCA	(4) Unilateral 2030 with BCA	(5) Unilateral 2030 with BCA	(6) Unilateral 2030 with BCA	(7) Unilateral 2030 with BCA
Instrument: tax (vs. not tax)	21.07 (9.81)	20.98 (10.25)	0.45 (0.19)	16.42 (10.30)	0.33 (0.19)	14.49 (11.16)	0.28 (0.21)
BCA strongly recommended	15.36 (8.82)	13.37 (8.93)	0.13 (0.22)	13.64 (9.11)	0.18 (0.23)	11.12 (10.06)	0.12 (0.24)
Revenue usage: households	28.96 (10.55)	14.41 (10.90)	0.53 (0.22)	16.23 (11.31)	0.64 (0.23)	16.20 (12.22)	0.63 (0.23)
Revenue usage: firms	-36.68 (11.22)	-37.47 (11.58)	-0.45 (0.20)	-37.98 (11.46)	-0.46 (0.21)	-40.80 (12.68)	-0.48 (0.22)
Revenue usage: government	-1.23 (10.43)	-9.97 (10.44)	-0.10 (0.23)	-2.09 (10.63)	0.15 (0.24)	-1.40 (11.82)	0.20 (0.26)
Revenue usage: international	36.53 (12.61)	30.99 (12.84)	0.32 (0.20)	34.31 (13.34)	0.34 (0.21)	35.99 (14.54)	0.32 (0.22)
Emission reduction target		28.17 (5.71)	0.80 (0.12)	23.96 (6.38)	0.66 (0.12)	24.01 (7.53)	0.62 (0.13)
Utility discount factor		9.02 (3.82)	0.26 (0.07)	7.40 (4.13)	0.19 (0.07)	7.56 (4.67)	0.18 (0.08)
Europe				10.90 (15.23)	0.52 (0.24)	8.69 (17.91)	0.59 (0.26)
Oceania				-29.25 (20.33)	-0.77 (0.38)	-37.01 (23.26)	-0.95 (0.43)
Asia				15.06 (24.86)	0.07 (0.45)	9.55 (26.26)	-0.05 (0.46)
South America or Africa				-0.61 (28.58)	0.14 (0.86)	-2.68 (30.80)	0.33 (0.95)
CC: Climate change knowledge				1.09 (0.49)	0.03 (0.01)	1.17 (0.51)	0.04 (0.01)
EC: Published on cap-and-tr.						-16.25 (11.85)	-0.01 (0.35)
Constant	73.19 (17.56)	-30.08 (23.30)		-121.59 (53.87)		-120.24 (55.81)	
Observations	424	397	397	382	382	341	341
R-squared	0.086	0.169		0.194		0.201	
Pseudo R-squared			0.0470		0.0625		0.0687

Notes: Robust standard errors in parentheses. Columns (1), (2), (4) and (6) are multivariate regressions estimated by ordinary least squares. Columns (3), (5) and (7) are multivariate regressions estimated by ordered logit to account for categorical dependent variables.

Table B.16: Multivariate analysis of the 2020 unilateral carbon price recommendations without BCA using all four additional data sources

	(1) Unilateral 2020 w/o BCA	(2) Unilateral 2020 w/o BCA	(3) Unilateral 2020 w/o BCA	(4) Unilateral 2020 w/o BCA	(5) Unilateral 2020 w/o BCA	(6) Unilateral 2020 w/o BCA	(7) Unilateral 2020 w/o BCA
Instrument: tax (vs. not tax)	6.68 (3.58)	6.37 (3.81)	0.32 (0.19)	4.20 (3.74)	0.14 (0.20)	4.29 (4.11)	0.08 (0.21)
BCA strongly recommended	-2.80 (3.95)	-3.90 (4.05)	-0.21 (0.22)	-3.62 (3.83)	-0.20 (0.22)	-5.37 (4.12)	-0.28 (0.22)
Revenue usage: households	12.56 (3.40)	8.94 (3.71)	0.46 (0.21)	9.76 (3.48)	0.46 (0.22)	10.49 (3.58)	0.42 (0.22)
Revenue usage: firms	-9.91 (3.94)	-9.56 (4.23)	-0.31 (0.20)	-10.69 (4.21)	-0.34 (0.21)	-10.73 (4.60)	-0.32 (0.22)
Revenue usage: government	0.48 (3.89)	-1.72 (4.00)	-0.04 (0.23)	1.20 (3.87)	0.14 (0.23)	-0.26 (4.52)	0.08 (0.25)
Revenue usage: international	8.52 (3.96)	6.12 (4.29)	0.22 (0.19)	7.54 (4.29)	0.24 (0.19)	9.00 (4.66)	0.26 (0.21)
Emission reduction target		7.70 (2.31)	0.54 (0.13)	5.62 (2.28)	0.46 (0.14)	4.99 (2.54)	0.40 (0.15)
Utility discount factor		3.23 (1.35)	0.25 (0.08)	2.20 (1.32)	0.20 (0.08)	2.99 (1.38)	0.23 (0.08)
Europe				5.71 (4.13)	0.33 (0.22)	6.05 (4.54)	0.48 (0.24)
Oceania				-7.61 (6.63)	-0.84 (0.35)	-9.81 (7.22)	-1.04 (0.34)
Asia				0.52 (5.82)	0.11 (0.43)	-1.72 (5.85)	0.02 (0.45)
South America or Africa				-13.59 (7.05)	-1.26 (0.57)	-13.52 (7.34)	-1.14 (0.63)
CC: Climate change knowledge				0.29 (0.13)	0.03 (0.01)	0.27 (0.13)	0.04 (0.01)
EC: Published on cap-and-trade						3.03 (5.32)	0.35 (0.37)
Constant	33.28 (5.53)	3.03 (7.57)		-17.36 (14.67)		-14.65 (15.21)	
Observations	418	390	390	375	375	335	335

R-squared	0.060	0.117		0.156		0.171	
Pseudo R-squared			0.0321		0.0508		0.0597

Notes: Robust standard errors in parentheses. Columns (1), (2), (4) and (6) are multivariate regressions estimated by ordinary least squares. Columns (3), (5) and (7) are multivariate regressions estimated by ordered logit to account for categorical dependent variables.

Table B.17: Multivariate analysis of the 2030 unilateral carbon price recommendations without BCA using all four additional data sources

	(1) Unilateral 2030 w/o BCA	(2) Unilateral 2030 w/o BCA	(3) Unilateral 2030 w/o BCA	(4) Unilateral 2030 w/o BCA	(5) Unilateral 2030 w/o BCA	(6) Unilateral 2030 w/o BCA	(7) Unilateral 2030 w/o BCA
Instrument: tax (vs. not tax)	14.74 (7.04)	14.02 (7.52)	0.45 (0.19)	10.79 (7.70)	0.31 (0.20)	9.14 (8.49)	0.26 (0.22)
BCA strongly recommended	-8.20 (7.49)	-9.42 (7.52)	-0.38 (0.22)	-10.56 (7.53)	-0.41 (0.23)	-14.31 (8.31)	-0.52 (0.23)
Revenue usage: households	27.02 (7.54)	17.55 (8.30)	0.56 (0.22)	18.65 (8.76)	0.62 (0.23)	20.21 (9.37)	0.63 (0.23)
Revenue usage: firms	-26.70 (8.26)	-27.62 (8.91)	-0.46 (0.20)	-28.32 (9.03)	-0.46 (0.21)	-30.44 (10.00)	-0.47 (0.23)
Revenue usage: government	-6.53 (9.50)	-13.17 (9.78)	-0.10 (0.25)	-6.24 (10.05)	0.08 (0.25)	-6.12 (11.33)	0.09 (0.28)
Revenue usage: international	23.64 (9.06)	20.20 (9.59)	0.37 (0.20)	23.00 (10.03)	0.41 (0.20)	24.37 (11.06)	0.41 (0.22)
Emission reduction target		19.01 (4.31)	0.75 (0.12)	16.03 (4.53)	0.66 (0.13)	14.57 (5.20)	0.59 (0.14)
Utility discount factor		7.43 (2.77)	0.25 (0.08)	6.29 (2.91)	0.21 (0.08)	6.87 (3.21)	0.22 (0.08)
Europe				4.04 (10.22)	0.15 (0.23)	4.86 (11.75)	0.28 (0.25)
Oceania				-16.99 (16.33)	-0.77 (0.35)	-20.32 (18.39)	-0.94 (0.37)
Asia				-5.34 (11.36)	-0.02 (0.41)	-8.05 (12.19)	-0.10 (0.43)
South America or Africa				-24.24 (15.49)	-0.57 (0.74)	-22.24 (16.61)	-0.35 (0.82)
CC: Climate change knowledge				0.31 (0.22)	0.03 (0.01)	0.38 (0.23)	0.03 (0.01)
EC: Published on cap-and-trade						-10.51 (9.02)	-0.02 (0.36)

Constant	70.86 (15.00)	-2.43 (16.65)		-21.69 (27.72)		-20.12 (29.76)	
Observations	418	389	389	374	374	334	334
R-squared	0.082	0.164		0.183		0.193	
Pseudo R-squared			0.0445		0.0544		0.0607

Notes: Robust standard errors in parentheses. Columns (1), (2), (4) and (6) are multivariate regressions estimated by ordinary least squares. Columns (3), (5) and (7) are multivariate regressions estimated by ordered logit to account for categorical dependent variables.

Online Appendix C: Discussion

This section contrasts and compares our survey results with results from IAM studies and discusses a number of considerations that may limit the conclusions one can draw from our survey results. As with any survey, standard concerns include population selection (external validity), sample response bias (internal validity) and potential strategic or protest response behavior. We address these concerns in detail below.

C.1 Relation to IAM estimates

We start by investigating if our results on global carbon price recommendations are broadly consistent with the literature on integrated assessment models (IAMs). We do this in several steps, examining the relation in terms of (1) absolute numbers, (2) growth rates, (3) determinants, (4) how survey responses differ by IAM experts.

First, recall that the mean (median) recommended carbon prices at the global level are \$50 (\$40) for a ton of CO_2 in 2020, with a modal recommendation of \$50. The mean is significantly higher than the central mean SCC estimate from the latest prior version of DICE by Nordhaus (2018) of \$35 in 2010 US dollars, around \$42 in 2019 US dollars (t-test: $p=0.002$). A recent analytic paper on the SCC (Traeger, 2023) illustrates a sensitivity range from \$10 to \$2330. A recent meta-analysis by Tol (2023a, 2023b) has collected more than 5000 estimates of the SCC, in 2010 USD and per carbon values. We adjust these estimates to 2019 US dollars and per ton of CO2 values and compare the (winsorized) distribution of SCCs in the literature to experts' 2020 global carbon price recommendations. Figure C.1 below shows this comparison using kernel density estimation (using biweight and a half-width of the kernel of 20 to smooth spikes so as to allow for a better visual representation). The left panel is winsorized at \$5000 (since a few SCC estimates are "off the chart"), and the right panel is winsorized to be on the comparable scale of expert recommendations from \$0 to \$500. For both cases, we find that SCC estimates in the literature are skewed towards much higher values and differ substantially from experts' recommendations (t-test: $p<0.000$; Kolmogorov-Smirnov test: $p<0.000$); For instance, the mean SCC is \$419 (\$165) in the left (right) panel. Thus, in comparison, the responses to our survey point towards less dispersed recommendations than SCC estimates from the literature.

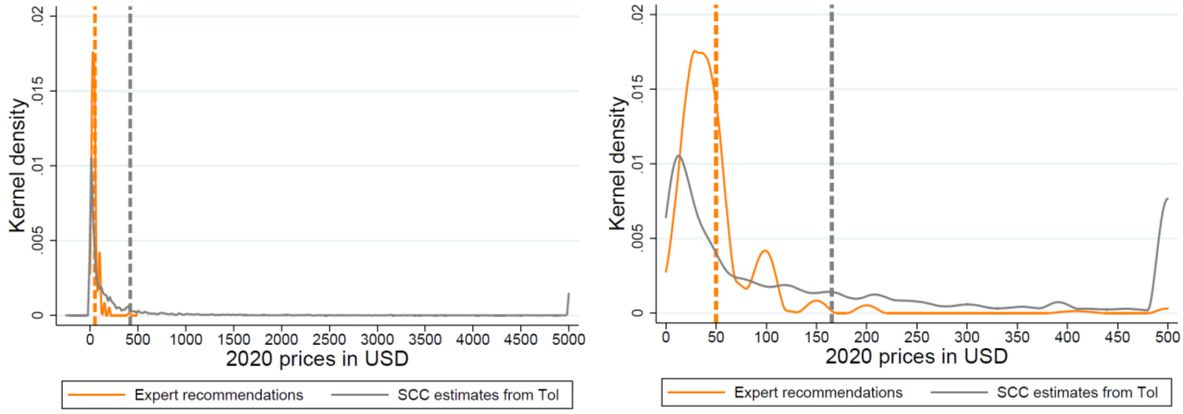


Figure C.1: Comparison of 2020 global carbon prices with SCC estimates in the literature

Notes: Kernel density plot of 2020 global carbon price recommendations (orange) and SCC estimates in the literature from the meta-analysis by Tol (2022a). SCC estimates are winsorized at \$5000 in Panel A and at \$0 and \$500 in Panel B to be on the same range as the carbon pricing recommendations. The vertical dashed lines represent the respective (winsorized) sample means.

Second, in terms of growth rates of carbon prices, we find that more than 95 percent of all global price paths increase over time. This is in line with most theoretical work on the topic.[2] For instance, Smulders et al. (2014: 435), referering to Golosov et al. (2014), state that "*as a rule of thumb, the optimal carbon tax grows at approximately the same rate as GDP*". There are a number of extensions to this rule of thumb (e.g. Bretschger and Karydas, 2019). Based on the price recommendations for 2020 and 2050, we compute exponential growth rates and find an interquartile range of 2.56 to 5.51 percent and a mean (median) growth rate of global carbon prices of 4.42 percent (4.09 percent) from 2020 to 2050; Figure C.3 in Online Appendix C.5 illustrates the distribution of these growth rates.[3] This is around twice as high as forecasts of long-term global economic growth rates, which tend to be around 2 percent (Christensen et al., 2018; Drupp et al., 2018), and higher than meta-analytic estimates of the mean growth rate of Pigouvian climate taxes or the SCC (Tol, 2013). It is slightly higher as compared to some prominent estimates derived from IAMs, cf. 3.5 percent (Nordhaus, 2018), or from stylized models, but considerably lower than carbon price growth rates as used in cost-efficiency IAMs

[2] Besides this standard case, 2020 to 2050 carbon price recommendations of 12 experts do not grow over time, eight of have a zero growth rate. One of this stays constant at a rather high value of \$500, which may be interpreted as the price of a backstop technology. In addition, four experts recommend carbon price schedules that exhibit negative growth rates between 2020 and 2050, as suggested i.a. by Daniel et al. (2019).

[3] If we split the time frame into two periods, we find mean (median) growth rates of global carbon prices of 6.53 (5.54) percent per year from 2020 to 2030, and 3.41 (3.19) percent per year from 2030 to 2050. This slowing growth rate of carbon prices in later periods is more pronounced than in standard IAMs. Compare for instance the optimal run by Nordhaus (2018) with a growth rate of the global carbon price of 3.37 percent per year from 2020 to 2030 and 3.07 percent per year from 2030 to 2050.

featured in the IPCC, which Gollier (2021) reports to exhibit mean (median) growth rates of almost 6 (8) percent.

Third, we have illustrated in Section 4.2 that global carbon price recommendations are affected in expected ways by key determinants from the IAM literature, including discount rates, damages, and the emission reduction target. Yet, while higher utility discounting is associated with lower carbon price recommendations, carbon prices are far less sensitive to utility discounting in our survey data than as suggested by standard IAMs (e.g., Emmerling et al., 2019; Hänsel et al., 2020; Nordhaus, 2019; Traeger, 2022).

Fourth, we have shown in Section 4.3 that global carbon price recommendations do not differ significantly between the subgroup of experts whom we have identified as publishing on IAMs based on their papers' abstracts (N=67) and the other experts (t-tests: p-values>0.65 for all three years). In terms of the qualitative direction, carbon price recommendations for the IAM subsample tend to be a little higher for 2020 ($52.82 vs. $50.61) and 2030 ($97.75 vs. $92.92) and a little smaller for 2050 ($212.45 vs. $235.25) for the IAM subsample. Additionally, we investigate differences regarding views on determinants between the IAM-subgroup and other respondents. Here we find no differences in ERT, utility discounting and mitigation costs (ranksum tests: p>0.25 in all cases), but IAM experts expect lower damages (mean damages and catastrophic damages; ranksum tests: p=0.002 and p=0.0495).

Overall, these analyses suggest that our survey results are comparable with standard IAM results but tend to be less dispersed and less sensitive to controversial input assumptions.

C.2 Non-response bias

Among the potential biases, we first consider *non-response bias*, which relates to a biased selection of specific experts from our population of experts into responding. Allowing respondents to reveal their identity, permits us to examine which experts respond to our study, and then to re-weight responses according to potentially biased sample characteristics. To some extent, such response bias would be desirable because our population selection yields publication-based *potential experts*, as co-authors of two pertinent papers. Some co-authors may not be experts (or may not sufficiently perceive themselves as experts) on carbon pricing, and if these select out of responding, this may not be a problem per se. For instance, we find that the probability of being a respondent is higher for those with more than the median number of publications (24.79 percent versus 18.87 percent; t-test: p=0.001).

We investigate how systematically these expert characteristics are related to experts' price recommendations. To this end, we use the information on those experts who revealed their identity to us to test for potential self-selection and response bias effects and compare respondents and non-respondents based on observable characteristics. We consider one such approach to see how the carbon price recommendations differ between the full dataset (Table A.2 in Online Appendix A.3) and matching models that allow price recommendations to be re-weighted based on the characteristics of the respondents and non-respondents.[4] For the purpose of this exercise, we define as respondents or non-respondents those that are neither explained non-respondents nor in the "missing" group (e.g. potential experts for whom we could not obtain a workable e-mail address). Respondents for whom we cannot identify characteristics are dropped from these models. We generate a constant broad notion of "treatment" (i.e. response), interpreted as the remaining respondents, who responded to the relevant question. We consider non-respondents as the "control" group. The matching procedure is done by propensity scores and outlined in Online Appendix C.5.

Table C.1: Re-weighting global price recommendations

	Global 2020	Global 2030	Global 2050	Unilateral 2020 with BCA	Unilateral 2030 with BCA	Unilateral 2020 w/o BCA	Unilateral 2030 w/o BCA
Full dataset	50.26	92.40	224.36	54.34	104.39	40.47	77.54
Unweighted	51.35	94.43	233.56	55.51	106.63	40.69	77.69
Weighted	52.33	95.07	247.38	55.41	107.70	39.77	78.28

Notes: The model consists of the following characteristics: Whether the expert is based in Europe, Oceania, Asia or the category of Africa and Latin America, is a male, as well as number of publications and citations, whether the publications are in economics journals and if so how many, and consider issues like IAMs, the SCC, carbon taxes or cap-and trade. Weights are estimated by propensity score matching.

The unweighted model in Table C.1 presents the mean recommendations before matching. It differs from the full dataset since the number of respondents is slightly lower. This is because we can only obtain the characteristics for some respondents. The weighted model presents the mean response after the matching procedure. We consider a model that is broadly in line with the setups considered in Section 4.3, in that it builds on the data types concerning continent of main affiliation and observable expert characteristics.[5] This allows us to focus on demographics as well as information related to the pertinent publications.

[4] Another approach is detailed in Dutz et al. (2021), showing how standard approaches to deal with this can be improved by modeling non-respondents, as some may decline to participate and others may not see the survey invitation. With our design, we identified 97 explained non-respondents, mitigating some of these concerns.

[5] We here focus on continent of main affiliation instead of continent implied by the answer to the survey, to obtain comparable information also for the non-respondents.

We explain the matching and estimation procedure in detail in Online Appendix C.5. To start with, we estimate the propensity to respond by a probit regression to obtain the propensity score. We then use these scores to reweight the sample of respondents. Table C.3 and Table C.4 in Online Appendix C.5 show the balancing test before and after reweighting for the global carbon price in 2030. After reweighting, characteristics are relatively balanced between respondents and non-respondents. While expert characteristics have predictive power regarding who responded to our survey, the effects on global price recommendations seem to decline in the aggregate, and in some cases cancel out. For the full dataset (see Table C.1), we obtain mean global prices of $50.26, $92.40, and $224.36 for the years 2020, 2030, and 2050, respectively. The matching models present both mean responses before and after re-weighting by propensity scores. The unweighted responses are $51.35, $94.43, and $233.56 for 2020, 2030, and 2050, respectively, and should be used for comparison. The re-weighed responses are $52.33, $95.07, and $247.37. While there is some effect on 2050 global carbon price recommendations when correcting for potential self-selection and response bias, the effect is not stable across other model specifications. The continent of affiliation has some predictive power in line with the analysis above, but these results tend to speak against systematic self-selection and response biases. The same is the case for information related to the relevant publications.

We also undertook this non-response bias analysis for the unilateral prices with and without BCA. The unweighted and weighted recommendations are $106.63 and $107.70 for the 2030 unilateral carbon price with BCA, and $77.69 and $78.28 for the 2030 unilateral carbon price without BCA. These exercises point in the same direction, as recommendations seem relatively unaffected by reweighting.

C.3 Non-representation bias

Our survey seeks recommendations on global carbon prices based on a population of experts that is itself not globally representative since a disproportionate fraction of academic experts are located in higher-income countries. We investigate this potential *non-representation bias* by exploring how country-level characteristics, in particular GDP per capita, is associated with carbon price recommendations and then perform a re-weighting of responses according to the global average of these country-level characteristics.

Panel A of Figure C.2 shows that recommendations on the appropriate global carbon price for 2030 vary significantly across the income distribution within our sample (the same holds for 2020 and 2050 prices). Using this observed relationship to re-weight the global carbon price recommendation according to the global average GDP per capita instead of our mean sample value leads to a reduction in the 2030 carbon price from the sample mean of $92.40 to $65.63. For 2020 (2050) the re-weighting would result in a mean carbon price of $30.83 ($137.15) as compared to $50.26 ($224.36) in 2020 (2050) in our sample. This indicates a potentially sizable non-representation bias of around 29 to 39 percent. To investigate effects across subgroups, we split the sample by the median number of publications, for those who have published or not in economics journals, and for experts who have or have not published on IAMs or the SCC. Figure C.5 in Online Appendix C.5 illustrates that for those who have published in economics journals, on IAMs or the SCC, and who have more than the median number of publications, we do not find a significantly positive relationship between GDP per capita and global carbon price recommendations in 2030.[6]

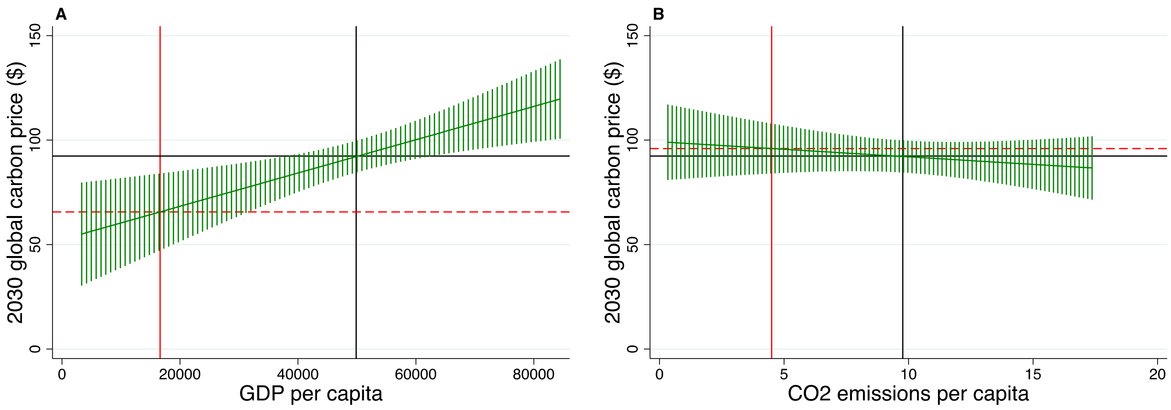


Figure C.2: Re-weighting global carbon prices for non-representation bias

Notes: Plot of 2030 global carbon price recommendations and GDP per capita (Panel A) as well as a CO_2 emissions per capita (Panel B), with linear fit (green line) and 95 percent confidence interval (green spikes). The black lines show mean characteristic values and mean 2030 global carbon price recommendations in our sample. The solid red lines show global GDP per capita (Panel A) and the global average CO_2 emissions per capita (Panel B) and the red dashed lines show the corresponding predicted (re-weighted) 2030 global carbon prices.

Furthermore, in the Panel B of Figure C.2, we consider global re-weighting also for a CO_2 emissions per capita, with emissions being a potentially more important metric for addressing the global climate externality. Here, we find no significant relationship, suggesting no indication for non-representation bias. This highlights that one would likely need to

[6] If we split at the median number of citations, we find a significant positive relationship between GDP per capita and global carbon price recommendations in 2030 for both subgroups, with p=0.029 and 0.001 respectively, in a linear regression with robust standard errors. Furthermore, we do find a number of significantly positive relationships for the above median sub-groups for 2020 global carbon prices but not for 2050 recommendations.

construct some multi-dimensional measure of “global representativity”, with appropriate indicator-weights, to clearly identify the extent of non-representation bias. In Figure C.6 in Online Appendix C.5, we further consider similar re-weighting exercises for the 2030 Glocal-wedge. While re-weighting according to global GDP per capita would predict a positive but insignificant Glocal-wedge, thus not detecting a clear free-riding signal, re-weighting according to CO_2 emissions per capita would lead to a somewhat larger Glocal-wedge.

C.4 Strategic response bias

A standard concern with expert elicitation is strategic response bias to tilt the resulting distribution according to one’s own preferences. We account for strategic response bias in different ways. First, we communicate median values besides mean values, which may be prone to strategic response bias. Second, we winsorize the data to deal with two extreme outliers, which may be regarded as either strategic or protest responses. Third, we test for remaining strategic response bias in two ways: Comparing anonymous and non-anonymous responses as well as comparing early and late respondents. The hypothesis is that strategic responders respond anonymously and early (Armstrong and Overton, 1977; Necker, 2014).

In our first test on strategic response bias, we compare early versus late responses across two measures. One measure is based on whether responses came to the initial e-mail invitation or to a reminder. We interpret respondents to the invitation e-mail as early respondents. In general, there is no predictive power of being an early respondent on global and unilateral prices for any years. With one exception, there are no differences between early and late respondents in terms of country-level information and experts’ characteristics: The share of respondents from Asia is lower in early respondents as compared to the later rounds (9.47 versus 16.52; t-test: p=0.042). But this is mitigated by the responses to the first reminder (20.00 versus 11.51: t-test: p=0.035). The other measure is based on the respondent ID (as recorded by SoSci Survey) as proxy for the time of response. We distinguish between early and late responses through a median split of the respondent ID. This confirms the observations made above for the price levels. In terms of country-level information, we see effects for experts being from Asia (consistent with above and mitigated in the first round of reminders), South America and Africa (for the opposite reason, yet insignificant when comparing respondents that reply to different rounds) and in terms of emission-weighted nationally implemented carbon prices (11.99 versus 8.80; t-test: p=0.031) and fossil fuel energy consumption (74.54

versus 77.96; t-test: p=0.028). With one exception, there are no differences in terms of experts' characteristics.

In our second test on strategic response bias, we compare anonymous and non-anonymous responses. The vast majority of our responses were non-anonymous, yet our preceding analysis has included also 57 responses that were provided anonymously. For these, we can still leverage their responses on the relevant country from the survey itself to investigate whether observable country-characteristics differ across these two sub-samples. We neither find that anonymous respondents make recommendations more often to countries on particular continents (chi squared tests: p>0.25 in all cases), nor that their GDP per capita is statistically distinguishable ($50954.49 versus $49817.71; t-test: p=0.604). Furthermore, we find that mean carbon price recommendations by anonymous respondents tend to be slightly lower but not significantly so as compared to non-anonymous respondents (t-tests: p>0.3 in all three years), with the same median values in 2020 and 2030.

C.5 Details of the analysis

Here we provide the details of the analysis behind the discussion in Online Appendix C.1-C.4.

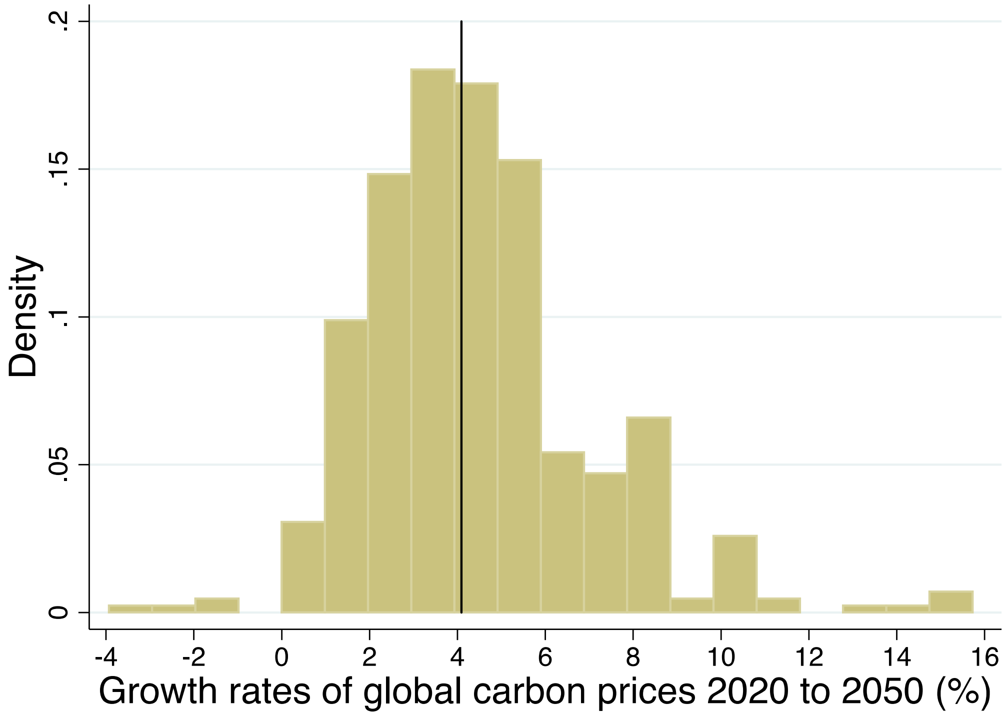


Figure C.3: Growth rates of global carbon price recommendations, 2020-2050

Notes: The figure shows a histogram of (exponential) real growth rates of global carbon price recommendations from 2020 to 2050. The vertical black line depicts the median growth rate of 4.09 percent per year.

Table C.2: Estimation of propensity score for global price recommendation

	(1) Response Global price 2020	(2) Response Global price 2030	(3) Response Global price 2050	(4) Response Unilateral 2020 w/ BCA	(5) Response Unilateral 2030 w/ BCA	(6) Response Unilateral 2020 w/o BCA	(7) Response Unilateral 2030 w/o BCA
Europe	0.24	0.25	0.25	0.25	0.25	0.24	0.25
	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)
Oceania	0.08	0.07	0.08	0.03	0.04	0.04	0.05
	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
Asia	-0.17	-0.16	-0.16	-0.17	-0.16	-0.16	-0.16
	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
South America or Africa	-0.08	-0.07	-0.06	-0.08	-0.07	-0.06	-0.06
	(0.28)	(0.28)	(0.28)	(0.28)	(0.28)	(0.28)	(0.28)
EC: Male	0.15	0.14	0.14	0.16	0.15	0.14	0.14
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
EC: Nb. of publications	0.05	0.04	0.04	0.05	0.04	0.04	0.04
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)

EC: Nb. of citations	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
EC: Published in econ	0.14	0.14	0.13	0.15	0.14	0.15	0.15
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
EC: Nb. of econ publications	0.04	0.04	0.04	0.05	0.05	0.04	0.04
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
EC: Published on IAM	0.30	0.29	0.28	0.31	0.31	0.30	0.30
	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)
EC: Published on SCC	-0.04	-0.03	-0.02	-0.06	-0.05	-0.04	-0.04
	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)
EC: Published on cap-and-trade	0.02	0.02	0.02	0.02	0.02	0.03	0.03
	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)
EC: Published on tax	0.21	0.20	0.20	0.20	0.19	0.19	0.19
	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)
Constant	-1.32	-1.33	-1.32	-1.33	-1.33	-1.33	-1.33
	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)
Observations	1,730	1,728	1,726	1,727	1,725	1,719	1,718
Pseudo R-squared	0.0393	0.0393	0.0386	0.0411	0.0407	0.0392	0.0395

Notes: Standard errors in parentheses. Weights are estimated by propensity score matching according to a probit model.

Next, we show the balancing tests before and after matching alongside a standard graphical evaluation of matching quality for the 2030 global price recommendation.

Table C.3: Balancing test for global price recommendation for 2030 – before matching

	Response	Nonresponse	t	p>|t|
Europe	0.55	0.43	4.05	0.000
Oceania	0.08	0.09	-0.43	0.666
Asia	0.11	0.18	-3.23	0.001
South America or Africa	0.02	0.02	-0.24	0.808
EC: Male	0.85	0.81	1.70	0.089
EC: Nb. of publications	4.07	3.38	3.93	0.000
EC: Nb. of citations	104.66	94.86	1.14	0.255
EC: Published in econ	0.53	0.40	4.55	0.000
EC: Nb. of econ publications	1.34	0.83	5.33	0.000
EC: Published on IAM	0.18	0.10	3.88	0.000
EC: Published on SCC	0.10	0.08	1.23	0.220
EC: Published on cap-and-trade	0.08	0.11	-1.50	0.133
EC: Published on tax	0.55	0.48	2.34	0.020

Notes: Balancing of characteristics by respondents and non-respondents before matching. t is the t-test and p>|t| the corresponding p-value.

Table C.4: Balancing test for global price recommendation for 2030 – after matching

	Response	Nonresponse	t	p>|t|
Europe	0.55	0.55	-0.15	0.884
Oceania	0.08	0.08	0.00	1.000
Asia	0.11	0.13	-0.67	0.501
South America or Africa	0.02	0.01	0.30	0.762
EC: Male	0.85	0.83	0.70	0.458
EC: Nb. of publications	4.07	3.59	2.07	0.039
EC: Nb. of citations	104.66	93.15	1.09	0.276
EC: Published in econ	0.53	0.56	-0.80	0.422
EC: Nb. of econ publications	1.33	1.21	1.03	0.302
EC: Published on IAM	0.18	0.21	-1.19	0.233
EC: Published on SCC	0.10	0.09	0.25	0.808
EC: Published on cap-and-trade	0.08	0.07	0.70	0.484
EC: Published on tax	0.55	0.57	-0.59	0.558

Notes: Balancing of characteristics by respondents and non-respondents after matching. t is the t-test and p>|t| the corresponding p-value.

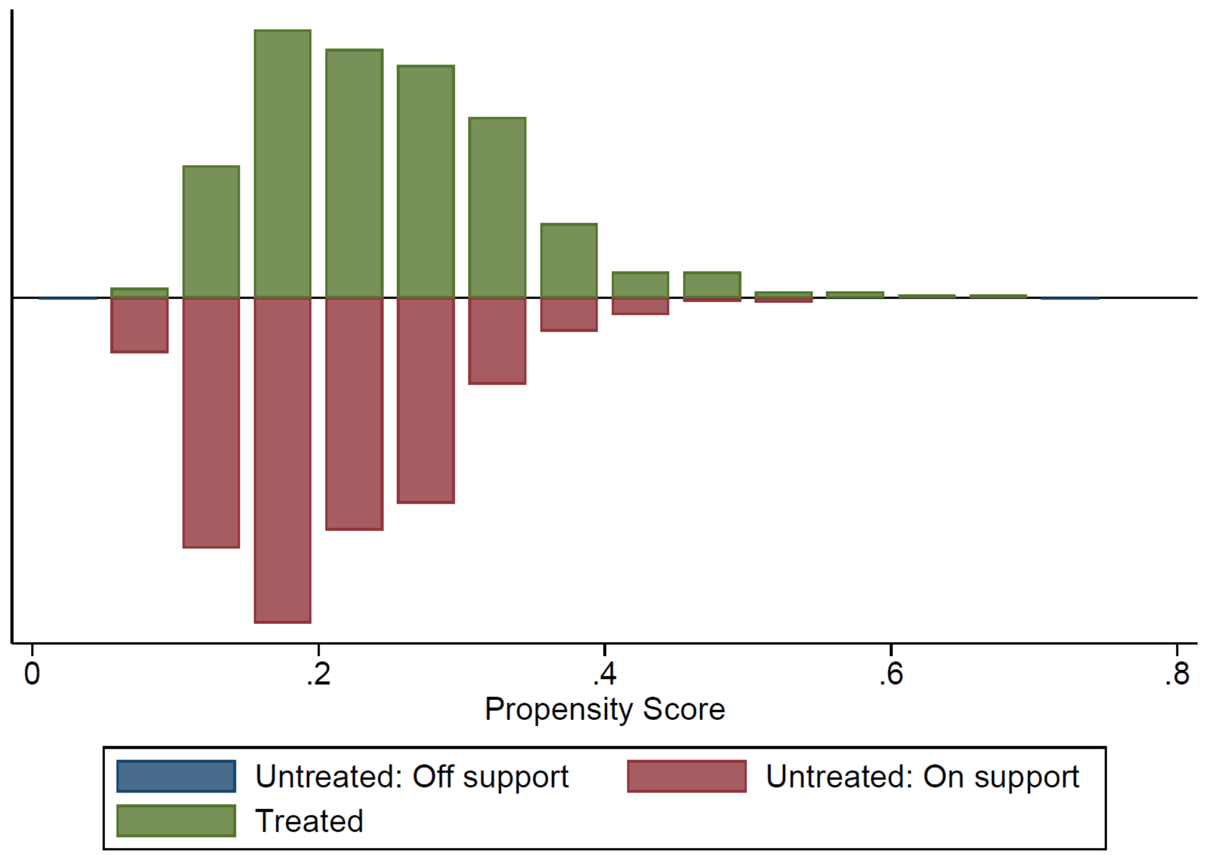


Figure C.4: Graphical evaluation of matching quality for 2030 global price recommendation

Notes: The figure shows the distribution of propensity scores for the treatment and control groups (i.e., respondents and non-respondents). It also illustrates where parts of the control group that is off support and thus not utilized in the matching procedure.

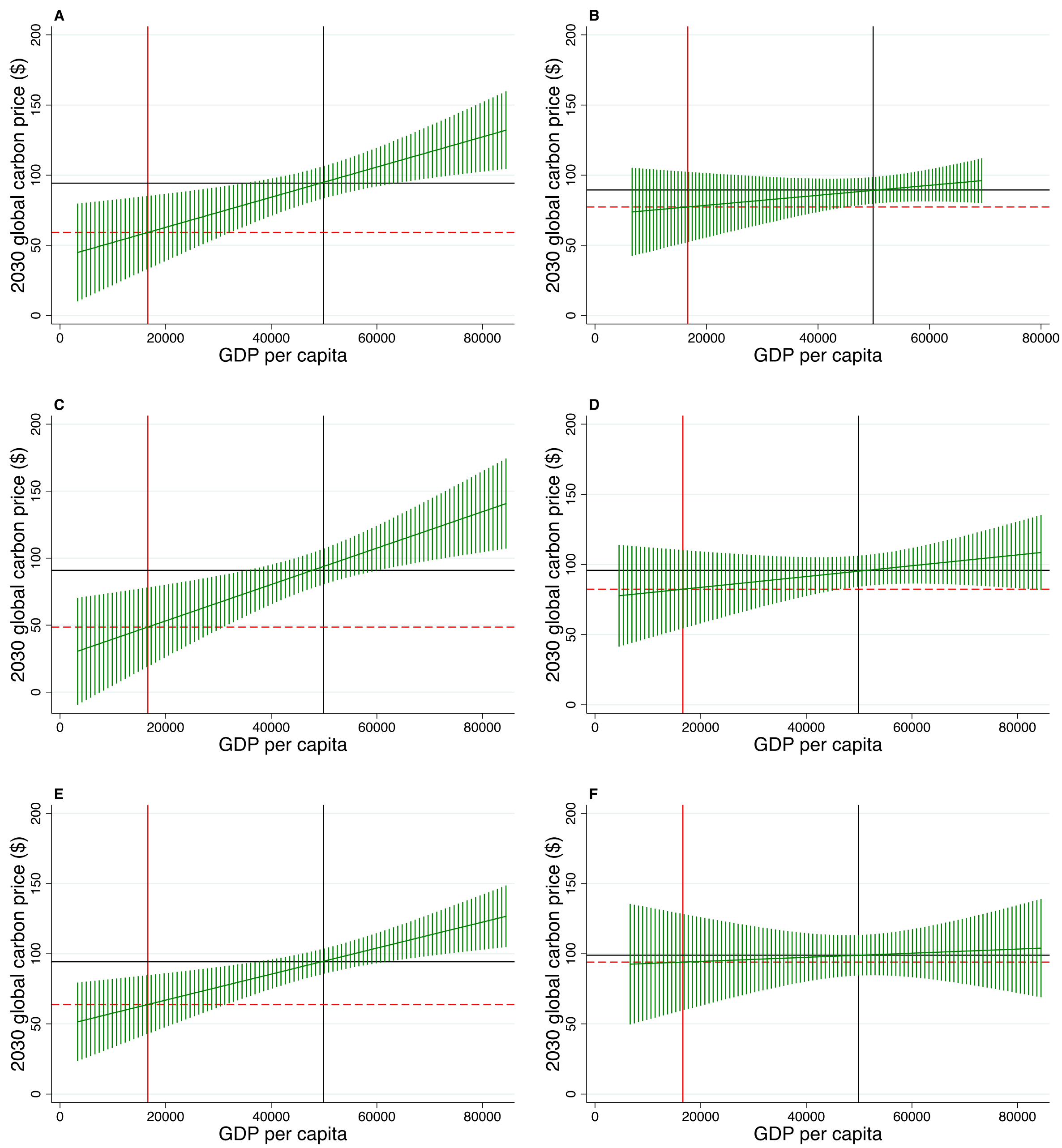


Figure C.5: Re-weighting 2030 global carbon prices for global GDP per capita across sub-groups

Notes: Plot of 2030 global carbon price recommendations and GDP per capita, with linear fit (green line) and 95 percent confidence interval (green spikes). The black lines show mean GDP per capita and mean global carbon price recommendations for 2030 in our full sample. The solid red line shows global GDP per capita and the red dashed line shows the corresponding predicted (re-weighted) 2030 global carbon price. Panel A (B) shows results for at or below (above) the median number of publications of experts, Panel C (D) shows results for experts who have not published (have published) in economics journals, while Panel E (F) shows results for experts from whose paper abstracts it is apparent that they have not published (published) on IAMs or the SCC.

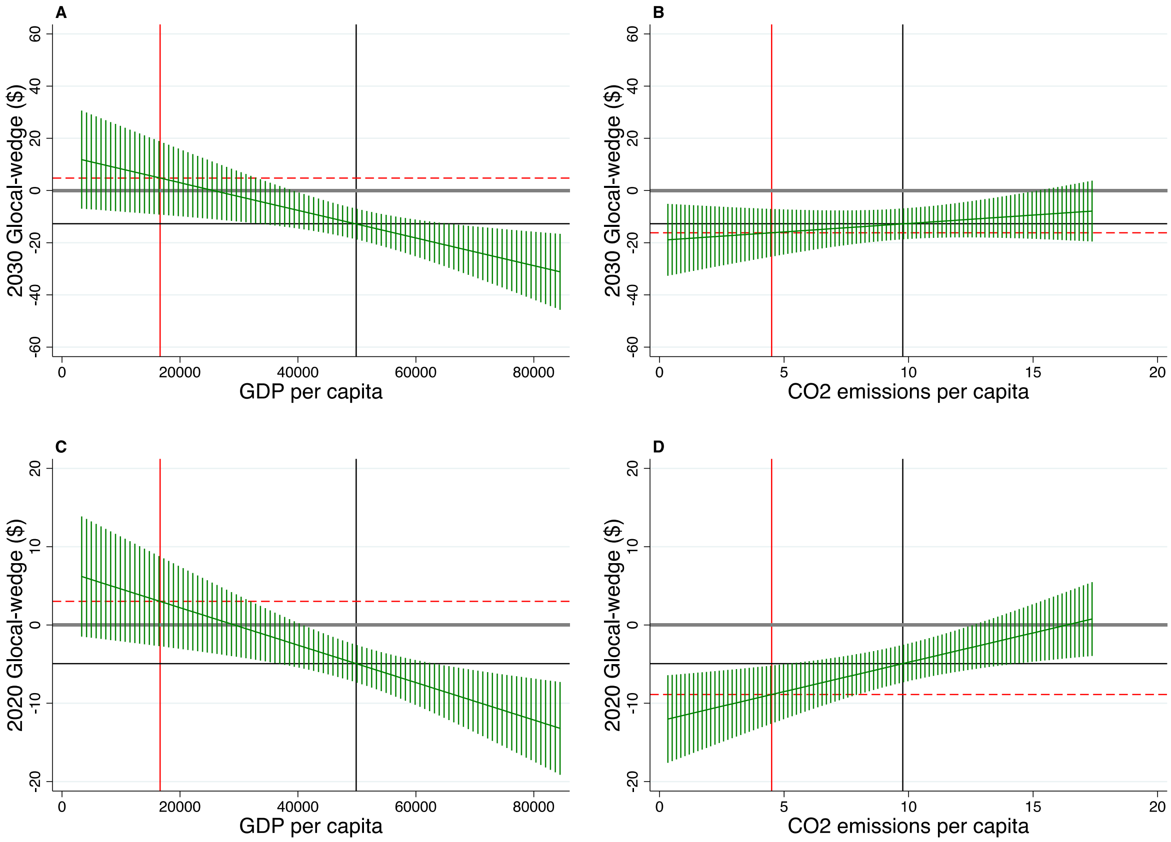


Figure C.6: Re-weighting the Glocal-wedge for global GDP and CO2 emissions per capita

Notes: Plots of 2030 and 2020 Glocal-wedges, i.e. the difference between global and unilateral with BCA carbon price recommendations, along GDP per capita (Panels A and C) and CO2 emissions per capita (Panels B and D), with linear fit (green line) and 95 percent confidence interval (green spikes). The black lines show mean GDP (or CO2 emissions) per capita and mean global carbon price recommendations. The solid red line shows global GDP (or CO2 emissions) per capita and the red dashed line shows the corresponding predicted (re-weighted) global carbon prices for 2030 and 2020.

References in the Online Appendix:

Acemoglu, D., Aghion, P., Bursztyn, L., & Hemous, D. (2012). The environment and directed technical change. *American Economic Review*, 102(1), 131-66.

Andre, P., Pizzinelli, C., Roth, C., & Wohlfart, J. (2022). Subjective models of the macroeconomy: Evidence from experts and representative samples. Forthcoming, *Review of Economic Studies*.

Armstrong, J. & Overton, T. (1977). Estimating nonresponse bias in mail surveys. *Journal of Marketing Research*, 14, 396-402.

Arrow, K., Cropper, M., Gollier, C., Groom, B., Heal, G., Newell, R., ... & Weitzman, M. (2013). Determining benefits and costs for future generations. *Science*, *341*(6144), 349-350.

Barrage, L. (2018). Be careful what you calibrate for: social discounting in general equilibrium. *Journal of Public Economics*, 160, 33-49.

Best, R., & Zhang, Q. Y. (2020). What explains carbon-pricing variation between countries?. *Energy Policy*, 143, 111541.

Bretschger, L., & Karydas, C. (2019). Economics of climate change: introducing the Basic Climate Economic (BCE) model. *Environment and Development Economics*, 24(6), 560-582.

Christensen, P., Gillingham, K., & Nordhaus, W. (2018). Uncertainty in forecasts of long-run economic growth. *Proceedings of the National Academy of Sciences*, *115*(21), 5409-5414.

Daniel, K. D., Litterman, R. B., & Wagner, G. (2019). Declining CO2 price paths. *Proceedings of the National Academy of Sciences*, 116(42), 20886-20891.

Dietz, S., & Venmans, F. (2019). Cumulative carbon emissions and economic policy: in search of general principles. *Journal of Environmental Economics and Management*, 96, 108-129.

Drupp, M.A., Freeman, M. C., Groom, B., & Nesje, F. (2018). Discounting disentangled. *American Economic Journal: Economic Policy*, 10(4), 109-34.

Dutz, D., Huitfeldt, I., Lacouture, S., Mogstad, M., Torgovitsky, A., & van Dijk, W. (2021). Selection in Surveys. Becker-Freidman Institute Working Paper No. 2021-141.

Emmerling, J., Drouet, L., van der Wijst, K. I., Van Vuuren, D., Bosetti, V., & Tavoni, M. (2019). The role of the discount rate for emission pathways and negative emissions. *Environmental Research Letters*, *14*(10), 104008.

Fischer, C., Hübler, M., & Schenker, O. (2021). More birds than stones–A framework for second-best energy and climate policy adjustments. *Journal of Public Economics*, *203*, 104515.

Freeman, M. C., & Groom, B. (2015). Positively gamma discounting: combining the opinions of experts on the social discount rate. *The Economic Journal*, 125(585), 1015-1024.

Gerlagh, R., & Liski, M. (2018). Consistent climate policies. *Journal of the European Economic Association*, 16(1), 1-44.

Gillingham, K., Nordhaus, W., Anthoff, D., Blanford, G., Bosetti, V., Christensen, P., ... & Reilly, J. (2018). Modeling uncertainty in integrated assessment of climate change: A multimodel comparison. *Journal of the Association of Environmental and Resource Economists*, 5(4), 791-826.

Gollier, C. (2021). The cost-efficiency carbon pricing puzzle. CEPR Discussion Paper No. DP15919.

Golosov, M., Hassler, J., Krusell, P., & Tsyvinski, A. (2014). Optimal taxes on fossil fuel in general equilibrium. *Econometrica*, 82(1), 41-88.

Hänsel, M. C., Drupp, M. A., Johansson, D. J., Nesje, F., Azar, C., Freeman, M. C., Groom, B. & Sterner, T. (2020). Climate economics support for the UN climate targets. *Nature Climate Change*, 10(8), 781-789.

Heal, G. M., & Millner, A. (2014). Agreeing to disagree on climate policy. *Proceedings of the National Academy of Sciences*, 111(10), 3695-3698.

Howard, P.H., & Sylvan, D. (2015). The Economic Climate: Establishing Expert Consensus on the Economics of Climate Change. Institute for Policy Integrity, 438-441.

Howard, P.H., & Sylvan, D. (2020). Wisdom of the experts: Using survey responses to address positive and normative uncertainties in climate-economic models. *Climatic Change*, *162*(2), 213-232.

Iverson, T., & Karp, L. (2021). Carbon taxes and climate commitment with non-constant time preference. *The Review of Economic Studies*, 88(2), 764-799.

Kornek, U., Klenert, D., Edenhofer, O., & Fleurbaey, M. (2021). The social cost of carbon and inequality: when local redistribution shapes global carbon prices. *Journal of Environmental Economics and Management*, 107, 102450.

Levi, S. (2021). Why hate carbon taxes? Machine learning evidence on the roles of personal responsibility, trust, revenue recycling, and other factors across 23 European countries. *Energy Research & Social Science*, *73*, 101883.

Levi, S., Flachsland, C., & Jakob, M. (2020). Political Economy Determinants of Carbon Pricing. *Global Environmental Politics*, *20*(2), 128-156.

Necker, S. (2014). Scientific misbehavior in economics. *Research Policy*, 43(10), 1747-1759.

Nordhaus, W. D. (2017). Revisiting the social cost of carbon. *Proceedings of the National Academy of Sciences*, 114(7), 1518-1523.

Nordhaus, W. (2018). Projections and uncertainties about climate change in an era of minimal climate policies. *American Economic Journal: Economic Policy*, 10(3), 333-60.

Nordhaus, W. (2019). Climate change: The ultimate challenge for Economics. *American Economic Review*, 109(6), 1991-2014.

Pindyck, R. S. (2013). Climate change policy: what do the models tell us? *Journal of Economic Literature* 51, 860-72.

Pindyck, R. S. (2019). The social cost of carbon revisited. *Journal of Environmental Economics and Management*, 94, 140-160.

Rezai, A., & Van der Ploeg, F. (2016). Intergenerational inequality aversion, growth, and the role of damages: Occam's rule for the global carbon tax. *Journal of the Association of Environmental and Resource Economists*, 3(2), 493-522.

Schultes, A., Piontek, F., Soergel, B., Rogelj, J., Baumstark, L., Kriegler, E., ... & Luderer, G. (2021). Economic damages from on-going climate change imply deeper near-term emission cuts. *Environmental Research Letters*.

Smulders, S., Toman, M., & Withagen, C. (2014). Growth theory and 'green growth'. *Oxford Review of Economic Policy*, 30, 3, 423-446.

Stern, N., & Stiglitz, J.E. (2022). The economics of immense risk, urgent action and radical change: towards new approaches to the economics of climate change. *Journal of Economic Methodology,* 1-36.

Tol, R. S. (2013). Targets for global climate policy: An overview. *Journal of Economic Dynamics and Control*, *37*(5), 911-928.

Tol, R. S. (2023a). Social cost of carbon estimates have increased over time. *Nature Climate Change*, 13, 532–536.

Tol, R. S. (2023b). Data for Social cost of carbon estimates have increased over time. *Nature Climate Change*, 13, 532–536. https://github.com/rtol/metascc

Traeger, C.P. (2023). ACE—Analytic Climate Economy. *American Economic Journal: Economic Policy*, 15(3), 372-406.

van den Bijgaart, I., Gerlagh, R., & Liski, M. (2016). A simple formula for the social cost of carbon. *Journal of Environmental Economics and Management*, 77, 75-94.