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Expert views on carbon pricing in the developing world*

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Abstract

Dozens of governments across the developing world have adopted or are actively considering a variety of carbon pricing policies, but why policymakers prefer some policy designs over others remains uncertain. We argue that expert assessments of carbon pricing primarily center on economic efficiency and distributional concerns, which in turn influence perceptions of technical efficacy and political feasibility. Leveraging a unique conjoint experiment with carbon pricing experts in developing countries, we examine how aspects of policy design influence effectiveness and feasibility, as well as how experts weigh these factors against each other. Design choices that alter the costs and benefits of carbon pricing affect perceptions of the policy's effectiveness and feasibility, often in opposing directions. Experts are split over which goal is more important overall, preferring political feasibility when distributing costs but weighing effectiveness and feasibility similarly when distributing benefits. Our findings highlight the challenge of balancing the ambition and political risk of pricing carbon in a developing country context.

1. Introduction

The highest-profile climate policy is *carbon pricing*, which has dominated much of the discourse on climate change over the past several decades. Directly pricing carbon emissions is potentially cost-effective, compatible with many other forms of climate action, and can be adapted to a wide range of economic contexts⁷. However, carbon pricing also poses political

challenges. Foremost among these is the difficulty of securing support from various political constituencies. Like other long-term policies (Jacobs 2016), carbon pricing imposes certain and concentrated present costs (both political and economic) to generate diffuse and uncertain future benefits. The distributional implications of raising and allocating carbon pricing revenues can also pose a challenge, especially when stakeholders disagree over how to use those proceeds (Stevens 2022). Moreover, carbon pricing only induces meaningful climate change mitigation if it remains sufficiently stringent through periods of economic and political volatility⁸.

To date, research on the political economy of carbon pricing has paid relatively little attention to developing countries. An unfamiliar observer might attribute this disparity to low interest among developing

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⁷ Nordhaus (1994), Stavins (1997), High-Level Commission on Carbon Prices (2017).

⁸ Finnegan (2022), Martinez-Alvarez *et al* (2022), Patterson (2023).

countries in pricing carbon. Most developing countries have contributed little to cumulative global emissions, so government leaders may feel less normative pressure to price emissions (Toerstad and Saelen 2018). Moreover, unstable political or economic conditions can threaten the institutional resources, capacity, and expertise required for carbon pricing to be a viable policy instrument (Levi *et al* 2020, Thisted and Thisted 2020, Linsenmeier *et al* 2023)⁹. Yet, at the same time, policymakers have become increasingly attentive to the policy's potential climate, technology, fiscal, and reputational benefits (Mercer-Blackman *et al* 2023, World Bank 2024). As of 2024, more than fifteen developing countries have adopted carbon pricing, and still more are actively considering adopting carbon pricing (figure 1).

How does carbon pricing gain meaningful political support? One key strategy is to shape narratives about the consequences of carbon pricing. The policy tends to attract greater support when it is expected to effectively reduce emissions and strengthen investment in renewable energy without negatively affecting household finances or disproportionately burdening the poor¹⁰.

We extend this literature by studying how *carbon pricing experts* (individuals who have directly worked on carbon pricing) across developing countries form expectations and preferences about a range of carbon pricing policy designs. Studying this difficult-to-reach population offers insight into the policy's supply-side logic, opening a window into the implicit strategic thinking of carbon pricing practitioners. Policy experts may differ from academics (e.g. Nesje *et al* 2024) and the public (e.g. Dechezleprêtre *et al* 2022, Mildenerger *et al* 2022) in their understanding of a policy's technical and political implications, as well as how they navigate tensions and trade-offs between the two. Differences between experts and the public seem especially likely in the context of carbon pricing, as public demand for climate action remains nascent in many developing countries (Leiserowitz *et al* 2023)¹¹. We center the experience of developing countries in our analysis, as experts from poorer countries systematically prefer different carbon pricing designs than their wealthier counterparts (Nesje *et al* 2024).

A further contribution of our study is to examine the decision to pursue 'second-best' policy designs.

Many policies present a tension between technical efficacy and political feasibility, obliging policymakers to compromise a policy's performance to win support sufficient for passage (Jenkins 2014, Stavins 2022). However, existing work only examines beliefs about the implications of carbon pricing or support for specific policy designs (e.g. Nesje *et al* 2024). The causal pathway that links a policy's design to beliefs about technical efficacy and political feasibility, and subsequently to decisions about whether and how to make trade-offs, has yet to be systematically understood.

Empirically, our paper presents the results of an original conjoint experiment that solicited the views of 97 individuals who have previously worked to develop carbon pricing in at least one developing country¹². Unlike existing surveys of either the public or the global community of carbon pricing experts, our participants have personal experience working in or with governments on carbon pricing policies in developing countries. Given the target population, our sample represents a non-trivial proportion of developing country carbon pricing experts.

Our analysis consists of two steps. First, we investigate how differences in carbon pricing designs affect expert perceptions of two key dimensions of carbon pricing: technical effectiveness (potential to reduce carbon emissions) and political feasibility (likelihood of being adopted). We focus specifically on the effect of three design decisions that determine who bears costs and receives benefits from carbon pricing: 1) the *instrument* (a carbon tax or an emissions trading system), 2) *coverage* (the extent of the economy's emissions covered within the policy's scope), and 3) *revenue use* (options for allocating the proceeds of carbon pricing). We expect these choices to drive variation in expert beliefs about the efficacy and feasibility of a given design¹³.

Second, we explore the relationship between perceptions of a carbon pricing design's effectiveness and feasibility and its overall support. In doing so, we investigate how experts navigate the trade-off between effectiveness and feasibility in a developing country context, both overall and for specific choices about instrument, coverage, and revenue. Our study examines the full causal chain underlying the relationship between a carbon pricing policy's design and its support, from design choices to policy perceptions to policy preferences.

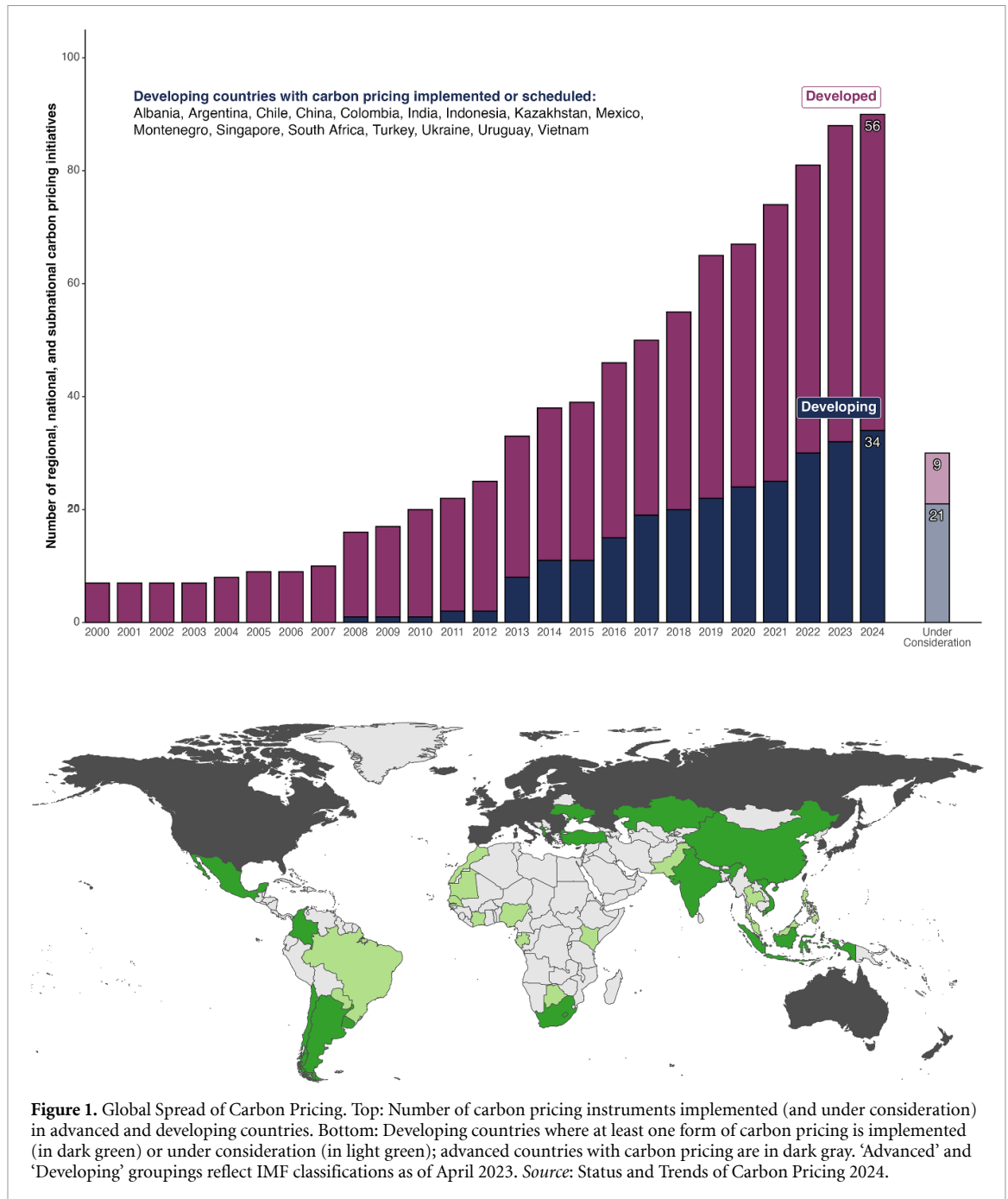
⁹ Global South countries also contend with challenges relating to regulatory certainty, monitoring, and finance that affect the implementation of carbon pricing. For further consideration of the broader political economy of carbon pricing in the Global South, we refer readers to World Bank (2024).

¹⁰ See, e.g. Dechezleprêtre *et al* (2022), Gaikwad *et al* (2022), Malerba *et al* (2024).

¹¹ In this paper we examine domestic factors and do not consider other potentially important external pressures, such as trade competition.

¹² Several participants have worked in more than one developing country, but we ask them to identify only the country they know best.

¹³ Our expectations are pre-registered at https://osf.io/frqty/?view_only=190b59a4c1c94d9a829f8923bcbdfcbb.



2. Perceptions and preferences over carbon pricing policy design

In addition to the economic benefit of internalizing the cost of pollution, carbon pricing offers a clear political logic. Politicians may anticipate rewards from 'making carbon polluters pay,' meeting climate mitigation targets, or groups that receive co-benefits from climate action.

At the same time, carbon pricing creates opponents who work to unravel the policy. Politicians may fear a backlash, both from workers in high-carbon industries and from voters worried about

higher energy prices, especially salient in developing countries. Opponents may invoke, some candidly, some cynically, objections based on inequitable historical responsibility for climate change, as well as debates over the merits of spending scarce human and financial resources on climate mitigation. Accordingly, while experts tend to view carbon pricing as more effective than mandates, regulations, and spending, they believe it to be among the least politically feasible options for accelerating decarbonization (World Bank 2024).

Policy design is the most immediate tool at policymakers' disposal for building support and

minimizing opposition to carbon pricing. Below, we examine each link in the causal chain between design and support. To start, we discuss the relationship between policy design choices and perceptions about likely technical effectiveness and feasibility. We then turn to how these perceptions inform preferences for one design over another.

2.1. Effectiveness and feasibility

While the literature on carbon pricing preferences mostly examines public (and occasionally elite) opinion in advanced countries, its focus on the relationship between these carbon pricing characteristics and policy support is likely pertinent to developing countries as well. That said, the magnitude and direction of these effects plausibly vary across developed and developing countries as well as between public versus expert audiences.

The first salient aspect of carbon pricing we consider is the choice of the carbon pricing *instrument*, i.e. a *carbon tax* versus an *emissions trading system* (ETS). The literature suggests that the relative merits of these instruments hinge largely on state capacity. However, different definitions of this concept yield contrasting expectations. If state capacity is understood as the ability to extract resources quickly and authoritatively through strong central and fiscal institutions (Meckling and Karplus 2023), capacity may suggest direct taxation instead of trading. But, if state capacity reflects institutions' ability to create and govern markets, an ETS may be a better lever for spurring decarbonization (Genovese and Tvinnereim 2019). Respondents are also likely to make additional assumptions about the design of carbon pricing instruments, even when considered in the abstract—e.g. tax progressivity or fiscal gains from carbon crediting—that would inform expectations about the policy's supporters and opponents.

We explore the relationship between instrument choice and perceptions of effectiveness and feasibility in one context, but we do not test hypotheses relating to instrument choice. Time and attention constraints prevented us from varying these characteristics, and we do not hold strong expectations about these relationships independent of country characteristics. However, it was important to include instrument choice in the experiment to avoid confounding other causal estimates.

The second aspect we consider is the *coverage* of carbon pricing. Carbon taxes and ETS can be designed to target specific actors (e.g. firms, communities) or broad populations. *Narrow* coverage could be justified by the desire to avoid mobilizing powerful opponents or by the concentration of emissions among a few firms. *Broad* coverage could indicate an attempt at maximizing emissions reductions or sharing burdens fairly. In general, we expect preferences for coverage to depend on whether the

policy maker prioritizes effectiveness or feasibility. We expect experts to view broad coverage as more effective (because it applies to more emissions) but narrow coverage as more politically feasible (because it makes fewer enemies).

- H1a: Experts see carbon pricing with *broad coverage* as more *technically effective*.
- H2a: Experts see carbon pricing with *narrow coverage* as more *politically feasible*.

Finally, we examine options for distributing resources generated through carbon pricing, i.e. *revenue use*. Redressing participation in carbon pricing through compensation is often believed to be a key element for making this policy credible (Colgan *et al* 2020, Gaikwad *et al* 2022). But like coverage, the revenue from carbon pricing can be used in various ways. We focus on three revenue use options that range from broader to more targeted societal segments. These are funding *climate change mitigation activities* (e.g. renewable energy installation), compensating *vulnerable communities* (e.g. low-income families or coal miners), or compensating the general population (e.g. in the form of rebates). We anticipate experts to view policy designs as more effective if revenue is used for *green infrastructure* because it allows pricing to reduce emissions twice over, first by disincentivizing emissions and second by funding cleaner alternatives. In contrast, we anticipate experts to see using revenues to *compensate vulnerable groups* or *compensate the general public* as more politically feasible because it could broaden the constituencies who benefit from pricing.

- H1b: Experts see carbon pricing that uses revenue for *green infrastructure* as more *technically effective*.
- H2b: Experts see carbon pricing that uses revenue for *compensations* as more *politically feasible*.

These expectations, if substantiated, would align with findings from studies of carbon pricing in developed countries. Broader carbon pricing that invests revenue in green energy infrastructure is likely to have the largest beneficial effects on long-term mitigation, as this helps redress market failures and barriers faced by low-carbon substitutes (Bowen 2015, Pahle *et al* 2018). Moreover, public opinion studies find that broad coverage and green infrastructure investment are key to boosting confidence in the effectiveness of carbon abatement (Bernauer and McGrath 2016, Baranzini and Carattini 2017, Tvinnereim and Mehling 2018, Sovacool *et al* 2020).

At the same time, other research indicates that ambitious carbon pricing is often politically infeasible (Rosenbloom *et al* 2020, Martinez-Alvarez *et al* 2022, Mildenerger *et al* 2022). For example, broad carbon taxes raise costs for the average voter in the short

term, who either pays carbon taxes directly or faces higher costs as a result of pass-through from businesses. Consequently, voters often refuse to accept meaningful pricing that will cost them significantly more money. Accordingly, narrow policies coupled with broader compensation may be less effective but more politically feasible. This logic could help explain why, despite some successful instances, carbon pricing has had limited effects on emissions on average (Green 2021).

2.2. Trade-offs and carbon pricing choices

Our analysis of experts' opinions about the effectiveness and feasibility of carbon pricing is only meaningful if it enhances our understanding of experts' choice of carbon pricing design. We extend our discussion to how effectiveness and feasibility relate to policy selection.

While experts may agree on the unconditional effects of carbon pricing design choices, they may differ on how effectiveness and feasibility generate policy preferences. On the one hand, our sample may prefer policy designs that maximize potential emissions reductions because experts tend to value technical effectiveness more than members of the general public¹⁴. According to our previous discussion, this would mean recommending policies with broad coverage and green infrastructure investment. On the other hand, technocratic views of carbon pricing may be moderated by political concerns, especially for expert practitioners embedded in or engaged with government institutions. As a result, our respondents may be sufficiently sensitive to carbon pricing's political risks to prefer features that favor feasibility over effectiveness. In light of these conflicting considerations, we approach the trade-off between effectiveness and feasibility without firm expectations.

3. Data and methods

3.1. Sample construction

We test our expectations with data from an original survey of policymaking experts. The population of interest was individuals with personal experience working to advance or develop carbon pricing in one or more developing countries. Experts were identified in collaboration with the World Bank's Partnership for Market Implementation (PMI) team, using PMI and International Climate Action Partnership (ICAP) stakeholder contacts. Invitations came from the PMI management unit, and responses were collected between 14 February 2023 and 24 March 2023. Of the 345 experts in the sample frame, 185 started the survey (54%) and 97 provided a valid response to the

conjoint (28%)¹⁵. Of the 97 respondents who met these criteria, 89 answered every question in the conjoint experiment¹⁶.

The final dataset consists of 97 individuals with expertise from 27 different countries. While there was especially high participation from experts in Mexico ($N = 17$) and China ($N = 11$), our results are robust to leaving out respondents for any given country (figure E1) or pair of countries (figure E2). Nearly all survey respondents are located within their country of expertise (98%), and a large majority identify as policy consultants (45%) or civil servants (31%)¹⁷. We anticipate our sample size to be appropriately powered to detect changes of 5%–10% for main effects and 15%–20% for conditional effects.

3.2. Research design

We employ a conjoint experiment embedded in the expert survey (Hainmueller *et al* 2014). The experiment began with a short preamble about a hypothetical country we want respondents to keep in mind while assessing pairs of carbon pricing policies. Since respondents had expertise in many countries, we made responses comparable by placing the experiment in the context of 'Carbonia,' a democracy in the upper-middle income range of developing countries (in terms of GDP and state capacity) with a high level of inequality and significant production of fossil fuels¹⁸. While Carbonia is a fictional construct, it shares characteristics with real countries that have adopted carbon pricing, such as Colombia and Indonesia. To avoid unnecessary complexity, we stated that Carbonia has no other climate mitigation policies.

We asked respondents to imagine they were advising a Carbonian policymaker on designing a carbon pricing policy that is both technically effective and politically feasible¹⁹. Experts then compared six

¹⁵ A valid response meant participants who had experience working on carbon pricing in a developing country (self-reported), provided a sincere response (self-reported), spent longer than 10 minutes on the survey (median time to completion 32 minutes), completed more than 25% of all survey questions, and compared at least one pair of policy designs.

¹⁶ We obtain substantively similar results if the sample is limited to the 89 respondents who answered every question (table E2).

¹⁷ Appendix A provides full descriptive statistics of the survey sample. To assess the risk of response bias, we re-weight survey responses by gender and holding a position in government (as recorded by the PMI and ICAP), the only two sample frame characteristics available, and obtain substantively similar results (table E1). See appendix E for all pre-registered tests for heterogeneous treatment effects by respondents' individual and country attributes.

¹⁸ Lacking sufficient power to present multiple profiles of developing countries, we choose to have respondents focus on just one hypothetical country.

¹⁹ The wording was: *Imagine you are advising a policymaker on carbon pricing. They would like the policy to be both technically effective and politically feasible—meaning it will substantially reduce carbon emissions and can be adopted without too much opposition.*

¹⁴ For example, experts tend to place high importance on plausible climate targets (e.g. Victor *et al* 2022). On expert concern for technical effectiveness more generally, see Caramani (2017).

pairs of carbon pricing policy designs, each consisting of three fully randomized attributes: *instrument* (carbon tax or emissions trading); *coverage* (broad, ‘covering most sections and sectors in society,’ or narrow, ‘applying only to high emission sectors’); and *revenue use* (support green infrastructure, ‘such as wind and solar,’ compensate vulnerable groups, ‘e.g. poor communities,’ or compensate the entire population ‘e.g. direct cash transfers’)²⁰. For each pair, respondents indicated which policy design they believed to be more technically effective and which they believed to be more politically feasible. They were then asked which they would propose to the policymaker²¹.

We analyze the pooled data ($N_{\text{obs}} = 97$, $N_{\text{eff}} = 1128$) with a linear regression model. Since conjoint experiments introduce multiple treatments (Liu and Shiraito 2023), we correct for multiple testing using the Holm–Bonferroni method²². We report robust standard errors clustered by respondent.

4. Results

4.1. Relationship between design features, effectiveness, and feasibility

We begin by testing how experts perceive the effectiveness and feasibility of different carbon pricing design features. We report the Average Marginal Component Effect (AMCE) estimates from the conjoint in figure 2 (see also table B1).

Starting with instrument selection, emissions trading is positively associated with effectiveness, although the relationship is not statistically significant at the 90% confidence level ($\beta = 8.67$ [SE = 5.52], $P < 0.12$). At the same time, trading is seen as more politically feasible than taxes ($\beta = 10.03$ [SE = 4.10], $P < 0.05$). Such enthusiasm aligns with similar findings by Nesje *et al* (2024), potentially reflecting emission trading’s prospect of transfers to poor countries from wealthy countries (Bauer *et al* 2020). Alternatively, this result may be an artifact of sample composition, as many respondents were recruited through their membership in ICAP, which encourages knowledge exchange on trading. While we did not register any priors for this attribute, and keeping these caveats in mind, we observe that experts perceive trading as promoting the political feasibility of carbon pricing without sacrificing effectiveness.

²⁰ In this experimental setting, while it is impossible to rule out unobserved variable bias entirely, we do not find evidence of statistically significant interactions among the policy attributes defined in the experiment (table C1). In addition, our results remain robust to the order in which a profile was presented to the respondent (table F1) and the inclusion of respondent gender, location, position, and years of experience as controls (table F2).

²¹ We rely on a forced choice measurement for all the outcomes.

²² We deviate from our pre-registered plan to correct estimates using Adaptive Shrinkage because it can be overly conservative when effect sizes are likely to be relatively small, as in our case.

Second, we turn to coverage. Contrary to H1a, while experts tend to view broad carbon pricing to be more effective than a narrowly tailored policy, the relationship does not attain statistical significance at the 90% confidence level ($\beta = 6.46$ [SE = 4.12], $P < 0.12$). As per H2a, experts considered a broadly targeted policy to be much less politically feasible than a policy with narrow coverage ($\beta = -23.63$ [SE = 3.56], $P < 0.001$).

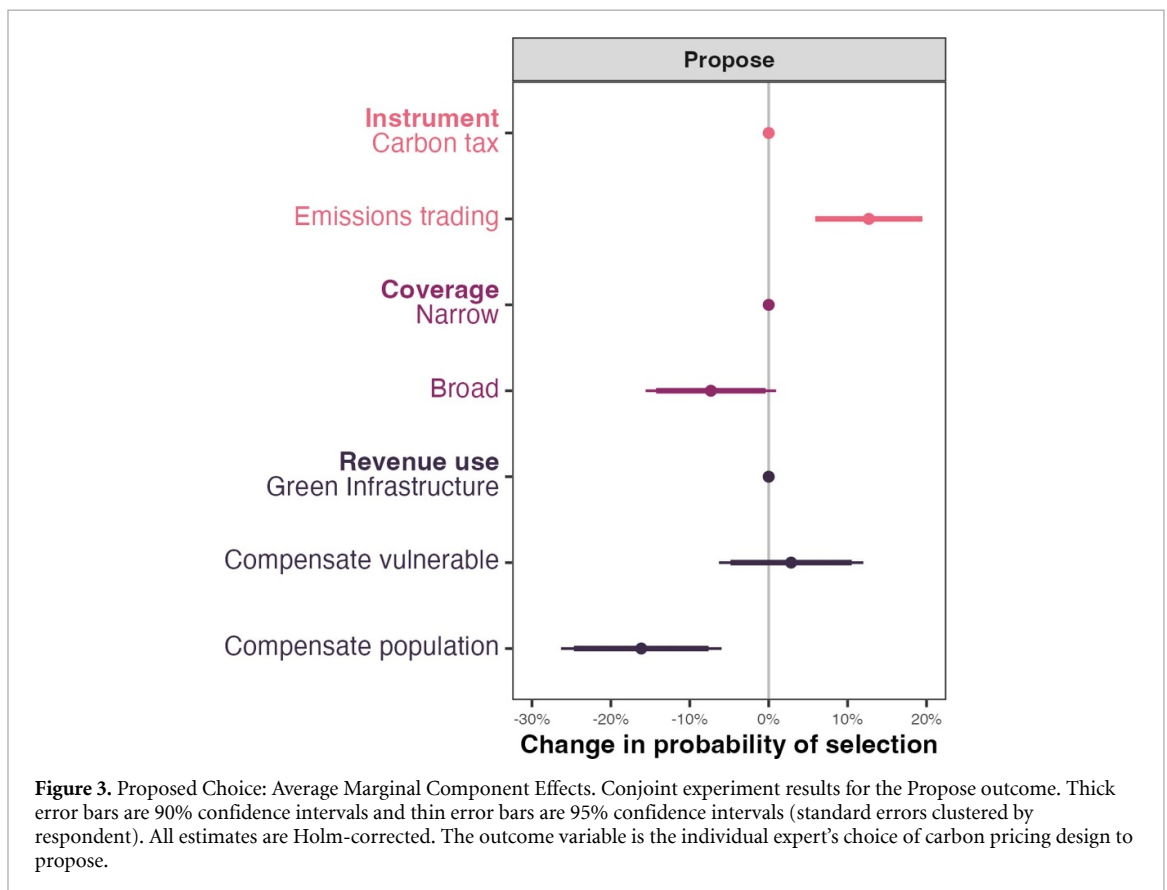
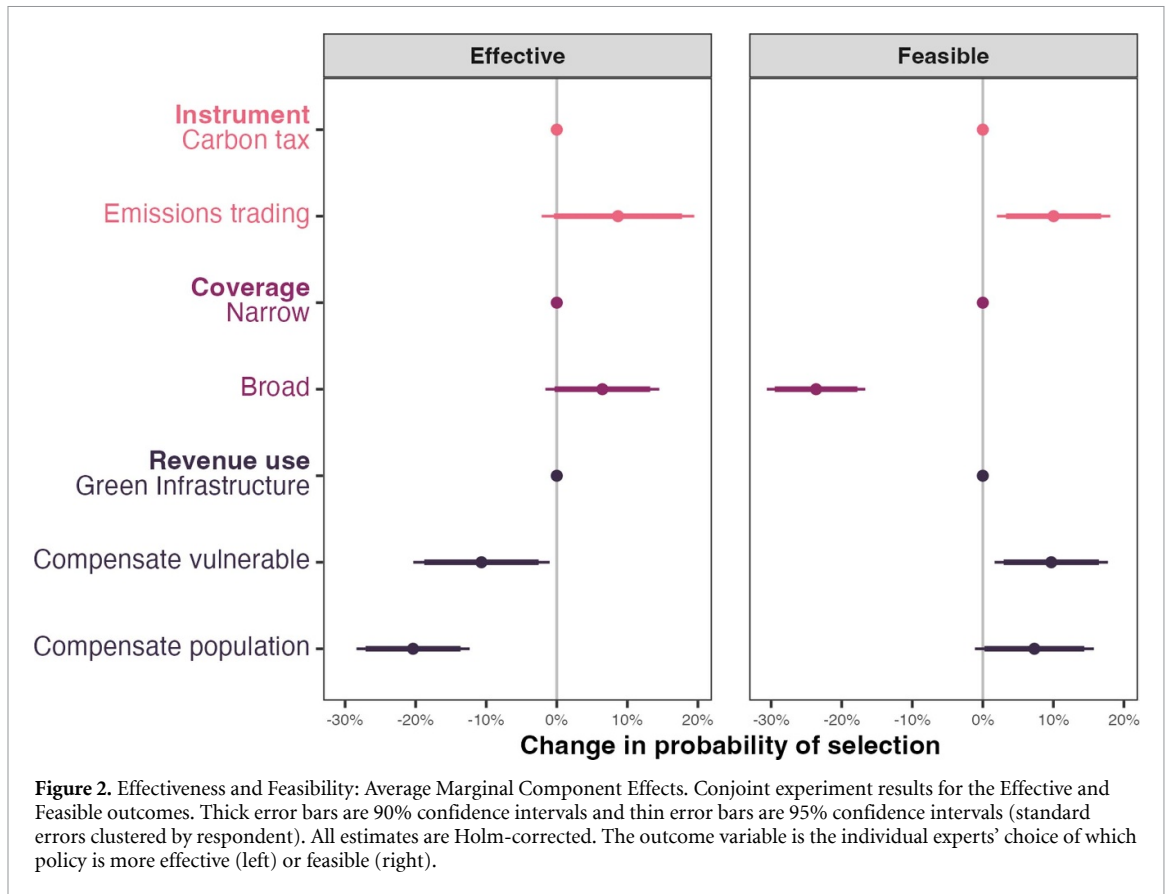
Third, we examine revenue use. As anticipated by H1b, experts viewed using carbon pricing revenues to support the development of green infrastructure to be more effective at reducing carbon emissions than compensation, both for vulnerable groups ($\beta = -10.68$ [SE = 4.93], $P < 0.03$) and for the entire population ($\beta = -20.37$ [SE = 4.09], $P < 0.001$). In line with H2b, however, experts tended to perceive compensation as more politically feasible. Providing compensation to vulnerable communities increases the likelihood of rating the policy as feasible ($\beta = 9.70$ [SE = 4.10], $P < 0.02$), as does compensating the general public ($\beta = 7.31$ [SE = 4.30], $P < 0.09$).

Taken together, these results reveal an important pattern. On the one hand, and in line with research in advanced countries, we find that experts consider carbon pricing that uses revenue to support infrastructure investment to be more effective. In contrast, experts show a fair degree of sensitivity to the distributional implications of coverage and revenue use decisions for political feasibility. But how do these findings combine to inform which design respondents would recommend to a policymaker?

4.2. Relationship between effectiveness, feasibility, and policy choice

After asking experts to judge policies based on effectiveness and feasibility, we then ask which they would propose to a policymaker. Figure 3 displays the AMCE estimates for how each of our three policy design aspects affects proposal choice²³. We find that, while experts let some aspects of effectiveness prevail, there is also evidence of their sensitivity to political feasibility. That experts would advocate for emissions trading over carbon taxation is unsurprising because trading was perceived to be similarly effective and more feasible than carbon taxes, although the strength of the effect is noteworthy at 13 percentage points ($\beta = 12.69$ [SE = 4.13], $P < 0.002$). In terms of coverage, experts are more likely to propose a narrowly targeted carbon price, reflecting concerns about political feasibility ($\beta = -7.33$ [SE = 4.22], $P < 0.08$). Finally, although experts were indifferent between using revenue for green infrastructure or compensating vulnerable groups ($\beta = 2.84$ [SE = 4.67], $P <$

²³ For a tabular presentation of these results, see table B1. We also report the conditional probabilities of proposing a policy in appendix D.



0.54), they were much less likely to propose compensating the entire population, suggesting that perceptions of effectiveness dominated their choice ($\beta = -16.15$ [$SE = 5.19$], $P < 0.002$).

In summary, our causal analysis of how experts perceive carbon pricing shows starkly different effects depending on whether experts are asked to judge technical effectiveness or political feasibility. Moreover, feasibility concerns can sometimes trump effectiveness, suggesting experts are attuned to the political risks of carbon pricing in developing countries. These results are robust to a variety of tests (presented in appendix E) examining heterogeneity in the individual and country experiences of our sample.

5. Discussion

Through this analysis of carbon pricing policies in a realistic developing country, we present three core findings. First, experts believe key choices in the design of carbon pricing policies create a trade-off between technical effectiveness and political feasibility. Experts expect carbon pricing to be more effective at accelerating decarbonization if the policy reinvests its proceeds in green infrastructure. By contrast, they perceive carbon pricing to be more politically feasible if its design imposes costs on only a few targeted sectors and distributes broad benefits through compensation. Second, developing country experts are divided over whether to prioritize effectiveness or feasibility when choosing between carbon pricing policy designs. The difference between the majority and minority preference was not more than approximately 16 percentage points for any of the three design choices. Third, experts prioritize effectiveness and feasibility differently for imposing policy costs than distributing policy benefits. For choices that affect who pays the costs of carbon pricing, experts tend to value feasibility over effectiveness. For choices that distribute its benefits, experts weigh effectiveness and feasibility similarly and tend to reject options that appear to sacrifice too much effectiveness.

These results remain consistent across a variety of individual and contextual differences among respondent differences. This may indicate that the community of carbon pricing experts in the Global South holds a relatively homogeneous perspective on the political economy of designing a carbon price, at least among those practitioners who have engaged at the international level via ICAP and the PMI. Our findings both reinforce and extend beyond existing studies of academic experts in the Global South (e.g. Nesje *et al* 2024), providing new insight into the strategic logic underpinning policy design preferences.

Our analysis makes several broader contributions. Whereas the carbon pricing literature tends to focus on either policy perceptions (e.g. effectiveness and

feasibility) or support, we examine the full causal chain from policy design to perceptions to preferences. This allows us to show how experts attend to the political risks of pricing carbon in a developing country context, seeking to strike a balance between effectiveness and feasibility. This understanding helps not only gauge the credibility of carbon pricing designs but also provides guidance to politicians, advocates, and international organizations about how to invest political resources and economic capital in promoting climate policy in developing countries. We speculate that Global North experts similarly perceive the tension between efficacy and feasibility, but they may make different trade-offs according to the distinctive political economy considerations of the Global North.

We make a second contribution by showing that experts make different trade-offs for different aspects of carbon pricing. Their support for narrower—and therefore more politically palatable—policy coverage indicates a wariness of creating too many opponents. In contrast, experts allow the potential political benefits of compensating the entire population to be overwhelmed by concerns about the perceived ineffectiveness of such transfers.

It seems possible that experts focus on feasibility when distributing costs due to internalized expectations about the political consequences of prospect theory, with constituencies more likely to mobilize in opposition to potential losses than foregone gains (e.g. Esterling 2004). Alternatively, these judgments could reflect beliefs about the relative political power of interest groups and the public in developing countries, especially for a relatively technical policy like carbon pricing. Uncovering what leads experts to prioritize technical efficacy or political feasibility in policy design is a topic worthy of future study.

Data availability statement

The data that support the findings of this study are provided by Lerner *et al* (2024) openly available at the following URL/DOI: <https://doi.org/10.7910/DVN/KKK1FL>.

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