Beliefs about Climate Action Consequences under Weak Global Institutions: Sectors, Home Bias, and International Embeddedness

July 6, 2020

Word count: 7,878 words

Abstract

Climate policy has distributional effects, so ratcheting up climate ambition over time will only become politically feasible if the general public believes that their country can win from ambitious climate action. In this paper, we develop a theory of belief formation which anchors distributional effects from climate action at the sector level. Specifically, we study how knowing about these impacts shapes public beliefs about collective economic consequences from climate policy—not only in a home country but also abroad. Findings from a nationally representative survey experiment in the United Kingdom demonstrate that respondents are biased towards their home country in assessing information about winning and losing sectors: while beliefs brighten for good news and worsen for bad news when home country information is provided, distributional effects from abroad are discounted for belief formation. We also show that feelings of 'international embeddedness,' akin to globalization attitudes, make respondents consistently hold more positive beliefs that the UK can benefit from ambitious climate action. Ruling out several alternative explanations, these results offer a first step towards a better understanding of how distributional effects in one issue area, such as globalization, can spill over to other issue areas, such as climate change.

Keywords: climate change; distributive politics; policy preferences; international embeddedness; Brexit; survey experiment.

Introduction

The 2015 Paris Agreement on Climate Change was celebrated as a major breakthrough in global environmental politics, cracking years and years of protracted climate negotiations. The crucial feature of the agreement is that it replaces the top-down approach under the Kyoto Protocol with bottom-up climate pledges (Hale, 2016; Keohane and Oppenheimer, 2016). Governments are now expected to put forward policy commitments and are free to make their obligations either ambitious or modest, with a growing body of research studying cross-national characteristics of government pledges (Drummond et al., 2018; Tobin et al., 2018). However, how these pledges are rooted in countries' domestic politics remain underexplored (Falkner, 2016). For example, it is unclear whether governments, similar to standard electoral promises (Thomson et al., 2017), anticipate the distributional effects that pledge fulfillment would entail for their national economies and domestic audiences.

Many governments, including "climate champions" such as the United Kingdom (UK) or Germany, have lately failed to be on track for meeting their climate pledges.[1] This is dramatic for making progress on fighting climate change, but it is also worrying politically. Climate pledges are voluntary commitments: if they turn out to be mostly empty promises, the credibility of the climate architecture under the Paris Agreement is undermined. In this weakly institutionalized setting, where power and responsibility is delegated to the national level, better understanding the microfoundation of the domestic political economy of climate policy is essential (Aklin and Urpelainen, 2013; Bayer and Urpelainen, 2016; Genovese, 2019; Mildenberger, 2020). In particular, we focus on individual *beliefs* around the distributive politics of climate change, because we expect beliefs to capture how people process information about the economy and therefore what effect economic facts can have on people's perception of climate policy—independently of their (more or less partisan) support for climate action.[2]

Our paper's contribution is to develop and test a theory of belief formation which anchors distributional effects from climate action at the *sector* level. In contrast to existing work which an-

[1] "The World Still Isn't Meeting Its Climate Goals." *New York Times* 7 December 2018, available at `https://www.nytimes.com/interactive/2018/12/07/climate/world-emissions-paris-goals-not-on-track.html`.

[2] In line with Rho and Tomz (2017), people may support policies against their self-interest, but may also change their support if presented with information that educates them about the policy consequences on individuals and their country as a whole. We therefore focus on what Rho and Tomz (2017) call causal beliefs in the context of climate change.

alyzes individual costs and benefits from climate policy (Bechtel and Scheve, 2013; Beiser-McGrath and Bernauer, 2019), we focus on beliefs about the collective economic consequences from climate action. Specifically, we study whether the public believes their country's economy can win from ambitious climate action as a function of distributional effects from climate policy on particular sectors.

We highlight the role of sectors as they are a major source of pollution and shape governmental policy on climate change in liberal democracies (Hughes and Urpelainen, 2015; Mildenberger, 2020). The effect of climate policy is not uniform across sectors. Instead, sectors are affected differently depending on their emission levels and technological capabilities (Meckling, 2008; Newell and Paterson, 2012). Some sectors, such as the renewables industry, win from ambitious climate action, while others, such as coal-based electricity production, lose. While other research has shown that those directly dependent on carbon intensive sectors, e.g., through employment, oppose strong climate action (Bechtel, Genovese, and Scheve, 2019; Olson-Hazboun, Howe, and Leiserowitz, 2018; Tvinnereim and Ivarsflaten, 2016), this tells us little about how the general public, and particularly those who are *not* directly affected by the threat of job loss, may change their beliefs once they learn about distributional effects from climate action on particular sectors.

But information about sectors can also implicate information about their international competitiveness (Genovese, 2019; Meckling and Nahm, 2019). Accordingly, we posit that the international nature of climate change policy has two implications for our theory of belief formation. First, since climate change mitigation requires contributing to a global public good, ambitious climate policy across countries will not only result in distributional effects at home but also abroad. In forming beliefs about collective economic consequences from climate action the general public may hence rely on informational cues about sectoral impacts of climate policy in foreign countries. The public's belief about whether their country can win from climate policy may become more positive upon hearing the news that some sectors in an economically and politically similar foreign country has been benefiting from such policy. Second, borrowing from studies in international trade and economic integration (Hoepner and Schaefer, 2012; Ingram, Robinson, and Busch, 2005), we argue that world views have an impact on the way individuals absorb information about sectors. Feelings of what we call 'international embeddedness,' akin to attitudes towards globalization and the liberal world order, matter for belief formation on global issues, such as climate change.

In support of our theoretical framework, we present findings from an original survey experiment with a nationally representative sample in the United Kingdom (UK). Respondents are asked to assess whether they think that the UK (as the home country) and Germany (as a foreign country) win or lose from ambitious climate action as a function of informational treatments about gains and losses for sectors from such policies. Our first finding is that information about the distributional effects from climate policy at the sector level moves beliefs in the ways expected: news about winning sectors makes respondents hold more sympathetic beliefs, while news about losing sectors triggers more pessimistic beliefs. Interestingly, and in contrast to our informational cue logic, these effects only occur when respondents receive *home* country information about UK sectors, while information about foreign, German sectors is discounted. This finding, which we refer to as home bias, makes ratcheting up global climate ambition potentially difficult as *foreign* success stories on climate champions are unlikely to brighten beliefs about the *domestic* outlook.

We also find that international embeddedness, measured as respondents' Brexit preferences for either to leave or remain in the European Union (EU), conditions our main treatment effects. While both groups are still prone to home bias, Remainers hold consistently more positive beliefs that the UK can benefit from ambitious climate action. These results are consistent with embedded liberalism theory (Hays, Ehrlich, and Peinhardt, 2005; Ruggie, 1982), which suggests that preferences for distributive outcomes depend on how internationally connected domestic constituencies feel in a globalized world. With Brexit challenging economic globalization and political integration in the form of the European idea, we are the first ones to highlight important links between sentiments of embeddedness and climate policy. As a consequence, further polarization around global integration may have immediate knock-on effects for public opinion on climate change, similar to evidence that emphasizes the link between struggles of the welfare state and climate politics (Kono, 2020). Our findings therefore offer a fresh political economy take on how domestic distributive politics affect people's beliefs over climate change policy.

Theoretical Framework

We develop our theoretical argument in three steps. First, we delineate how, given the Paris Agreement's focus on domestic politics, *individual beliefs* about climate action have become ever

more critical for climate policy. Second, we discuss these individual beliefs in view of how climate action affects *sectors* (rather than individuals) as central building blocks in a country's domestic economy. Third, we make the case that individuals' assessment of the distributional consequences from climate action at the sector level depends also on their feeling of 'embeddedness' in the international order.

The Relevance of Individual Beliefs about Climate Action

Public opinion is crucial for governments to credibly commit to global public policy, including climate and energy policy (Bayer and Ovodenko, 2019; Klenert et al., 2019; Stadelmann-Steffen and Eder, 2020). This has become particularly true since the 2015 Paris Agreement. The treaty replaced top-down greenhouse gas governance with bottom-up climate pledges that are formulated as *national* commitments (Hale, 2016; Jacquet and Jamieson, 2016; Keohane and Oppenheimer, 2016; Keohane and Victor, 2016). In such a weakly institutionalized setup, national willingness to act was pushed to the center of attention (Keohane and Victor, 2016). Climate change has since moved from only being perceived as a global collective action problem towards a more domestic focus for its distributional effects on national economies (Aklin and Mildenberger, 2019; Beiser-McGrath and Bernauer, 2019; Falkner, 2016).

Reflecting the importance of public support for climate policy, research has studied sources of support and opposition to climate action. The main finding here is that people are sensitive to how costs of climate action are shared, and that individual-level costs and social norms influence climate support (Aldy, Kotchen, and Leiserowitz, 2012; Bechtel and Scheve, 2013; Drews and van den Bergh, 2016; Stokes, 2013; Tingley and Tomz, 2014). Additionally, public views on climate change follow political ideology (McCright et al., 2016; McCright, Dunlap, and Marquart-Pyatt, 2016), and have recently been shown to depend on individuals' own beliefs about what others think about climate change (Mildenberger and Tingley, 2019).

We complement this existing work in an important way. While many studies on public opinions about climate change focus their attention on outcomes such as individual support for ambitious climate policies, willingness-to-pay, or general concern about climate change, we look at individual beliefs (rather than support) as the primary variable of interest. Importantly, these beliefs are not about whether individuals believe in anthropogenic climate change—instead, we refer to *distribu-*

tional beliefs about *collective* economic consequences from climate policy. Specifically, we seek to understand whether individuals think their country's economy would benefit or lose from ambitious climate policy. While these beliefs are studied in other research areas that investigate preferences, for example, in international trade (Mansfield and Mutz, 2009; Rho and Tomz, 2017), beliefs about *collective* economic consequences from climate policy are largely understudied relative to individual cost-benefit evaluations, which justifies our focus on this type of beliefs here.[3]

Distributional Effects of Climate Action on Sectors at Home and Abroad

Aside from emphasizing beliefs about collective economic consequences, another theoretical advance is that we concentrate our attention on sectors as a central building block in our argument. In times when 'net zero' targets become a political reality, climate policy requires nothing less of countries than to completely overhaul how their economies are run. These fundamental changes affect different sectors, say the fossil fuel and renewables industries, very differently, and these distributional effects shape the type of climate policies that nations implement (Hughes and Urpelainen, 2015). Recognizing that labor mobility within sectors is higher than across sectors, resistance to climate action that threatens carbon-intensive sectors forms along sectoral divides. Consistent with this expectation, support for climate policy is typically lower among those employed in more polluting sectors (Bechtel, Genovese, and Scheve, 2019; Olson-Hazboun, Howe, and Leiserowitz, 2018; Tvinnereim and Ivarsflaten, 2016). This is probably not surprising given that a majority of these workers are likely to lose their jobs as climate ambition increases.

Our focus on sectors is slightly different. We are not so much interested in how those employed in carbon-intensive sectors respond to climate policy (not least because previous research already established that). Instead, we want to understand how distributional effects from climate policy on particular sectors shape mass beliefs about collective economic consequences from ambitious climate action. This is important because we have much less knowledge of how the general public, and in particular those outside of carbon-intensive sectors, stands on climate policy once they hear about the sectoral cost from climate action. Contextualizing this cost in terms of sectors makes it more tangible and relatable relative to abstract estimates of aggregate effects. Aggregate, economy-wide

[3] Among few exceptions, Kim and Wolinsky-Nahmias (2014) argue that collective concerns about national welfare and living conditions are more important predictors of public views on climate policy than individual materialistic considerations.

effects tend to 'net out' positive and negative distributional consequences, and most severe effects, such as closure of an entire industry, are likely downplayed. This information may however affect public opinion on climate policy writ large, emphasizing sectors in our argument.

Ambitious climate action benefits some sectors, but harms others. It creates winners and losers at the same time. We argue that individuals' beliefs on the collective economic cost from climate change, that is, how well they think their country will do under ambitious climate policy, is shaped by information on sectoral winners and losers. This distinction between winning and losing sectors captures the basic distributional conflict of climate policy in a country's home economy. Classical political economy models theorize that support for ambitious economic policies increases when they create many domestic winners, while the opposite holds with a growing number of losers (Goldstein and Martin, 2000).

We leverage the difference between *beliefs* about collective economic consequences from climate policy and *support* for climate policy, holding that beliefs are causally prior to support in any mental model of behavioral change. Against this background, we argue that prompting individuals to think about sectoral winners and losers from climate action will first and foremost result in belief change. Changes in beliefs do not necessarily translate into changes in support because of other impeding factors along the causal path: even if individuals are convinced that ambitious climate policy creates winners, they may not support such a policy if the policy is costly or not compatible with broader political ideology (McCright et al., 2016; McCright, Dunlap, and Marquart-Pyatt, 2016).

Following this logic, we expect that: if individuals learn that *national* sectors can win/lose from strong climate action, beliefs about the collective economic consequences from climate action in the *home* country will increase/decrease (Hypothesis 1a). This hypothesis is straightforward, yet its focus on beliefs and sectors is novel. We put this forward, for clear theoretical expectations are not guaranteed to stand the empirical test.

We referred to domestic sectors, but climate change is a global problem. It requires an internationally coordinated effort to reduce carbon emissions, and any effects on sectors from national climate policy reverberate through the global economy. Imposing costs on fossil fuel reliant industries to cut back on their carbon use squeezes profit margins and makes them lose market share in global markets if other countries are reluctant to enact similar policies. What the general

public thinks about collective economic consequences from climate action for the home economy may hence depend on what they know about the effects from climate action in *foreign* countries. Existing research however finds little support that this competition logic shapes public opinion. According to Tingley and Tomz (2014) there is no appetite among the general public for intrinsic reciprocity to cut back emissions if other states do so as well. Other studies come to a similar conclusion as public support for unilateral climate policy is generally high (Bernauer and Gampfer, 2015; McGrath and Bernauer, 2017).[4]

In the mentioned articles, the inferential goal is to examine support for climate policy as a function of other nations' behavior, with little concern about distributional, let alone sectoral beliefs. While support may not change, beliefs about collective economic consequences from climate action might. For example, hearing about foreign losing sectors could result in downward adjustments of beliefs about how climate action affects the home country's economy. Similarly, knowing of home sectors that benefit from climate action may lead to a more positive assessment among the home country's public about the economic effects from climate policy abroad. We therefore argue that, for comparable countries, the distributional effects from climate action on sectors abroad serve also as informational cues. We expect that learning about winning/losing sectors from ambitious climate policy in a *foreign* country increases/decreases public beliefs about the collective economic consequences from climate action in the *home* country (Hypothesis 1b). Consistent with our informational cue argument, mass beliefs on collective economic consequences move more as the general public learns about distributional effects on sectors at home compared to effects on sectors abroad. Put differently, the magnitude of the effects from Hypothesis 1a is larger than for Hypothesis 1b.

International Embeddedness

Our theoretical framework explores how individuals' beliefs about collective economic consequences depend on information about winning or losing sectors from climate action—both at home and abroad. So far, this discussion has mainly followed a 'pocketbook' logic: distributional effects on sectors, be they positive or negative, are materialistic and framed in terms of economic productivity,

[4]We do find descriptive patterns consistent with a similar competitive logic in a subgroup analysis for London residents (Appendix A7.3.2), although our statistical power here is relatively weak.

(un)employment, or income. This is however a simplistic way to model belief formation: learning about winning and losing sectors from climate action and how it shapes beliefs does not happen in an ideological vacuum. Curtis, Jupille, and Leblang (2014), for example, show that material concerns operate alongside sociotropic and partisan logics in mass international political economy. With respect to climate change, Bechtel and Scheve (2013) also find social norms to matter greatly for popular support of global climate policy.

We expect that an individual's world view also matters for beliefs in climate action for this is usually interpreted as another aspect of globalization, and thus triggers ideological attitudes. It has been consistently found that affiliation to the broader international (liberal) order matters for transnational issues such as trade (Martin and Simmons, 1998). Mansfield and Mutz (2009), for example, show that perceptions of the performance of the US economy as a whole shape trade preferences much more than direct material effects. Accordingly, those who feel more attuned to international integration likely prefer global, multilateral solutions to more local, national solutions to address global problems. For climate mitigation, we suspect that general attitudes that support the international order should translate into generally more supportive beliefs of climate action. As argued in the liberal embeddedness literature (Ruggie, 1982), this is particularly true if those at the losing end of multilateralism are compensated (Hays, Ehrlich, and Peinhardt, 2005). Along these lines, Kono (2020) demonstrates that a sense of preparedness for green economic liberalization matters for US Congressional climate votes. Broadly put, this research highlights that individuals' attitudes towards globalization shape their belief of and support for more multilateral solutions to global problems.

Climate change is a global problem with severe domestic implications. Any climate action taken domestically will automatically contribute to the global public good. We argue that because climate action immediately creates this positive externality for the international system, those who reject the liberal world order hold more skeptical beliefs about climate action. Those who feel embedded, on the other hand, hold more favorable beliefs. We hence expect that individual attitudes towards the international system, or what we call international embeddedness, *conditions* how learning about the distributional effects from climate action impacts individual beliefs. Formulating this more explicitly as a hypothesis, we anticipate: for any given level of benefits or costs for sectors from ambitious climate policy, higher levels of embeddedness result in more favorable beliefs

(Hypothesis 2). This hypothesis is related to Hypothesis 1b in that it interrogates the sensitivity of climate action beliefs relative to actors abroad. However, while Hypothesis 1b inspects beliefs in relation to information about foreign sectors, Hypothesis 2 leverages individuals' observational stance on international relations more broadly.

In sum, concerns about costly contributions to a global public good among those feeling disenfranchised from the international world order drives our argument about conditional effects. Since these concerns about costs of climate action do only matter when they are borne domestically, our second hypothesis only focuses on the home country.

Research Design

We test our hypotheses with an original survey experiment.[5] We fielded our study in the United Kingdom, which is an ideal test case for two reasons. First, the UK is a liberal democracy committed to the United National Framework on Climate Change (UNFCCC) climate regime. It is also the first major economy that has written a net zero carbon emissions target into law (UK Government, 2019). Despite these ambitious plans, the country is currently not on track to meet the legal targets (Committee on Climate Change, 2019). This tension, which forces the government to decide where across the UK economy to cut emissions, is conducive to test our argument about distributional effects from climate action.

Second, the UK is currently tangled in a major societal cleavage around exiting the European Union. The Brexit debate touches on major issues pro and against globalization, and helps us get at the concept of international embeddedness. The decision about whether to leave the European Union seems not to be exclusively driven by material concerns about economic integration (Colantone and Stanig, 2018; Hobolt, 2016), but to a great deal also by ideological concerns about political and cultural integration (Norris and Inglehardt, 2019). Consistent with recent findings in international political economy (Curtis, Jupille, and Leblang, 2014), pocketbook logics and symbolic politics are likely to have *jointly* shaped Brexit preferences. Support for Brexit therefore usefully captures, in a single measure, individual attitudes towards the material consequences of economic globalization as well as the ideological contestation around political integration. Both

[5] We pre-registered a complete study protocol with EGAP (ID 20190529AA), available at http://egap.org/registration/5775.

economically and ideologically, Leavers support a more isolationist agenda, whereas Remainers hold a more integrationist world view. Those opposing Brexit are likely to feel more attuned to the idea of European integration and the liberal, international order more broadly. We therefore argue that Brexit preferences are a good proxy to capture key aspects of how we understand the concept of international embeddedness.

Our study uses a between-subjects design with five experimental conditions. Apart from the control group, we manipulate what information respondents receive: they learn that either home (UK) or foreign (German) sectors win or lose from ambitious climate action. Germany compares well to the UK in terms of the size of the economy and its climate leadership aspirations. The UK was the first country to legislate 'net zero' targets, its emissions have fallen the most among G7 advanced economies over the last two decades, and it will play host to UN climate talks in 2021—affirming Britain's position on par with Germany's as longstanding 'climate champion'. These similarities are important as learning about otherwise very different countries makes it unlikely for informational cues to operate across countries.

After a set of settling questions, the survey introduced respondents to the main climate policy theme. We used the following preamble to set the stage:

> *The United Kingdom is a member of the 2015 Paris Agreement on Climate Change, the latest international effort to fight climate change. The agreement's goal is to stabilise the rise of average global temperatures at well below 2°C this century. 185 countries, together with the UK, have committed to the Paris Agreement in 2015.*
>
> *Current policies around the world are not enough to achieve the Paris Agreement goals. Not acting on climate change risks severe damages from extreme weather events, such as floods and heatwaves, in the UK and abroad. Observers and experts believe more ambitious policies are urgently needed.*

We then randomly assigned our respondents to either a control group or one of four treatment groups. As everyone else, the control group received basic information about the UK's commitments under the 2015 Paris Agreement, together with costs and benefits from climate action. The prompt reads as follows:

> *The UK is currently falling behind its Paris emission reduction targets by about 50%. To continue addressing climate change, the UK needs to take even* stronger *climate action.*
>
> *The UK would become a climate leader if it reduced its dependence on fossil fuels, for instance by promoting green energy. Achieving this will require the UK government to make public investments and charge polluting firms. These actions are deemed necessary for climate policy, but will cost money. The green transition is expected to cost the UK economy roughly £12 billion per year, about a quarter what the UK currently spends on defence.*

Other countries committed to ambitious climate action face the same decision with similar costs for their economies.

In the four treatment conditions, respondents receive information about either the UK or Germany and about whether particular sectors in the respective country win or lose under strong climate action.[6] We first highlight the cost from climate action for both individuals and sectors.

Every citizen in the developed nations like the UK will have to pay a certain amount (about 1% of their annual income) for their country to afford more ambitious climate policy. Some firms in some sectors will also be affected by the implementation of the policy.

After that, treatment texts vary. They describe domestic winners (T1), domestic losers (T2), foreign winners (T3), and foreign losers (T4) conditions. Table 1 summarizes the central paragraphs for each treatment group, and the full questionnaire can be found in the Appendix. All vignettes are similar in tone, style, and length, with almost identical wording except for sector and country information. We also ensured that any numeric information, e.g., about economic growth in sectors, is comparable across treatments to minimize potential bias from differences in scale.

The domestic winners treatment emphasizes employment and growth benefits from climate action for the UK energy industry, while the domestic losers treatment points at losses for the UK transportation sector as a result of ratcheting up climate ambition. The two foreign treatment texts state the benefits for the German electric vehicle industry as an example of a winning sector. The German fossil fuel energy sector is used in treatment T4 as a foreign losers case.

To measure our outcomes, we asked respondents, in two separate questions, how likely they think that the UK and Germany will be a loser or a winner from ambitious climate policy (belief outcome). We also asked about support for climate action (support outcome). Outcomes are recorded on a $1-4$ scale from "very likely a loser"/"not at all supportive" to "very likely a winner"/"very supportive." To avoid ordering effects, we randomized whether the outcome question for the UK or Germany was shown first.

[6]The vignette texts use real-world data from the UK Government's Clean Growth Strategy, the Committee on Climate Change, and the Grantham Institute for the UK and from GTAI (German Trade and Invest) and 'Global Energiewende' for Germany. We conducted a pilot study with 405 respondents in May 2019 to validate the questionnaire and to trial the experimental design.

ID	Treatment	Vignette text
T1	Domestic winners	**Strong climate action will *benefit* some sectors of the *UK* economy.** An example of a *benefitting* sector is the UK *renewables sector*, and wind and solar power in particular. This sector has been growing three times faster than the country's economy as a whole and recently created thousands of green jobs.
T2	Domestic losers	**Strong climate action will *harm* some sectors of the *UK* economy.** An example of a *losing* sector is the UK *transportation sector*, and manufacturers of combustion engine cars and airlines in particular. Public investment in this UK sector has been the lowest among West European states. Yet, the UK transportation system accounts for a quarter of UK carbon emissions, more than any other sector in the country.
T3	Foreign winners	**Strong climate action will *benefit* some sectors in *foreign* countries**. An example of a *foreign benefitting* sector is the German *transportation sector*, and firms producing electric cars and trains in particular. This sector has been growing three times faster than the country's economy as a whole and is increasingly investing in infrastructure for electric vehicles.
T4	Foreign losers	**Strong climate action will *harm* some sectors in *foreign* countries.** One example of a *foreign losing* sector is the German *power sector*, and power companies that produce electricity from coal and fossil fuels in particular. Accounting for 40% of Germany's carbon emissions, the German power sector has slowed the country's transition away from fossil fuels.

Table 1: Overview of Treatment Conditions and Vignette Texts. We use treatments T1 and T2 to test Hypothesis 1a and treatments T3 and T4 to test Hypothesis 1b. Hypothesis 2 is tested by conditioning all four treatments with our international embeddedness 'Brexit' measure.

Empirical Analysis

Our survey was fielded in the UK from 5-7 September 2019 with nationally representative respondents, which we recruited through the online platform Prolific (https://www.prolific.co/). Prolific offers a flexible and transparent crowdsourcing service at reasonable cost and provides nationally representative samples, which are stratified by age, sex, and ethnicity based on 2011 census data from the UK Office of National Statistics. Its biggest strengths are high quality data and a respondent pool that is comparable to more expensive general population surveys (Palan and Schitter, 2018; Peer et al., 2017). Out of 1137 complete responses, we exclude six respondents as they failed an attention check and another 25 as they needed less than three minutes to complete the survey (average completion time was 7 minutes 24 seconds) for a total sample size of 1106 respondents.

In terms of basic demographics, 51 percent of our sample are female, two in five respondents are younger than 40 years (42 percent), about half have a University degree (BA or above), and

the median income lies between £30,000-40,000. Politically, 46 percent see themselves left to the center, with the rest between the center-right and right. Four in five respondents voted in the 2017 General Election, and there is a majority of 60 percent in favor of remaining in the European Union, while 32 percent support "Leave," and 8 percent are undecided.

Given the emphasis on climate action in our study, respondents' attitudes towards climate change are important. While almost everyone (93 percent) thinks that climate change is a somewhat serious/very serious problem, fewer are concerned about the effects of climate change for their communities (79 percent). Roughly four in five respondents have heard about the Paris Agreement, but two thirds of these respondents do not know much about it. Close to half thought that major sectors, such as energy and transport, are going to fare badly under stringent climate action.

We report the results of our survey experiment in steps. First, we show the effects of our sectoral treatment texts on beliefs about the collective economic consequences from climate policy. Second, for the UK, we demonstrate that international embeddedness, measured as respondents' Brexit preferences, condition treatment effects in an important way. Third, we test and discuss several alternative explanations based on additional subgroup analyses.

Main Results: The Effect of Winning/Losing Sector Information and Home Bias

In our main analysis, we study how, in the form of informational treatments, distributional effects from climate action for sectors shape respondents' *beliefs* about collective economic consequences from climate policy. As cautioned above, beliefs are different from policy support, and changes in distributional beliefs, which are activated by our treatment vignettes, are necessary but not sufficient for changes in policy support. We do not find evidence that our treatments lead to changes in policy support for climate action (Appendix A4). Yet, we think understanding effects on beliefs is still critical, because without changes in beliefs, any changes in support are elusive and inexplicable.

To test our hypotheses on individual beliefs about collective economic consequences from climate action in the home country and abroad, we asked respondents whether they think that the UK and Germany, as a comparable, industrialized economy, will win or lose from ambitious climate action. Specifically, our outcome question reads: "Given what you have read, how likely to do you think

the UK/Germany will be a winner from ambitious climate action?"[7]

Figure 1 shows our main results.[8] To start, we find treatments have different effects depending on whether respondents are asked about beliefs on collective economic consequences from climate policy for the UK as their home country or for Germany as a foreign, yet economically similar country. While the findings for Germany in the right panel are fully compatible with our proposed informational cue argument, UK respondents' beliefs are *not* sensitive to information about winning or losing sectors in Germany. When forming beliefs about the home country, information about *foreign* distributional effects from climate action gets discounted, whereas the same information about distributional effects at home matters greatly: we call this asymmetry in how respondents make use of information depending on which country it comes from *home bias*.

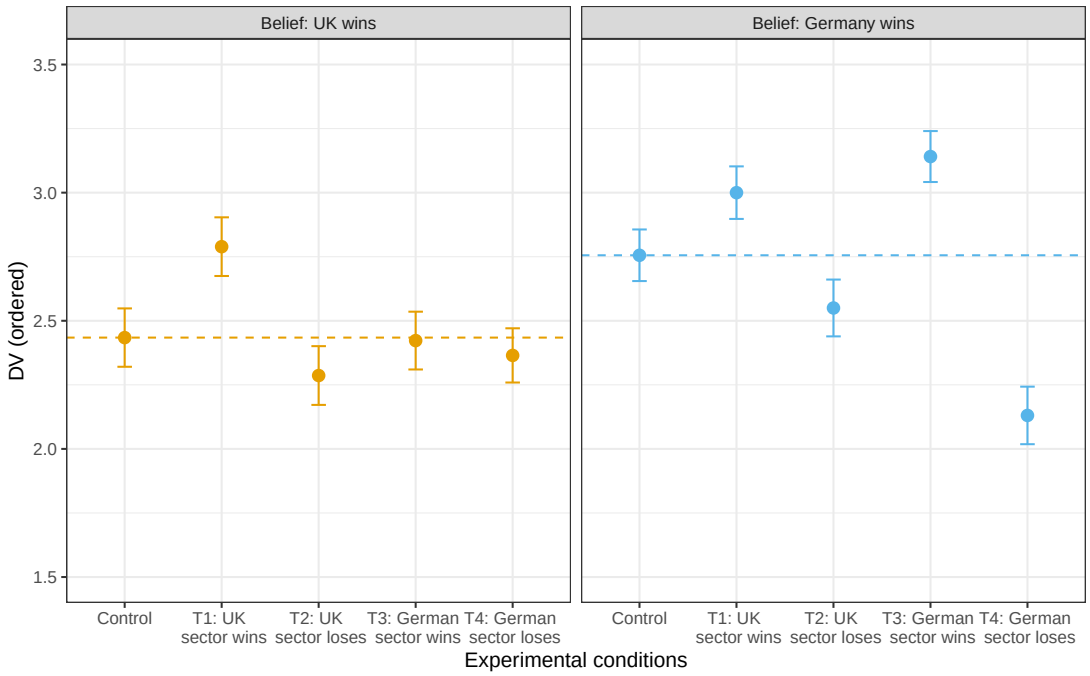

Figure 1: Results Plot for Beliefs about Collective Economic Consequences from Climate Action for the UK and Germany. The plot shows point estimates and 95% confidence intervals for treatment effects of informational vignettes on the belief that the UK (left panel)/Germany (right panel) will win from ambitious climate policy. Dashed lines indicate control group means. Outcome variable: $1-4$ scale.

Looking into the results in greater detail, we can evaluate our specific predictions. Starting

[7] We also ask respondents how likely they think an emerging economy, such as India, will win from climate action. We do not find any treatment effects here, which fits our informational cue argument from above as it requires countries to be comparable. Consistent with this interpretation, baseline level beliefs that India will win from ambitious climate action are 14-24 percent lower relative to the UK and Germany. See Appendix A5 for details.

[8] See Appendix A3 for tabular results.

with the UK (Figure 1, left panel), we find good support for Hypothesis 1a. Relative to the control group mean of 2.43 on a 1 ("very likely a loser") to 4 ("very likely a winner") response scale, the treatment T1, which emphasizes positive effects for the British wind and solar industry, increases beliefs that the UK economy as a whole can win from ambitious climate policy by 14.8 percent (mean=2.79, $p < 0.000$). Treatment T2 about the negative effects for the British transportation sector reduces beliefs by 5.7 percent (mean=2.29, $p < 0.071$). Both treatment effects are substantively large, even though the negative effect is roughly just a third in magnitude relative to the positive effect; it also becomes statistically insignificant when adjusting p-values for multiple comparisons.

Contrary to Hypothesis 1b, we do not find any evidence that UK respondents' beliefs about collective economic consequences from climate action are affected by learning about winning (mean=2.42, $p < 0.886$) or losing (mean=2.36, $p < 0.378$) sectors in Germany. This suggests that UK citizens do not respond to informational cues about sectoral effects from climate action in foreign countries, yet pulling in results for Germany (Figure 1, right panel) tells a more refined story.

Clearly, we would expect beliefs for Germany to win from climate action to be higher/lower when our experimental vignettes paint a positive/negative picture for German sectors as treatments T3 and T4 do. Our data support this expectation: T3 (mean=3.14, $p < 0.000$) increases levels in beliefs by 13.7 percent, while T4 decreases levels in belief by 22.8 percent (mean=2.13, $p < 0.000$) relative to the control group mean of 2.76. More interesting for our argument, however, if the informational cue logic were true, we would also expect levels of beliefs that Germany can win from climate policy to go up/down when learning about positive/negative distributional effects on UK sectors. This does indeed bear out in the data. Learning about the benefits for the *UK* renewables sector as a consequence of ambitious British climate policy (T1) makes respondents 8.6 percent more likely to think *Germany* can also win (mean=3, $p < 0.000$); the opposite is true for T2, which reduces the level of beliefs by 7.6 percent (mean=2.55, $p < 0.007$). Consistent with our informational cue logic, the effects on beliefs about Germany's economic prospects under ambitious climate action are larger for treatments T3 and T4, which directly offer information about Germany, compared to treatments T1 and T2, which focus on UK sectors. Only in the latter case, respondents infer likely impacts on German sectors from stated impacts on UK sectors. Hence, they rely on informational cues.

The interpretation of these findings is that respondents use informational cues selectively. While they show belief formation that makes use of informational cues, they do so only when forming beliefs about foreign countries, but not their home country. For home country beliefs, information about distributional effects abroad is discounted. In a form of home bias, only information that directly relates to positive or negative impacts on national sectors is considered relevant. The sources of such bias are likely varied, and we leave a further exploration for future research, but sources may include, for instance, beliefs that Germany is a bad comparator, outright anti-German/anti-foreign sentiment, or cognitive dissonance when the provided information is incompatible with partisan or ideological beliefs.

Subgroup Analysis: The Effect of International Embeddedness

To test our second hypothesis, we study how international embeddedness conditions our treatment effects. As discussed in the theory section, the concept of international embeddedness refers to individuals' attitudes towards the international world order. We conjecture that those who prefer being more embedded in the international system are more sympathetic to addressing global problems, such as climate change, through multilateral solutions. We therefore expect these respondents to hold more favorable beliefs about collective economic consequences from climate policy for any given level of benefits and costs from climate policy for home sectors. We now show that measuring differences in international embeddedness with individual respondents' Brexit preferences, we find considerable support for Hypothesis 2.

Figure 2 provides two important insights. First, Leavers (left panel) and Remainers (right panel) are equally susceptible to home bias. Learning about positive (T3) or negative (T4) impacts on *German* sectors from climate action produces beliefs that are indistinguishable to the beliefs in the control group, both among those in favor of Brexit ($p < 0.719$ for T3; $p < 0.701$ for T4) and those opposed to it ($p < 0.380$ for T3; $p < 289$ for T4). There is furthermore no statistically significant interaction effect of Brexit preference: Leavers and Remainers do not respond differently to treatments T3 ($p < 0.195$) and T4 ($p < 0.253$). While studying the sources of home bias is beyond the scope of the paper, these results suggest that Brexit preferences offer little explanatory power.

Second, and in keeping with Hypothesis 2, Brexit preferences as our measure of international embeddedness play a big role in explaining differences in beliefs when *UK* sectors are affected

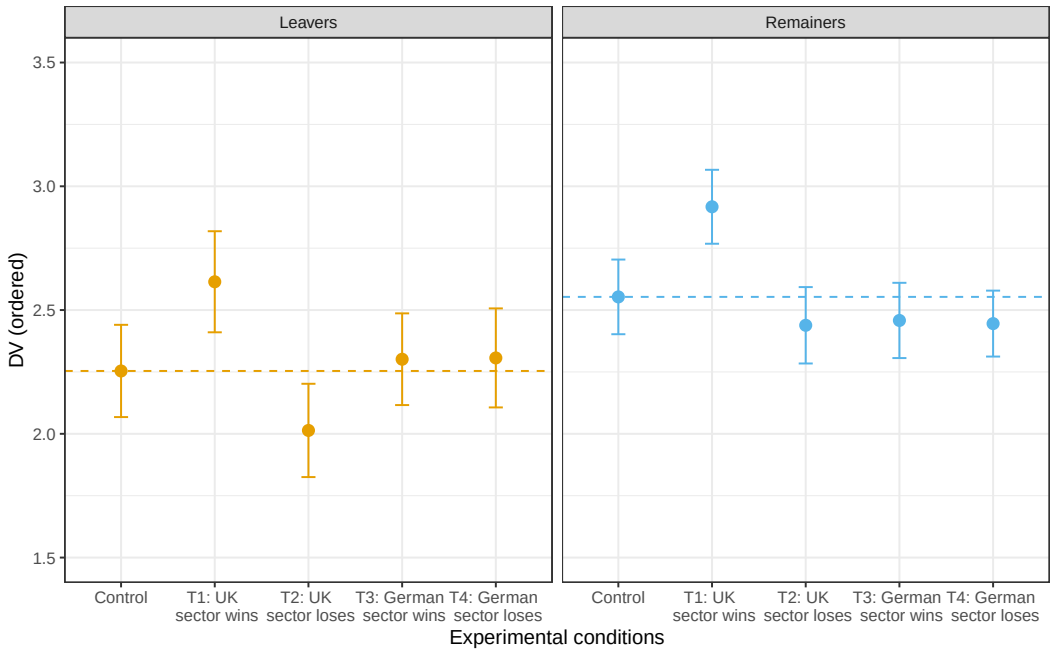

Figure 2: Results Plot for Beliefs about Collective Economic Consequences from Climate Action for the UK: Subgroup Analysis by International Embeddedness. The plot shows point estimates and 95% confidence intervals for treatment effects of informational vignettes on the belief that the UK will win from ambitious climate policy, separately for Leavers (low levels of embeddedness, left panel) and Remainers (high levels of embeddedness, right panel). Dashed lines indicate control group means. Outcome variable: $1-4$ scale.

from climate action. No matter whether respondents are told that UK sectors win or lose from climate action, Remainers consistently hold higher levels of beliefs that the UK can win from ambitious climate action. These differences are highly statistically significant—even after correcting for multiple comparisons ($p < 0.030$ for T1; $p < 0.003$ for T2). In fact, Remainers take such a positive stance on climate action that the negative treatment vignette which highlights losses for the UK transport sector decreases beliefs by less than 5 percent (compared to a 10.6 percent reduction for Leavers); this effect is so small that it fails to become statistically significant ($p < 0.293$).

In view of our theoretical argument, we interpret these findings to mean that respondents who feel embedded into the liberal, international world order, here measured by support of European integration along the Brexit divide, hold more optimistic beliefs that the UK can benefit from ambitious climate action. This is the case not only when respondents receive positive information about winning sectors, but also when they learn about losing sectors. International embeddedness therefore conditions treatment effects of distributional information about how climate action affects

domestic sectors. These results also point to a much bigger research program that seeks to develop a more refined understanding of how distributional effects in one policy area, such as Brexit, which shapes feelings of embeddedness, affect and spill over to other policy areas, such as climate change (Kono, 2020). While we cannot empirically disentangle whether international embeddedness is a materialistic or ideological sentiment, we provide additional analyses next, which indicate, similar to Curtis, Jupille, and Leblang (2014), that it captures more than just pocketbook effects among the winners of European integration or globalization more broadly.

Alternative Explanations and Additional Results

So far, we have provided empirical evidence that Brexit preferences matter for how UK respondents in a nationally representative survey form beliefs about collective economic consequences for the UK economy from climate action. We find that Remainers, relative to Leavers, are more convinced that climate action will benefit the UK economy *independent* of whether they receive a winning or losing sector treatment. Since we conceptualize Brexit preferences as a measure of international embeddedness and offer a theoretical defense above, we take the patterns in our data to be consistent with our argument about international embeddedness. Our survey data does not allow us to empirically probe the concept of international embeddedness further, but we can rule out several plausible alternative explanations.

The first set of alternative explanations comes from the observation that Brexit preferences might shape beliefs on collective economic consequences from climate action because support to leave the European Union is clustered by sector and geographically. We therefore conducted a subgroup analysis by sectoral employment splitting respondents into high and low carbon intensive sectors (Appendix A7.1); we also grouped respondents according to whether the live in a region dependent on extractive industries, such as coal mining or oil and gas production (Appendix A7.2). None of these results produced effects similar to our main results.

We also explored aspects of geography further. Specifically, we re-analyze our data separately for English and Scottish respondents (Appendix A7.3.1) as well as for Londoners and non-Londoners (Appendix A7.3.2). Notwithstanding large confidence intervals due to low statistical power in these much smaller subgroups, Scottish respondents show higher beliefs than the control group in all four experimental conditions, making Scots seemingly less prone to home bias. The London subsample

shows descriptive patterns similar to our main results for Remainers even though the interaction effect is not statistically significant ($p < 0.537$ for T2). Given that support to remain in the EU was high in Scotland and London, these findings are reassuring for our argument as both London and Scotland are known to be outward looking—be it for material or ideological reasons, both of which were shown to have mattered for Brexit vote choice (Hobolt, 2016; Colantone and Stanig, 2018; Norris and Inglehardt, 2019).

In order to somewhat gauge the relative importance of material and ideological concerns, even if only imperfectly, we split respondents into those living in the relatively wealthier South of the UK and those in the relatively poorer North of the country along median wealth levels from the UK's Office for National Statistics (Appendix A7.3.3): we do not find a conditioning effect of wealth similar to the one we report for our main results. The same is true when we analyze high and low income groups based on individual income data from our survey (Appendix A7.4). We take this as suggestive evidence that international embeddedness is probably more about ideological rather than material concerns.

Another reaction to our results could be that the distinction into Leavers and Remainers does not really capture international embeddedness but reflects left-right party identification (Appendix A7.5). However, we do not find that either left-right party ideology or vote choice in the 2017 General Election conditions beliefs in the same way that international embeddedness does. Respondents on the left and right hold beliefs about collective economic consequences from climate action that are indistinguishable from each other, and the same holds for Tory and Labour voters in 2017. Rather than party identification, individual positions on globalization seem to motivate belief formation about distributive politics from climate change in the UK.

In additional confirmatory analyses, we show that sectoral and climate attitudes matter in the ways predicted (Appendix A7.6 and A7.7). Respondents who think that major sectors, such as energy and transport, will do well despite strong climate action hold much more positive beliefs about the UK being able to benefit from climate action. On the other hand, those expecting sectors to struggle have consistently more skeptical beliefs across all experimental conditions. When climate change is considered as a very serious problem and when concern about the effects from climate change on local communities is high, respondents hold significantly more positive beliefs that the UK can benefit from ambitious climate action. This is in line with expectations: fear over

serious climate impacts for the British society increases the benefits from decisive climate action. Purely having heard or being knowledgeable about the Paris Agreement does however not produce differences in beliefs, which is consistent with another finding that education does not condition treatment effects (Appendix A7.8).

Conclusion

Past research on attitudes towards climate action largely agrees that the main dilemma confronting governments is that effective policies are expensive but public support wanes with increases in the *average* policy cost for *individual* citizens (Bechtel and Scheve, 2013; Drews and van den Bergh, 2016). However, less is known about mass public beliefs about *collective* economic consequences from climate action (rather than individual cost), and how these beliefs are formed as a function of distributional effects on sectors. Economic sectors often bear the monetary brunt of climate policy and shape countries' policy responses to climate change, while emission reduction targets are increasingly framed around sectoral responsibilities (Cheon and Urpelainen, 2013; Hughes and Urpelainen, 2015). This paper encourages the conversation about the importance of sectors in the domestic economy for understanding countries' climate responses (Bechtel, Genovese, and Scheve, 2019; Tvinnereim and Ivarsflaten, 2016; Olson-Hazboun, Howe, and Leiserowitz, 2018). Our main contribution is the focus on belief formation about collective economic consequences and distributional effects at the sector level.

The basic tenet is that the general public reacts meaningfully to information about the effects from climate action on sectors—both at home and abroad. We formulate two key expectations. First, that positive and negative news move beliefs about collective economic consequences in the corresponding direction, but that they do so more strongly for home country information compared to foreign country information, because there is a premium for home country information. Second, we theorize that because of the global scope of climate change, individuals who are more sympathetic towards globalization (for material or world view reasons), and hence feel more embedded into the international world order, hold more positive beliefs about climate action.

In a nationally representative survey conducted in the UK, these expectations bear out. Beliefs about collective economic consequences are shaped by information about winning and losing sectors

in the anticipated way. In an interesting twist, however, we find evidence of what we call home bias: UK citizens discount the offered information about foreign sectors when assessing the collective economic consequences from climate action for their *home* country, but fully rely on informational cues in their *foreign* country assessment. Beliefs about the home country are hence not guided by information alone, but are likely shaped by other attitudes towards nationalism, partisanship, and ideology more broadly.

This finding is consistent with our second main result. International embeddedness, which we measure with respondents' Brexit preferences, conditions belief formation. We identify Leavers and Remainers as the antipodes in Great Britain's current societal struggle on the future of the country's economic globalization and political integration. Both Leavers and Remainers show signs of home bias, but Remainers hold consistently more positive beliefs. Independent of whether they receive positive or negative news about climate policy-related distributional effects for sectors, they think climate action is beneficial for the UK. This is a fascinating result as it demonstrates that alongside material considerations, respondents' *feelings and perceptions* on how well they are integrated into the international world order affect mass beliefs in climate policy. In times of growing nationalism, this is bad news for the international climate agenda.

Our paper is a first attempt to explore public opinion effects of information on winning and losing sectors at home and abroad. Evidently, some limitations exist and include the external validity of the findings and the comparability of the German case with the UK. Nonetheless, we think the paper has important implications for understanding national responses to the Paris Agreement in the near future. Our home bias result suggests that success stories and best practices from similar countries abroad may not have a large impact on exciting home populations about climate action. Instead, narratives about domestic winning sectors may be the most effective way to stimulate mass appetite for more ambitious climate policies. Individual beliefs about climate mitigation as a global public good do however form in the context of a globalized world economy. This is why domestic responses to more ambitious decarbonization are not only determined by distributional effects alone, but are likely also shaped by whether a society considers proposed policies to a global cooperation problem as an illegitimate interference with domestic sovereignty or an effort to build a fairer world order. The unprecedented fallout of the current Covid-19 crisis on the world economy and impending threats of receding multilateralism showcase the importance of international embeddedness. The

more the general publics around the world feel disenfranchised from the liberal world order and see themselves as losers from globalization, the more difficult it will become to effectively respond to global crises, be it in the case of global public health or climate change.

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