

Communicating Risk across the Political Divide

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PRELIMINARY DRAFT – NOT FOR CIRCULATION

Abstract

Political polarization in the public's perception of risk is an increasingly serious problem. In both Canada and the US, public opinion is sharply divided over basic facts about policy relevant risks associated with climate change, vaccine safety, and other issues. Research on motivated cognition in psychology suggests that individuals are more receptive to information that comes from sources aligned with their own views. In this paper, we draw on this literature to identify the impact of using a variety of common governance channels to communicate risk. We use experimental surveys to test for causal effects on perceived trust, and the credibility and persuasiveness of information about a set of current risks when communicated by a range of government and private actors. We administer our experimental survey to large samples in both Canada and the US, to gain a comparative perspective on the culture of public trust in these governance institutions.

I. Introduction

The existence of climate change and its expected impacts is now a matter of scientific consensus.² Despite this, political polarization and conflict continue to surround attempts to formulate and implement effective policy. In the US, recent evidence finds the divergence between Democrats and Republicans on climate change risks and the priority on climate policy more extreme than views on abortion.³ In Canada, there are similar persistent divides in the attitudes of liberals and conservatives.⁴

While experts in climate science and policy are often in strong agreement, their contributions to public policy have often struggled to gain political traction in North America. Recent Canadian attempts to pursue standard climate mitigation strategies endorsed by experts such as cap and trade programs and carbon taxes have helped topple provincial governments and prompted constitutional challenges to the federal carbon tax.⁵ In the US, government climate action has been uneven, with significant reversals in policy and litigation by states both opposing and attempting to force federal action.⁶ Surveys of the public indicate that the same political

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² Luo & Zhao, 2019; Intergovernmental Panel on Climate Change (IPCC), 2014, 2015, 2018.

³ Leiserowitz *et al*, 2019.

⁴ Wherry, 2019; Ecofiscal Commission, 2018.

⁵ CBC, 2018; King, Fairfax & Gelbman, 2019.

⁶ Vandenbergh & Gilligan, 2017; *Massachusetts v. EPA*, 2007; pipeline approval policy; ANWR Oil & Gas Licensing, *Paris Agreement* participation.

polarization affecting opinions about the existence and human causes of climate change also colour public opinion on climate policy options.⁷

Unfortunately, while climate change was a frontrunner in polarized public opinion over science and policy, it has been joined by other crucial subjects in both Canada and the US. The risks of the novel COVID-19 pandemic, the need for public health measures, and the safety of vaccines provide an obvious example.⁸ The most recent and deeply unsettling partisan factual divide in the US is the legitimacy of the 2020 Presidential election results that sent President Joe Biden and Vice-President Kamala Harris to the White House.⁹

In the climate change context, a large and growing literature has examined how to convey climate science in a way that is accessible to both liberals and conservatives. Much of this research, however, has been focused on communication by scientists themselves.¹⁰

In reality, climate science and policy, like many other polarizing issues, is debated and implemented in a range of legal, political and economic contexts. Ignoring the question of who is speaking in these varied settings provides an incomplete picture of how information about risk and policy is actually provided to the public. Our objective is to understand how the institutional actor communicating affects the perceived accuracy and persuasive power of scientifically grounded risk information for individuals across the political divide. Our focus is not on the particular individuals who provide information, or precisely how they phrase information, but rather on the importance of different institutional roles. We comparatively examine the provision of information by political members of the executive at different levels of government within the federal schemes of both Canada and the United States, as well as considering alternatives in the form of international / national “independent” agencies, and market sources. These actors are among those identified by academics, and law and policy makers as critical players in the dissemination of information and normative commitments. We seek to understand how use of these various institutions contributes to public opinion and political polarization around current public policy risks.

Our empirical approach uses an experimental survey methodology to provide causal estimates of the effect of our institutional source conditions. We administer experimental surveys to samples of Canadian and US respondents. The survey evidence allows us to test a range of hypotheses, in particular:

- 1) whether institutions constructed to be apolitical / multilateral are perceived as more accurate and trustworthy, and are more persuasive than explicitly political actors,
- 2) whether perceived accuracy, trustworthiness and persuasiveness of political actors varies with their level within a federal scheme – theories of subsidiarity suggest local officials may be more persuasive, while alternative theories about political capture might suggest that regional or national leaders are more trustworthy
- 3) whether market actors with financial motives to gather and process information are perceived as more accurate, trustworthy, persuasive relative to political actors

⁷ Ecofiscal Commission, 2018; Leiserowisz *et al*, 2019; Mildemberger *et al*, 2016.

⁸ See e.g. discussion in A. Gollwitzer *et al*, (2020) <https://doi.org/10.1038/s41562-020-00977-7>.

⁹ See e.g. https://www.pewresearch.org/politics/2020/11/20/sharp-divisions-on-vote-counts-as-biden-gets-high-marks-for-his-post-election-conduct/pp_2020-11-20_post-election_0-01/.

¹⁰ Luo & Zhao, 2019; Fischhoff & Scheufele, 2019; Kahan *et al*, 2012; Kahan, 2015.

- 4) Whether perceived trust, accuracy, persuasiveness of actors varies across the political spectrum in a way that reflects suggestions in the literature that individuals are more receptive to information coming from sources aligned with their political commitments.
- 5) Whether the culture of public trust varies across similar institutional sources in Canada and the US. Strategies for communicating to a polarized public often fail to account for possible variation in national contexts. We test the generality of conclusions on hypotheses 1-4 by comparing results across our Canadian and US samples.

The surveys themselves provide direct evidence to test these hypotheses, using equivalence of means and comparison of response distributions across experimental conditions. In addition, we use regression analysis incorporating additional controls gathered in our experiments, including measures on participants' demographics, preferred information sources, and general trust.¹¹ The balance of our article proceeds as follows: Section II briefly reviews relevant literature, Section III discusses results from a prior study and outlines our survey methodology, Section IV describes the data collection and results.

II. Risk Communication, Cognition & Motivated Reasoning

A large literature has examined climate change opinion polarization as a problem of effective science communication. Researchers have analyzed the influence of factors such as the simplicity or complexity of the message;¹² the numeracy/ literacy / scientific knowledge of respondents;¹³ familiarity with the topic;¹⁴ impact of uncertainty / ambiguity in messaging;¹⁵ impact of salient events such as floods or extreme weather;¹⁶ among other factors.¹⁷ Underlying much of this work are theories of human cognition which treat the problem of communicating about scientific risks such as climate change as one of insufficient attention or other failures of rational cognition.

More recently, researchers have begun to approach the problem as one of motivated reasoning, or identity-protective cognition.¹⁸ This theory suggests that individuals process information in a way that aligns with what they perceive to be the beliefs of their “cultural” community. Certain issues – particularly certain risks – have become points around which conservatives and liberals have established identifying positions. These polarized identity-related commitments about risk then colour the way that individuals perceive and attend to information about risk and policy.¹⁹ A growing literature tests for differential processing of climate risk and

¹¹ Ethics review and approval was obtained from Emory (add IRB #) and Queen's General Research Ethics Board (add GREB#) prior to fielding the survey.

¹² Myers *et al*, 2015.

¹³ Rutjens, Sutton & van der Lee, 2018; Drummond & Fischhoff, 2017; Ranney & Clark, 2016; Guy *et al*, 2014; Zia & Todd, 2010.

¹⁴ Ranney & Clark, 2016.

¹⁵ Visschers, 2018; Deryugina & Shurchkov, 2016; McCright, Dunlap & Xiao, 2013.

¹⁶ Fownes & Allred, 2019; Shao *et al*, 2014.

¹⁷ Luo & Zhao, 2019; Whitman *et al*, 2018, Keller *et al*, 2012; Sunstein, 2005, Weber, 2016; Carrus, Panno & Leone, 2018; Arbuckle, 2017.

¹⁸ Kahan *et al*, 2017; Kahan, 2012, 2013; Shi, Visschers & Siegrist, 2015; Lahsen, 2013.

¹⁹ See e.g. related to climate risk: Kahan, 2013; Gromet, Kunreuther & Larrick, 2013; Gelbech, Robinson & Vriesema, 2019.

policy information in a way that aligns with this theory.²⁰ The theory provides an important potential explanation for why the simple availability of more information about risks such as climate change fails to close the risk perception gap between self-identified conservatives and liberals.²¹

Another dimension of the theory in the empirical literature, is that identity protective or cultural cognition can lead to selective consumption of risk and policy information through sources aligned with the cultural beliefs of the group. Again, looking to the climate change context, researchers have examined the potential impact of partisan media coverage of climate science to entrench political polarization²² as well as the role of elites / opinion leaders in shaping climate opinion.²³

It is this last connection which provides the basis for emerging theories of how institutions might be harnessed to bridge (or worsen) the polarization between liberals and conservatives on issues like climate science and policy. The core intuition is that the selection of institutional mechanisms for conveying risk information should align with cultural commitments. In the climate change context, one example is theoretical work that suggests the use of climate risk prediction markets.²⁴ Prediction markets could be used to provide information about the probability of climate risks such as: sea level rise, heavy precipitation events, or extreme heat/cold events. Traditionally such risk information is provided by government, often drawing on work by scientists associated with government agencies, or international scientific bodies.²⁵ However, these sources can clash with conservatives' skepticism about government itself.²⁶ Researchers have suggested that one important advantage of climate prediction markets is that they are a mechanism aligned with conservatives' traditionally stronger faith in market institutions.²⁷ Looking beyond prediction markets, the more general theory is that the same information provided by markets may be more congruent with conservatives' cultural commitments²⁸ and is thus more likely to be perceived as credible and trustworthy – and more likely to be persuasive – than if it originates with government.²⁹

This is an important theory, as it offers up a way to use a variety of institutions to broaden meaningful engagement by the public with the problem of polarized issues, such as climate change or the pandemic and their urgent policy choices. However, to date, there is little empirical evidence to test the theory. While there is a significant body of emerging work establishing evidence for

²⁰ Leiserowitz, 2012; Hornsey *et al*, 2016; Rutjens, Sutton & van der Lee, 2018; Cutler *et al*, 2018; Hart, Nisbet & Myers, 2015.

²¹ While foundational models incorporating information in economics abstract from partisan information perception, there are examples of such “motivated cognition” in experimental settings similar to litigation, see e.g. Babcock *et al* (1998).

²² Newman, Nisbet & Nisbet, 2018; Post & Ramirez, 2018; Carmichael *et al*, 2017; Turner, 2007.

²³ Boycoff, 2013; Boussalis & Coan, 2016; Farrell, 2016; Merkley & Stecula, 2018; Kousser & Tranter, 2018.

²⁴ Bell, 2006; Hsu, 2011, 2012, 2014; Vandenbergh *et al*, 2014.

²⁵ See e.g. IPCC, 2014, 2015, 2018.

²⁶ Fairbrother, 2016; Pechar, Bernauer & Mayer, 2018; Stiglitz, 2016.

²⁷ Vandenbergh *et al*, 2014.

²⁸ Lewandowsky, 2013, Dana & Nadler (2019), suggesting that corporate initiatives may make action on animal welfare, GMP foods more appealing to political conservatives compared with government regulation.

²⁹ See e.g. Macey (2021) suggesting current turn to ESG and emphasis on actions by corporations reflects distrust of government and a “libertarian turn” to private governance.

identity-protective cognition around climate science and policy *per se*,³⁰ it has generally not extended to the manipulation of informational sources in a way that aligns with the variety of “real world” institutional options.³¹

III. The Effect of Institutional Source on Beliefs about Information: Experimental Surveys

To gain insight into the causal connection between institutions and public perceptions of policy-relevant risks, such as climate change or vaccine safety, we use experimental surveys. Experimental surveys are a well-established methodological approach in social psychology, behavioural economics and empirical legal studies.³² The method has been used to study the expected causal effect of a variety of legal rules.³³ It has also been employed widely in the climate science communication literature.³⁴ The extension of the method to study causal connections between the institutional source of information about risk and public opinion is well supported by the literature. One critique of survey-based research in empirical legal studies and economics is the potential gap between hypothetical choices by respondents and their actual behaviour in a “real world” setting.³⁵ However, because our research is about how institutions interact with polarized *perception* of risk, this shortcoming is less relevant.

A. Climate Information: Prior Study³⁶

The evolution of international environmental law has seen the creation of expert advisory bodies, with the objective of generating and disseminating credible science on global environmental issues. In a prior study, we set out to compare the relative persuasiveness of government supported multilateral bodies like this with more market-oriented information. The theories in the literature suggest that using market institutions might be a way to persuade conservative “climate skeptics” on the science of climate change.

In our experimental survey, respondents—from both the United States and Canada—were provided with information about particular risks of climate change.³⁷ Using a randomization strategy, half the respondents were told (accurately) that the information originated with the United Nation’s Intergovernmental Panel on Climate Change (“IPCC”), the body charged with “assessing the science related to climate change.”³⁸ The other half of the respondents were provided with exactly the same information, but were told that it originated from (fictional) trading in prediction

³⁰ Gilbealt, Becker & Centola, 2018, Myers *et al*, 2017; Mildenerger *et al*, 2016.

³¹ But see Scannell & Gifford, 2013; Feldman & Hart, 2018 (policy implementation stage), Dana & Nadler (2019).

³² (Weisberg, Krosnick & Bowen, 1996; Krosnick, 1999; Louviere, Hensher & Swait, 2000; Kahneman & Tversky, 2000).

³³ Hoffman & Wilkinson-Ryan, 2013, Nadler & Seidman Diamond, 2008; Metcalf, 2014a; Cardi *et al*, 2012, Olsen *et al*, 2018, Irvine *et al*, 2018.

³⁴ See e.g. Schuldt, Roh & Schwarz, 2015; Jones, 2014; Kahan, Jenkins-Smith & Braman, 2013b; Turner, 2007.

³⁵ See e.g. Mullainathan, 2001.

³⁶ The paper for the prior study, “Institutions & Information: Public Perception of Climate Change Information provided by Government vs. the Market”, is available from the authors. Here it simply provides context for the current study.

³⁷ The particular predictions were from the ICPP AR 5 report and related to the increased risk of heavy precipitation events and extreme temperature events. The survey was administered to equally balanced Canadian and US samples.

³⁸ See *The Intergovernmental Panel on Climate Change*, <https://www.ipcc.ch/> (“IPCC”).

markets administered by the Chicago Mercantile Exchange (“CME”).³⁹ In addition to the information about the risk predictions themselves, respondents were provided with a short description of the way each institution generated the predictions through the aggregation of a large number of independent assessments (scientific research for IPCC, individuals trades for the CME).

The surveys solicited changes in individuals’ beliefs about the existence of climate change and its attribution to anthropogenic causes in response to the information.⁴⁰ Respondents also indicated the perceived trustworthiness of the source and accuracy of the information. We tested for a causal connection between the source of the information (government vs. market) and both the perceived accuracy and persuasiveness of the information. We then examined these beliefs, and the perceived trustworthiness in the institutional sources in light of individuals’ self-reported political views.

We did find statistically significant effects of institutional source on our measures of interest. However, we did not find effects across the political divide consistent with the working hypotheses in the literature. The use of markets to convey climate risk information caused lower perceived credibility of the information, and a lower level of trust in the informational source. We obtained results showing highly statistically significant differences in the mean reactions of self-identified conservatives and liberals. However, while conservatives were more skeptical of climate risk information than liberals in both the market and government conditions, there was no improvement in the perceived credibility of information provided by markets for conservatives. In fact, they perceived the IPCC as more accurate, and trustworthy. Additionally, an unintended consequence of using a market approach in our prior study was that it damaged liberals’ confidence in climate change and its attendant risks relative to the IPCC alternative. These results were consistent across equivalence of means tests and regression analysis conditioned on demographic and other controls.⁴¹

The results in our prior study were somewhat surprising to us and are concerning for proposed strategies to use non-government, market approaches to bridge the opinion gap for politicized risks like climate change. However, there are several features of that study that suggested more is needed to fully understand the results. One concern was the particular nature of our market alternative – a CME market trading in climate risk prediction products. In light of the global financial crisis of 2008 and resulting distrust of “Wall Street”, this type of market may be problematic as a way to test the more general theory. This market alternative also involves a complicated description of how the market risk measures were produced. This complexity and unfamiliarity for respondents may also have reduced trust in the source and information.⁴² Another factor that may influence the success of institutions theory for risk communication is the difference between the information, respondent’s priors, and what they expect from the institution itself. For example, after being presented with the climate risk information liberals in our survey were less

³⁹ See *CME Group*, <https://www.cmegroup.com/>. While the risk information provided to these respondents was accurate, the sourcing of the information was not: Although the CME is a real organization, hosting trading in derivatives and futures, it does not currently host climate change prediction markets.

⁴⁰ The survey solicited baseline beliefs before respondents were exposed to the experimental conditions presenting the climate risk information, then asked to revisit these beliefs in light of the information.

⁴¹ For accuracy and trustworthiness of information we used equivalence of means and ordered logit regressions with our scaled responses as dependent variables. For persuasiveness, we used equivalence of means tests.

⁴² See e.g. Myers et al. (2015), Ranney & Clark (2015).

confident about climate change in both the market *and* IPCC conditions, although this effect was much stronger in the market condition. This may be a result of the risk information being less serious than they expected, interacting with their level of trust in the source. While we uncovered important results in our prior study, they prompt us to expand our research.

B. Communicating Risk across the Political Divide – Experimental Survey Design

Our current survey builds on the prior study to more generally explore the issue of how the institutional source of information affects individuals' trust, and their perceptions of its credibility and persuasiveness. The current survey incorporates greater variation across institutional sources as an experimental condition, to better understand how different governance channels influence beliefs among the public. We also include multiple risk scenarios, in order to better assess the systematic influence of these institutional sources.

The survey structure largely tracks the one we adopted in the prior study. We begin with a series of general questions on demographic characteristics.⁴³ Next, we move to the risk scenarios. For each risk scenario we first solicit baseline beliefs related to the foundational facts. Respondents are then exposed to information relevant to the risk, randomizing attribution across our institutional source conditions.⁴⁴ Respondents are then asked a series of questions about the trustworthiness of the information source, accuracy of the information, and finally asked to update their baseline beliefs. Respondents are exposed to all risk vignettes, randomizing the order for each respondent. Sample vignettes and questions for our risk scenarios are provided in the Appendix. After respondents complete the experimental portion of the survey for all risk scenarios, they are asked questions to identify their political affiliation⁴⁵, identify their most frequent source of information about public issues like those in our risk scenarios, frequency with which they seek information, level of trust in their preferred source and answer the world values trust question.⁴⁶

Risk Scenarios

Our new surveys incorporate multiple risk scenarios. The survey design includes a range of risks with both highly polarized and more neutral scenarios. The survey incorporates environmental risks and other types of risk (health). Among our range of risks are scenarios where we expect polarization in public opinion to favour liberal alignment with truthful information, and where we expect conservatives to be more credible of truthful information presented in our vignettes. The survey structure allows us to obtain both within and between subjects estimates of

⁴³ We use quotas for some demographics to help keep the sample more representative of the underlying population. This requires inclusion of some basic demographic questions close to the beginning of the survey, to prevent unduly taking time from respondents who are not eligible for the survey. To prevent priming, questions on political affiliation were placed after the experimental vignettes. This necessitated a different sampling strategy, using information available to panel providers to target recruitment to reach political quotas.

⁴⁴ For all risk scenarios we include a control that simply presents the additional information without attribution to any specific source.

⁴⁵ To structure the form of questions on political affiliation we follow approaches by national polling experts, e.g. US Pew Research http://www.aapor.org/AAPOR_Main/media/AnnualMeetingProceedings/2015/J2-1-Kiley.pdf.

⁴⁶ Respondents are asked to identify their most frequent source of information about public issues such as climate change, the pandemic from a list that includes: various forms of media (traditional, alternative, social media); government / official sources; institutions respondent is associate with (school, employer); Religious or other community leaders; family, friends or people respondent knows.

how trust in institutions varies across these contexts. This will allow us to draw more robust conclusions about the role of our alternate institutions themselves in communicating information to the public.

Our specific risk vignettes include four distinct scenarios. We retain a primary scenario on climate change risks. This remains a politically polarized policy area in which the inability to establish a shared factual foundation is an issue.⁴⁷ We also incorporate a scenario on risks associated with the new COVID-19 vaccines. Vaccine hesitancy was emerging as a critical public health issue even before the pandemic, and data indicates this is another area of significant concern in terms of politicized beliefs about basic facts. In both of these risk scenarios, the politically polarized views of the public align so that liberals are more likely to believe risk information and conservatives more inclined to be skeptical.⁴⁸ We also add two additional risk scenarios. We include one scenario on risk from single-use plastics for marine pollution. Reducing plastics pollution has been a subject of bi-partisan action relatively recently in both Canada and the US. It is an evolving risk, with rising public resonance, relatively less polarized than some other environmental risks.⁴⁹ It is also an environmental concern where risks have been identified at international⁵⁰, national and other levels (e.g. plastic bag bans, etc.)⁵¹ Our final risk vignette concerns pesticide residue and food safety, including a health comparison with organic, natural foods. This is another relatively persistent public concern for which risk statements exist from both international and national regulatory agencies, as well as other government officials, and market

⁴⁷ See e.g. Community partisan beliefs about climate change: Yale Climate Information Project – Climate Beliefs by Party Affiliation (<https://climatecommunication.yale.edu/visualizations-data/partisan-maps-2018/?est=happening&group=dem&type=value&geo=cd>)

⁴⁸ See e.g. Community beliefs about vaccine safety (willingness to be vaccinated, by state / province e.g. <http://angusreid.org/canada-covid-vaccine-january/>).

⁴⁹ See e.g. <https://www.theguardian.com/environment/2018/nov/13/the-plastic-backlash-whats-behind-our-sudden-rage-and-will-it-make-a-difference> (UK, widespread and rapid support for plastic bans, review of issue); Canadian polls supporting plastics regulation: <https://www.ctvnews.ca/climate-and-environment/majority-of-canadians-want-plastic-ban-expanded-survey-1.5298944>; US polls, willingness to pay to avoid disposable plastics: <https://www.pbs.org/newshour/nation/most-americans-would-pay-more-to-avoid-using-plastic-poll-says> (November, 2019). Poll results, Amazon customers concerned about plastic waste during pandemic shopping, commitments by manufacturers to create alternatives: <https://www.globenewswire.com/news-release/2020/07/14/2061696/0/en/Survey-Amazon-Customers-Overwhelmingly-Concerned-About-Plastic-Pollution-Want-Plastic-Free-Choices.html>. Some bipartisan action:

<https://www.plasticsnews.com/article/20181012/NEWS/181019959/trump-signs-ocean-plastics-pollution-law>; but see <https://www.washingtonpost.com/news/powerpost/paloma/the-energy-202/2019/07/23/the-energy-202-trump-does-not-get-the-point-of-plastic-straw-bans-pollution-experts-explain/5d3603c2a7a0a46ab0088404/>. Corporate commitments to zero waste: Kroger <http://sustainability.kroger.com/2020-goals.html>;

⁵⁰ International – E.g. UN: <https://news.un.org/en/story/2019/11/1050511> (micro-plastics, etc.); UNEP Clean Seas Info Graphic: <http://www.cleanseas.org/what-marine-litter>; UNEP Plastics Reports: <https://www.unep.org/resources/report/addressing-marine-plastics-systemic-approach-recommendations-actions>.

⁵¹ Canada – national strategy: <https://www.canada.ca/en/environment-climate-change/services/managing-reducing-waste/zero-plastic-waste.html>; US NOAA facts, links to measures: <https://www.noaa.gov/education/resource-collections/ocean-coasts/ocean-pollution>; van Beynen, P.E. Editor's Message: Impact of politics on USA water quality monitoring, protection and management. *Hydrogeol J* 26, 1763–1765 (2018). <https://doi.org/10.1007/s10040-018-1791-5>;

players have played a role in this space.⁵² Pesticide and food safety issues are not highly partisan⁵³, although characteristics of those who are very concerned map onto democratic demographics, so if anything we expect democrats to be more skeptical of truthful information suggesting safe consumption of foods grown with pesticides.⁵⁴

Our risk scenarios provide basic, scientifically accurate information about key risk assessments for these scenarios.⁵⁵ In our current survey we have restricted our conditions to the presentation of a relatively closed set of facts on risks, without providing any elaboration about the processes of the institution providing the information. This will help us more cleanly focus on the identity of the institution itself as a driver of public trust and persuasiveness.

Institutional Actors

The current survey also takes a more general approach to the range of institutional actors. We include two broad types: government and market-based actors. This retains the structure from the original survey that will allow us to test whether conservatives are more persuaded by non-government, market actors. However, we have expanded the range of sources within both these categories, attempting to choose a range that have external validity as important “governance” participants in practice.

We incorporate two different types of government actors: independent agencies and elected political leaders. These two choices represent an important variation in the potential grounds for public belief in information they provide. The independent / multilateral agencies are deliberately constructed to include apolitical experts who can provide reliable, *non-partisan*, science-based information to support policy making and debate.⁵⁶ In contrast, the political leaders we include

⁵² UN WHO <https://www.who.int/news-room/fact-sheets/detail/pesticide-residues-in-food>; US FDA <https://www.fda.gov/food/pesticides/pesticide-residue-monitoring-program-questions-and-answers>; Health Canada <https://www.canada.ca/en/health-canada/services/about-pesticides/pesticides-food-safety.html>; General Mills, pesticides and sustainability <https://www.generalmills.com/Responsibility/Sustainability/Pesticides>; Kroger <https://www.kroger.com/food-tips/cooking-skills/dietitians-corner-what-makes-produce-clean-understanding-pesticide-use-and-safety>

⁵³ See PEW poll on relative politicization of a variety of risks:

<https://www.pewresearch.org/science/2015/07/01/americans-politics-and-science-issues/>.

⁵⁴ See PEW polling on food risks (2018) <https://www.pewresearch.org/science/2018/11/19/public-perspectives-on-food-risks/>.

⁵⁵ Source of Climate Risk Information is UN IPCC Special Report: Global Warming of 1.5 Degrees (2018) Summary for Policy Makers <https://www.ipcc.ch/sr15/chapter/spm/>. Source for COVID-19 Risk Information is primarily data from the US Center for Disease Control <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/index.html>, supplemented and cross-checked against data from the World Health Organization <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/covid-19-vaccines> and the Canadian Public Health Agency <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/prevention-risks/covid-19-vaccine-treatment.html>. In addition to reviewing these government sources to assess the range of facts most likely to be presented, we also review polling data on public concerns to select relevant facts, see e.g. Kaiser Family Foundation polling <http://files.kff.org/attachment/Topline-KFF-COVID-19-Vaccine-Monitor-December-2020.pdf>;

⁵⁶ For example, in the climate risk scenario, we use the US Center for Environmental Information at NOAA as the reference agency in the US and Environment and Natural Resources Canada as the reference for Canada <https://www.canada.ca/en/services/environment/weather/climatechange.html>. In the vaccine risk scenario we use the CDC as the reference agency in the US, and the Public Health Agency of Canada in Canada <https://www.canada.ca/en/public-health.html>. These national agencies are intended to provide non-partisan, expert

exercise authority derived from their election to office. While this is inherently partisan, it nevertheless reflects a democratic legitimacy that potentially supports public belief in the information. In any case, the fact that these actors *do* exercise government authority means it is important to understand how the public perceives their trustworthiness as a source of information. For both types of government actor, we vary the level at which the actor is situated. For our independent agencies, we include one international independent / multilateral agency that is recognized as a key source of scientific information, and one national agency that plays a similar role in the domestic setting. For our political leaders we include executive leaders at the national, regional and local levels.⁵⁷ The incorporation of elected representatives at varying levels within federal structures will allow us to test theories about divided government, such as principles of subsidiarity, that suggest the level of government connected with a policy can be systematically connected to perceptions of its legitimacy, with trust enhanced in the local level of government with which respondents are most closely connected.⁵⁸ Cutting against this view are alternative theories of federalism that fear capture of local institutions and suggest greater trust in national actors.⁵⁹

In addition to these formal government-based sources of information, we also include multiple market-based sources that operate as potential private governance institutions. Again, we vary the nature of these sources somewhat to reflect different rationales for the information to be perceived as trustworthy and credible. However, we try to include institutional alternatives that have external validity as important prospective sources of information to the public. One market-based source is an industry coalition – a group of firms that include large market players that are *actually* publicly active in the context of the risk scenarios.⁶⁰ The use of a coalition of companies, including some that would normally be competitors, is intended to mitigate respondents’ fears that corporate statements will be self-serving (i.e. moral hazard). The second market-based source is one that would use a more actuarial / transactional approach to determine risks (e.g. insurers). Both these sources draw on potential for market-based sources of information to be credible because they reflect economic incentives for market players to search out and disseminate accurate information. Our first alternative is quite common and has been embraced as a prospective way to enhance the practical reach of commitments in international law by the UN.⁶¹ The second

advice for government and the public. See Adrian Vermeule, *Conventions of Agency Independence*, 113 Colum. L. Rev. 1163 (2013) (arguing that one should assess an agency’s independence based on practice, not legal protections); Kirti Datla & Richard L. Revesz, *Deconstructing Independent Agencies (and Executive Agencies)*, 98 Cornell L. Rev. 769 (2013) (suggesting that agencies lie along a spectrum from more to less independent of presidential control).

⁵⁷ In the US our elected government officials include the President, State Governor, and local Mayor. In Canada, the elected officials are the Prime Minister, Provincial Premier, and local Mayor.

⁵⁸ INSERT subsidiarity references ...

⁵⁹ See e.g. William A. Fischel, *Regulatory Takings: Law, Economics, and Politics* (Harvard Press: 1995) (discussion of relatively greater potential for the “small republics” of local government to neglect the interests of outsiders, under-represented groups and those who are unable to “exit” in response to policy). additional capture references ...

⁶⁰ We use polling data to assess the relative political valence of the companies explicitly included in the coalition in the surveys, see e.g. <https://www.axios.com/democrats-and-republicans-favorite-companies-5b888834-5efb-48cc-aa0c-720d8a1ff2ec.html>. We do not mention specific companies in the COVID scenario, for example those that supported the COVID Vaccine Producer’s Pledge, since the information in the scenario differs somewhat from that in their pledge, see e.g. <https://www.pfizer.com/health/coronavirus/pledge>.

⁶¹ See e.g. UN Global Compact. Coalitions with an ESG focus link explicitly to UN International goals in the environmental realm. For example, see the Amazon Climate Pledge, with its direct incorporation of the *Paris Agreement*: <https://sustainability.aboutamazon.com/about/the-climate-pledge#section-nav-id-0>; Walmart has similar

alternative is intended to be more purely market driven and less prone to being viewed as politicized “window dressing” that large firms are often accused of in relation to ESG initiatives. We use a statement attributed to a group of major insurance companies that provide service to commercial clients.⁶²

IV. Survey Administration & Results

A. Survey Administration & Sample

The survey was administered online to samples of respondents in both Canada and the US. While opt-in panels, particularly Amazon’s MTurk, are often used in experimental studies, it is challenging to obtain a sufficiently large sample for countries outside the US, because the participant pool is much smaller. Instead, we used two panel providers, Qualtrics (for Canada) and Prime Panels (for the US) to help solicit participants. Both services maintain access to large pools of respondents, and this allows for a sample of participants more representative of the population to be included. Although the survey design uses experimental variation to drive the internal validity of results, a more representative pool of respondents will bolster confidence in potential for external validity. There is some uncertainty around the possible effect size, making it challenging to use power calculations to choose our sample size.⁶³ We aimed to recruit 200 respondents into each experimental condition, in both the Canadian and US surveys. Both the Canadian and US surveys were fielded at approximately the same time.⁶⁴ Respondents were randomized into the experimental conditions on entry into the main survey and the order in which they were exposed to the four risk vignettes was also randomized.⁶⁵

The Canadian sample includes respondents with relatively diverse characteristics. Respondents were split relatively evenly between male and female respondents, while a small

initiatives linked to the *Paris Agreement*, including a commitment to reach net zero emissions by 2040 and its “Project Gigaton” for removal of GHG emissions driven by private business; <https://corporate.walmart.com/media-library/document/walmart-sets-goal-to-become-a-regenerative-company/> proxyDocument?id=00000174-ae08-dcf3-a7fc-afdcca070000.

⁶² For similar real world statements of climate risks by insurers, see e.g. <https://www.genevaassociation.org/research-topics/climate-change-and-emerging-environmental-topics>; <https://www.iii.org/article/background-on-climate-change-and-insurance-issues>; <https://www.mckinsey.com/industries/financial-services/our-insights/climate-change-and-p-and-c-insurance-the-threat-and-opportunity#>; <https://actuariesclimateindex.org/about/> (use of actuarial methods to assess climate change risks). In the COVID-19 vaccine context, this alternative is less externally valid, due to waivers of general liability negotiated by vaccine producers as part of the race to address the pandemic. However, liability for employers, for example, remains an area of active prospective liability engaging this actuarially driven market.

⁶³ Based on our prior study, we obtained significant effects with approximately 150 individuals per condition in each of Canada and the US. We increased our sample size slightly, to increase power in the event effect sizes were smaller.

⁶⁴ The Canadian survey was fielded by Qualtrics during the period from May 6-28, 2021. The US survey was fielded with Prime Panels during the period from May 10-20, 2021. A total of 1648 responses were collected for the Canadian survey and 1655 for the US survey.

⁶⁵ Prior to entry into the main experimental component of the survey, respondents were subject to an attention screening question [add the question details, fair question]. In addition to this attention check that automatically excluded inattentive respondents from participating, an additional attention check was incorporated at the end of the demographic conditions. Subjects who did not fill in the open response entry correctly were excluded. A duration check was also used to eliminate responses for “speeders”.

minority preferred not to answer or identified as intersex.⁶⁶ Respondents came from across the provinces, with a majority from Ontario.⁶⁷ Respondents also came from a wide range of educational backgrounds; just under 20% indicated high school as their highest level of education, while just under 30% indicated “some college” or a two year college program, approximately 30% had a four year degree and 16% had graduate or professional training.⁶⁸ Most respondents were white (73%) but the remaining respondents (27%) identified with a wide range of different racial identities. Most respondents were born in Canada (77%) but a substantial portion had immigrated – with the largest number arriving more than 10 years ago (15%). Approximately 25% of the sample were from rural or small town / city locations, while another 17% were from medium sized cities, and the balance were from large urban areas, split between suburban (31%) and urban core (27%) residents. Just over 22% of our sample described religion as “very important” in their lives, with another 24% saying it was “somewhat” important. Our respondents were distributed relatively evenly across our family income bands, with the median falling within the \$60,000-\$80,000 per year band.⁶⁹ The even distribution of respondents across conservative and liberal viewpoints is crucial to our experimental design: approximately 40% identified as liberal or very liberal, while 40% were conservative or very conservative; 5% identified as slightly liberal, 3% as slightly conservative and the remaining 12% identified as moderates.⁷⁰ The use of our panel provider allowed for targeted recruitment for this balanced sample, without the priming effect of directly soliciting political views within the survey prior to the experimental component.

Data for our US sample also reflect participation from a relatively diverse population of respondents. The sample includes roughly equal numbers of participants identifying as male and female, with a small minority choosing other categories.⁷¹ The US sample includes respondents from every state, with the largest groups of respondents coming from California, Florida, New York, and Texas.⁷² Our US respondents also came from varied educational backgrounds; just over 26% indicated high school as their highest education level, about 33% indicated “some college” or a 2 year college program, while just over 22% had a 4 year degree and just over 14% had

⁶⁶ Males (47.5%), Females (52%), Intersex (.2%), Prefer not to answer (.2%). Note that “intersex” was the preferred alternate term identified by Queen’s GREB.

⁶⁷ BC (14.68%), AB (13.69%), SK (2.49%), MB (4.13%), ON (46.48%), QC (10.68%), NB (1.88%), NS (3.94%), Nfld (1.46%), PEI (0.67%). These are quite close to the census shares based on 2016, particularly taking into account the relative population growth rates across provinces. The exception that Ontario is slightly over-represented (38.26% - 2016) and Quebec is under-represented (23.23% - 2016). The latter result is likely explained by the fact that the survey was administered in English only.

⁶⁸ Approximately 7% indicated they had a trade certification as their highest qualification.

⁶⁹ The average Canadian family income in 2019 was \$62,900, but for non-senior families (main income earner is less than 65) the comparable figure was \$93,800, see <https://www150.statcan.gc.ca/n1/daily-quotidien/210323/dq210323a-eng.htm>.

⁷⁰ In addition to having an even distribution of political views across which to randomize our survey, this is also very consistent with the underlying distribution of political affiliations in Canadian politics. For example in the 2019 federal election the Conservatives & Bloc secured 42% of the popular vote, the Liberals and NDP 48%, see <https://globalnews.ca/news/6066524/canada-election-the-2019-results-by-the-numbers/> [get additional natl data, just pol views, not party affiliation].

⁷¹ The sample was 48.25% males, 51.57% females, 0.12% Intersex and 0.06% preferred not to answer.

⁷² The percentages for the states are as follows: 6.83% (CA); 8.16% (FL); 7.5% (NY); 7.19% (TX). Substantial numbers of respondents were also drawn from the next most populous states: 4.41% (PE); 4.35% (IL); 4.11% (OH); 3.5% (GA); 4.23% (NC); 2.72 (MI). While the sample does not exactly reflect the relative population shares of the states, it is quite similarly distributed, see e.g. <https://www.infoplease.com/us/states/state-population-by-rank>.

graduate or professional training.⁷³ In our US sample, 82% of respondents indicated “White” as their racial identity, leaving just under 18% to reflect other racial identities. This included just under 9% who identified as “Black” and just under 4% “Asian”.⁷⁴ In terms of ethnicity, just over 8% indicate “Latino or Hispanic” identity.⁷⁵ Our sample is not fully representative of the US population, as it skews “White” and non-Hispanic, but it does include a substantial number of minority respondents. Almost all our US respondents were born in the country (95%) with very few indicating that they had immigrated to the US. Rural respondents made up 20% of our sample, with another 20% coming from a small town or city, 16% coming from medium sized cities, and just under 43% coming from large urban centers, with the majority of those in suburbs (29%), compared with the urban core (14%). Among our US respondents, 38% indicated religion was “very important” in their lives, while another 27% considered it “somewhat important”.⁷⁶ Respondents also come from across the income distribution, with the median respondent family income in the band from \$40,000 - 60,000 annually.⁷⁷ As with the Canadian sample, a primary goal of sampling was to ensure that respondents were approximately balanced across political orientations. In the US, this is generally done via individuals identifying as either a Democrat or Republican.⁷⁸ Our sample is evenly balanced, with 38% of respondents identifying as Republican, 42% as Democrats, and 19% as Independents. Of the latter, 23% of our Independents lean Republican and 25% lean Democrat, leaving around 10% of respondents as “true” Independents. The share of our sample who are either Democrats or lean Democrat is thus just under 49%, Republican or lean Republican is just under 43%. Our sample is relatively well balanced and also a good reflection of overall US political affiliations.⁷⁹ The sample remains well balanced if we use an alternate measure of political views.⁸⁰

⁷³ A small percentage of respondents indicated a trade certification as their highest level (3.4%). The US Census puts the share of those over 25 with a four-year degree or above at 32%, see: <https://www.census.gov/quickfacts/fact/table/US/PST045219>.

⁷⁴ These figures are for race alone, and do not separate out ethnicity to exclude those of Hispanic or Latino ethnicity. Using this approach, the US Census estimates for 2019 indicate that 76.3% of Americans are “white alone”, 13.4% are “black alone” and 5.9% are “Asian alone”, see <https://www.census.gov/quickfacts/fact/table/US/PST045219>.

⁷⁵ This compares with a US Census estimate for 2019 of 18.5%.

⁷⁶ According to the most recent PEW Religious Landscape Survey (2014) 53% of Americans surveyed indicated religion was “very important” and 24% said it was “somewhat important”, see:

<https://www.pewforum.org/religious-landscape-study/importance-of-religion-in-ones-life/>; however, more recent data indicate that religiosity in the US has been falling as measured by religious attendance, and denominational affiliation – so that our sample is likely more reflective of the current US population. See e.g.

<https://www.pewforum.org/2019/10/17/in-u-s-decline-of-christianity-continues-at-rapid-pace/>.

⁷⁷ This compares with US Census estimates of median family income of \$62,843 (2015-2019, in 2019 dollars), see <https://www.census.gov/quickfacts/fact/table/US/PST045219>. The distribution of household income across the income bins for our sample is very similar to the actual US income distribution, see e.g. *The US Income Distribution: Trends & Issues* (Congressional Research Services, 2021) at p.6

<https://fas.org/sgp/crs/misc/R44705.pdf>.

⁷⁸ This also allowed us to target sampling without asking respondents about their political views prior to the experimental portion of the survey.

⁷⁹ Pew found that immediately following the 2020 US election, 49% of voters identified as Democrat / leaners, 44% as Republican / leaners, see <https://www.pewresearch.org/fact-tank/2020/10/26/what-the-2020-electorate-looks-like-by-party-race-and-ethnicity-age-education-and-religion/>.

⁸⁰ Those who describe their views as either “liberal” or “very liberal” make up 23% of our respondents, while “conservative” and “very conservative” respondents account for just over 31%. If we include those who express “slight” leanings, the figures are 33% for liberal views and 37% for conservative views, with around 30% describing their views as “moderate”.

Overall, both our US and Canadian samples are relatively diverse and reflective of the underlying population in the two countries on our main demographics.⁸¹ Critically, they also include enough respondents holding both liberal and conservative political views.

B. Results

i) Baseline Risk Beliefs

Our first question is whether respondents in our sample show a divergence in their views about our risk contexts by political orientation. We are also interested in whether our samples show similar patterns across Canada and the US.

The results for our climate change vignette are presented in Figure 1a, vaccine vignette in Figure 1b, plastic pollution vignette in Figure 1c, and finally pesticide risk vignette results are in Figure 1d.



Notes for Figures: 1a) Mean responses for belief in existence of climate change, and belief it is mainly due to human causes in the form of GHG emissions, responses on a 7-point qualitative scale, where 1= “very unlikely”, 7= “very likely.” 1b) Mean responses for belief that approved COVID-19 vaccines are safe, effective, and intention to be vaccinated, responses on a 7-point qualitative scale, where 1= “very likely”, 7= “very unlikely.” 1c) Mean response for belief that plastic pollution is a serious problem, and belief it is an environmental risk to humans, responses on 7-point qualitative scale, where 1=“very unlikely”, 7=“very likely”; 1d) Mean responses for belief approved agricultural pesticides pose health risks, and that organic or natural products are healthier, responses on 7-point qualitative scale, where 1= “very unlikely”, 7= “very likely”. All figures, standard error for mean indicated by error bars.

⁸¹ Quotas were used to ensure respondents were roughly equally distributed across three age bins: 18-34; 35-55; 55+.

It is easy to see that in general our sample respondents display very similar behaviour across countries. Both Canadian and US “liberals” are more likely to believe in the existence of climate change *and* its attribution to human causes than “conservatives.” The difference between the mean baseline climate change beliefs of conservatives and liberals is highly significant in both Canada and the US.⁸² Both US and Canadian liberals also think it more likely that approved COVID vaccines are safe and effective and say they are more likely to get vaccinated than their conservative counterparts.⁸³ In both the climate and vaccine scenarios, there is a substantial difference in the level of means for the prior beliefs, with liberals “likely” to believe in the risks, while conservatives find them only “slightly likely” or sometimes only on average between “as likely as not” and “slightly likely”.⁸⁴ This gap in priors across our respondents by political orientation is consistent with polling evidence showing perception of these risks is highly polarized. Differences between liberals and conservatives on the risks associated with plastic pollution, and pesticide food residue risks are also statistically significant in both Canada and the US.⁸⁵ However, the size of the risk perception gap on these issues is smaller relative to the climate change and vaccine risks. This is reassuring, since it suggests that, consistent with our experimental design, these are less polarizing risks for our respondents. While Canadian liberals and conservatives are slightly more confident in the likelihood of our vignettes risks than their US counterparts, Figures 1a)-1d) illustrate how similar the qualitative assessments of risk are on average within political orientation across the two countries.⁸⁶ Politically polarized perceptions of risk appear to pose a similar challenge in both Canada and the US, according to our samples.

ii) Institutional Trust

Key to the potential for harnessing alternative institutions to communicate risk is the idea that individuals may trust some institutions more than others – and particularly that conservatives may place greater faith in non-government institutions. We use our survey to test this theory among both our Canadian and US respondents, looking across our four risk vignettes. First, we consider mean trust across our institutional conditions generally, then we examine the conservative-liberal divide. Finally, we use regression with controls to assess how factors other than political orientation affect institutional trust.

Institutional Trust & Global Warming

⁸² P values for one-tailed T-tests of means (Lib>Con), two samples, unequal variances: Canada P<0.000; US P<0.0000 for both metrics (global warming exists, caused by GHG emissions).

⁸³ P values for one-tailed T-tests of means, two samples, unequal variances: Canada P<0.000; US P<0.0000 for all three metrics (Vaccine safety, efficacy, intent to vaccinate). In the Vaccine vignette, “very likely” is coded as 1, so the one tailed means test is for Lib<Cons – as this reflects greater liberal confidence.

⁸⁴ On our qualitative scale, 4 is the numerical equivalent to “as likely as not” in all codings. See notes to Figures 1a)-1d) for qualitative mapping for each set of priors.

⁸⁵ P values for one-tailed T-tests of means (Lib>Con), two samples, unequal variances for Plastic pollution risks: Canada P<0.000; US P<0.0000. P values for one-tailed T-tests of means (Lib>Con), two samples, unequal variances for Pesticide health risks: Canada P<0.000; US P<0.0000.

⁸⁶ There is a larger difference in respondents’ intent to be vaccinated with an approved COVID-19 vaccine. Canadians are substantially more likely to indicate this intention than US respondents – a difference that maps to the higher vaccine uptake in Canada vs. the US over the pandemic, see e.g. <https://www.nytimes.com/interactive/2021/world/covid-vaccinations-tracker.html> (Fully vaccinated: Canada 75%, US 58%, October 26, 2021).

Measures of institutional trust in our global warming vignette for each of our institutional source conditions across all respondents are shown in Figure 2, for both Canada and the US.

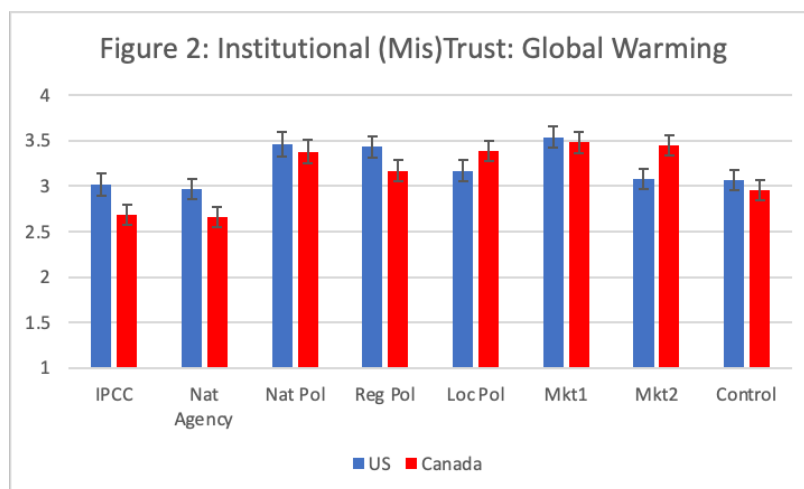


Figure 2 Notes: Means for measures of trust on a 7-point qualitative scale, where 1=extremely trustworthy, 7=extremely untrustworthy; higher means indicate greater mistrust in the institution. Standard errors for means are shown by error bars.

We can see several patterns in our measures of institutional trust. Overall, it is the “independent” agencies in which respondents express the highest levels of trust as a source of the climate risk information in our vignettes. In both Canada and the US, mean trust for these agencies is significantly higher than most of the political representatives, or market alternatives. In the US, the IPCC and NOAA are more trustworthy than the President or state Governor, and more trustworthy than either the market alternatives of corporate actors or insurers as an information source.⁸⁷ However, US respondents are not statistically significantly less trusting of their local elected leaders relative to these independent agencies.⁸⁸ In Canada, the pattern is similar, but more pronounced. The IPCC and Natural Resources Canada (NRC) are statistically more trustworthy than all elected officials for our respondents on average.⁸⁹ It is the same story when contrasting these independent agencies with the market alternatives for Canadian respondents.⁹⁰ Relative to our US respondents, the Canadians are more trusting of the independent agencies. Canadians are more trusting of their provincial premiers than US respondents are of their state governors, but Canadians trust their local mayor less than our US respondents. US respondents are more trusting of insurers in our sample than Canadians, but both have a similar level of trust in corporate coalitions.

Our results do show statistically significant differences in the trust respondents have in a range of institutional actors communicating about climate risks. However, to assess how this might impact the political divide on climate risk, we need to break results down by political orientation. Results for Canada are shown in Figure 3 and for the US in Figure 4.

⁸⁷ The respective P-values for equivalence of means tests for the IPCC vs. these alternatives are: P>.02; P>.02; P>.09; P>.00. The values for the NOAA are: P>.01; P>.01; P>.04; P>.00.

⁸⁸ Respective P-values for equivalence of means tests are: P>.37 (IPCC); P>.21 (NOAA).

⁸⁹ The P-values for equivalence of means tests for all elected officials vs. both the IPCC and NRC are all P>.00.

⁹⁰ The P-values for equivalence of means tests for all elected officials vs. both the IPCC and NRC are all P>.0000.

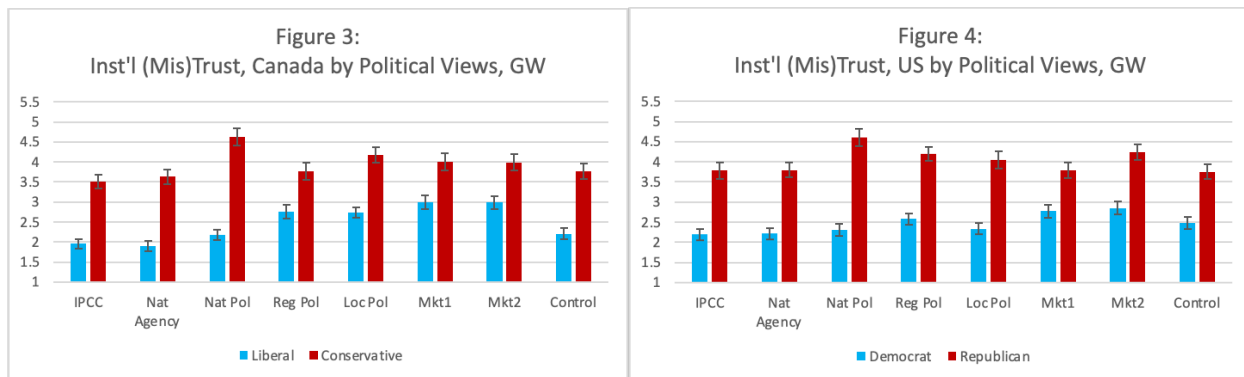


Figure 3,4 Notes: Means for individual trust responses for those with liberal vs. conservative, Democrat vs. Republican views. Institutional trust measured on 7-point qualitative scale, 1=extremely trustworthy, 7=extremely untrustworthy, so higher means reflect greater mistrust. Standard errors for estimates of means indicated by error bars.

The highly significant difference between those with conservative vs. liberal political views for Canada across every institutional source is obvious. The relative trust gap closes somewhat in our market conditions – but mostly due to the increased *mistrust* of liberals, rather than any significant increase in trust for conservatives. Particularly striking is the enormous difference between the relative trust by liberals and conservatives in the Prime Minister as a source of this climate risk information. Our political conservatives trust their Premiers more than the Prime Minister, while liberals reverse this pattern.

We also see the well-documented political divide in our US respondents in Figure 4. As in Canada, the highly statistically significant difference in institutional trust between Democrats and Republicans is obvious. There are other similarities. The independent agencies are the most trusted of our alternative institutional sources. The mean for Democrats' trust in these agencies is statistically greater than for state governors, or either of our market conditions.⁹¹ However, in contrast with Canada, US Democrats show indistinguishable levels of trust between these agencies and the President, or their local mayor. While Republicans also show the greatest level of trust in the independent agencies, the difference is only significant in comparison with the President.⁹²

Within the federal structure, US patterns of trust are somewhat similar to those in Canada. Democrats have slightly higher mean average trust in the President compared with state governors or local mayors, but the difference is not statistically significant. Republicans show the highest mean level of *distrust* in the President, with mean trust increasing as political leaders become more local. However, only the difference between the President and local mayor is statistically significant.⁹³

⁹¹ F-test, two-tailed equivalence of means, IPCC: $P < 0.0654$ (vs. State Governor); $P < 0.0106$ (vs. Mkt 1); $P < 0.0025$ (vs. Mkt 2). F-test, two-tailed equivalence of means, NOAA: $P < 0.0775$ (vs. State Governor); $P < 0.0121$ (vs. Mkt 1); $P < 0.0027$ (vs. Mkt 2).

⁹² F-test, two-tailed equivalence of means: IPCC: $P < 0.0063$ (vs. President); NOAA: $P < 0.0048$ (vs. President). One-tailed tests for the null of higher trust in the agencies would also be marginally significant against the institutional alternatives of the State Governor and Insurers for both the IPCC and NOAA.

⁹³ F-test, two-tailed equivalence of means, President: $P > .0677$ (vs. Local Mayor). A one-tailed test of the null of greater trust in the State Governor vs. President would also be marginally significant.

As in Canada, the trust gap is narrowest in our market conditions, but again this is substantially contributed to by higher mistrust of these information sources among Democrats. We generally do not see improved trust among Republicans for our market conditions, although there is some evidence that the corporate coalition can improve trust relative to the least-trusted political actors.⁹⁴

We complement our analysis of means across experimental conditions with regression analysis of individual trust decisions across the sample. In addition to dummies for our experimental conditions, we also include a variety of controls: age; gender; minority status / ethnicity; rural residence; education; employment status; family income; liberal / conservative political views; religiosity; preference for alternative media for information and the world values trust indicator as a measure of pro-sociality.⁹⁵

In Canada, we find that *all* institutional source conditions reduce trust relative to the IPCC (our omitted category). Females, high income earners, those who indicate that religion is either “very” or “somewhat” important, and those who are prosocial on the World Values trust question all exhibit higher levels of trust relative to the omitted categories for these characteristics. The largest positive effect on trust comes from holding liberal political views, which is highly significant. In contrast, age, rural residence, and the use of alternative media information sources all lead to individuals having lower levels of trust in institutions. Again, the largest negative effect on institutional trust is associated with having conservative political views – although the negative impact of alternative media reliance is almost as large. Both are highly significant.

In the US, relative to the IPCC, the Presidential and state governor source conditions statistically significantly reduce institutional trust, as do both our market conditions. Age, high income, religiosity, and consumption of alternative media are also correlated with lower levels of trust in institutions for our US respondents. Again, the largest contributor to mistrust in institutions is our conservative political views dummy, indicating Republican identification. All these variables are highly significant. Individual characteristics associated with higher levels of institutional trust include being prosocial on the World Values Trust measure and holding liberal views, measured as identifying as a Democrat. Again, these are highly statistically significant.

COVID-19 Vaccine & Institutional Trust

Patterns in general institutional trust for our COVID-19 vaccine vignette are shown in Figure 5, for both Canada and the US.

As with our global warming vignette, the independent agencies have an edge in overall trust relative to other institutional alternatives, but it is much more muted. In Canada, the WHO enjoys statistically greater trust on average than all political leaders, and the market alternative of insurers. However, there is no statistically significant difference between trust in the WHO and the

⁹⁴ There is a significant difference in Republican trust between the President (their least trusted institutional source) and the market alternative of a corporate coalition: $P < 0.0052$. A one tailed test of higher trust in the corporate coalition vs. State Governors would also be marginally significant. However, there is no significant difference in mean Republican trust with the second market alternative of a group of insurers.

⁹⁵ Add details of how each of these variables is measured for inclusion in regressions.

market alternative of the corporate coalition.⁹⁶ Canadians trust their national health agency, the PHAC more than their Provincial Premiers or the market alternative of the insurers, but otherwise the PHAC is indistinguishable from other institutions. In the US, the WHO enjoys the greatest average trust of all institutions, but it is statistically distinguishable only from the President and state Governors.⁹⁷ The CDC does not enjoy a level of trust statistically distinguishable from any of the other institutions. Within their federal schemes, on average neither Canadians nor US respondents trust one level of political actor above another on COVID-19 Vaccine risks. In comparison with their political leaders, the only significant difference for our market alternatives, is the lower trust Canadians show in their provincial Premiers than the corporate coalition.⁹⁸ Canadians remain more trusting than US respondents of the independent agencies, and their national political leader. Otherwise, average levels of trust are indistinguishable. Overall, patterns are very similar between Canadian and US respondents.

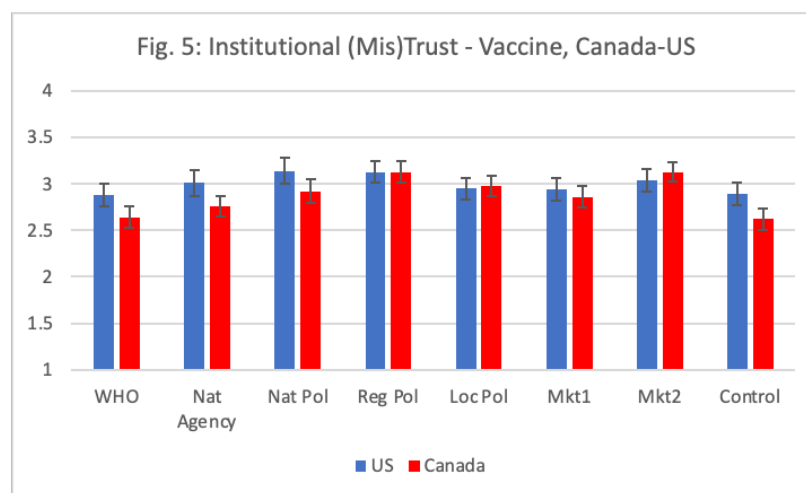


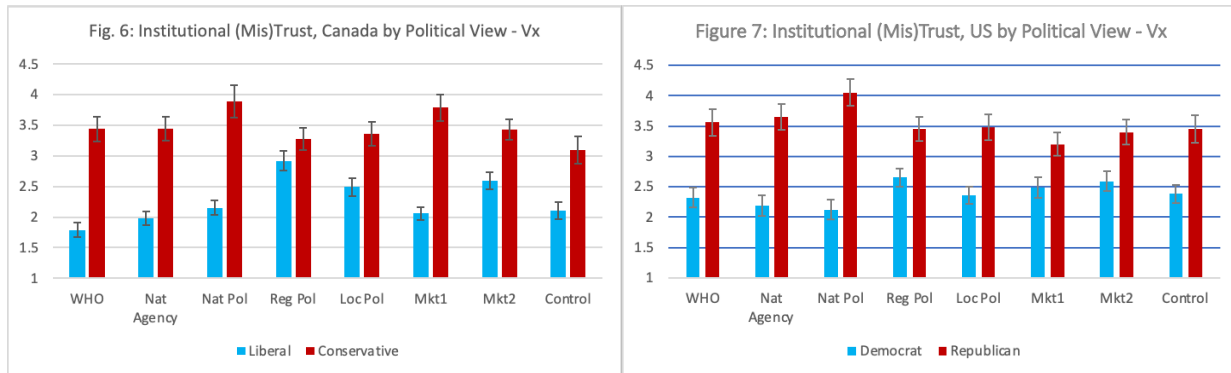
Figure 5 Notes: Means for measures of trust on a 7-point qualitative scale, where 1=extremely trustworthy, 7=extremely untrustworthy; higher means indicate greater mistrust in the institution. Standard errors for means are shown by error bars.

When we break down responses by political orientation, a somewhat different picture emerges. Figures 5 and 6 present mean trust by institutional condition for conservative and liberal respondents in Canada and the US respectively. As in our climate change vignette, the polarization of trust between liberal and conservative respondents is obvious in both Canada and the US. However, some interesting similarities and differences emerge on the relative political divide between the two countries.

⁹⁶ F-test, two-tailed equivalence of means, WHO: $P < 0.01913$ (vs. Mkt 1). One-tailed tests for greater confidence in WHO relative to political actors and the Mkt 2 alternative are all significant at 5% or less.

⁹⁷ Significant at 5% in one-tailed tests of the null that the mean for WHO is less than that for other institutions. Recall that with the coding for this vignette, lower means are associated with greater trust.

⁹⁸ Significant at 5% for a one-tailed test of null that market trust is greater than trust in Provincial Premier.



Figures 6,7 Notes: Means for individual trust responses for those with liberal vs. conservative, Democrat vs. Republican views. Institutional trust measured on 7-point qualitative scale, 1=extremely trustworthy, 7=extremely untrustworthy, so higher means reflect greater mistrust. Standard errors for estimates of means indicated by error bars.

In Canada, liberals trust the WHO more than any other institution, while among liberals the PHAC enjoys greater trust than regional or local political leaders, or a market coalition of insurers. Actually, it is these same regional and local political leaders, and the market coalition of insurers that cause Canadian liberals to lose trust relative to all other institutions. As in the global warming vignette, a stark trust gap emerges for the Prime Minister between liberal and conservative respondents. He is Canadian Conservatives' least trusted source, although statistically so only as compared to regional and local political leaders.⁹⁹ These opposing movements in trust mean that the average trust gap between liberals and conservatives is lowest for regional and local political leaders as sources of COVID-19 risk information. Somewhat surprisingly, use of the market alternative of the coalition of firms leaves liberal trust relatively unharmed, but *increases* distrust among conservative Canadian respondents, resulting in a large trust gap. The market alternative of insurers does help close the trust gap in Canadian respondents, but as with our global warming scenario, mostly by undermining liberal trust.¹⁰⁰

The story in the US is somewhat similar. Although the independent agencies enjoy relatively high trust among Democrats, they trust the President most, although significantly so only relative to the state Governors and the market alternatives.¹⁰¹ The high trust of Democrats in the President contrasts with the views of Republican respondents, who have lowest trust in the President.¹⁰² The President thus generates the largest trust gap between Democrats and Republicans as a source of COVID-19 vaccine information. In contrast with Canada, in the US the use of both market alternatives is associated with higher trust among US Republicans, although

⁹⁹ F-test, two-tailed equivalence of means for conservative respondents, Prime Minister: $P < 0.0549$ (vs. Premiers); $P < 0.1006$ (vs. Mayors). There is a marginally significant difference for a one-tailed null of lower trust in the Prime Minister relative to both independent agencies, as well as the market alternative of the insurers.

¹⁰⁰ Among conservatives, there is no significant difference between average trust in the insurers vs. all other institutions, except for the marginally lower trust in the Prime Minister and the Mkt 1 conditions. For liberals, the insurers produce significantly lower average trust relative to the agencies, the Prime Minister, and the Mkt 1 condition.

¹⁰¹ F-test, two-tailed equivalence of means for Democrats, President: $P < 0.0178$ (vs. Governors); $P < 0.0450$ (vs. Mkt 2). There is a marginally significant difference for a one-tailed null of greater trust in the President vs. Mkt 1.

¹⁰² The difference is marginally significant in a one-tailed test of the null that Republicans trust the President less than the independent agencies, and significantly less in two-tailed equivalence of means tests: $P < 0.0444$ (President v. Governor); $P < 0.0595$ (President vs. Mayor); $P < 0.0035$ (Mkt 1); $P < 0.0303$ (Mkt 2).

significantly so only relative to the President.¹⁰³ The trust gap between Democrats and Republicans closes most with the use of the firm coalition, in large part because it improves Republican trust. However, there is still some contribution from lower Democrat trust.

We again complement our analysis of means across experimental conditions with regression analysis of individual trust decisions across the sample, using the same series of controls.

In Canada, all experimental conditions reduce trust relative to our omitted category for the WHO, with significant negative effects for all our political leaders, and the market insurance provider alternative.¹⁰⁴ Other characteristics significantly associated with lower trust by individuals include rural residence, holding conservative views, and use of alternative media for information gathering.¹⁰⁵ Higher trust is significantly associated with high income, holding liberal views, and pro-sociality.¹⁰⁶

Among our US respondents, we also see that estimated coefficients on all our experimental conditions reduce trust relative to the WHO, but only significantly for the President.¹⁰⁷ Characteristics associated with lower trust include rural residence, conservative views, and reliance on alternative media.¹⁰⁸ Higher trust was associated with increased age, high income, holding liberal views and pro-sociality.¹⁰⁹

Institutional Trust & Plastic Pollution

We return to the context of an environmental risk with our plastic pollution vignette, but this time one for which our respondents hold less polarized initial views. How does this affect institutional trust in our experiments? Figure 8 illustrates mean trust across our institutional conditions for the full sample of respondents, in both Canada and the US.

The general pattern is similar to the climate context. The independent agencies on average enjoy the highest trust in both Canada and the US.¹¹⁰ As in our vaccine vignette, Canadians are

¹⁰³ There is also a marginally significant difference for a one-tailed test of the null that Mkt 1 mean trust is higher than that of the CDC.

¹⁰⁴ Respective P-values for two-tailed t-test: P<0.012 (Prime Minister); P<0.002 (Premiers); P<0.027 (Mayors); P<0.001 (Mkt2).

¹⁰⁵ Respective P-values for two-tailed t-test: P<0.047 (Rural); P<0.000 (Cons view); P<0.000 (Alt Info Source).

¹⁰⁶ Respective P-values for two-tailed t-test: P<0.076 (High Y); P<0.000 (Lib view); P<0.000 (Prosocial WV Trust).

¹⁰⁷ The P-value for two-tailed t-test is: P< 0.022 (President).

¹⁰⁸ Respective P-values for two-tailed t-test: P<0.032 (Rural); P<0.006 (Cons view); P<0.000 (Alt Info Source). Identifying as female also was marginally significant in reducing trust in our COVID-19 vaccine sources: P<0.10 (Female).

¹⁰⁹ Respective P-values for two-tailed t-test: P<0.075 (Age); P<0.096 (High Y); P<0.000 (Lib Views); P<0.000 (Pro-social WV Trust).

¹¹⁰ F-test, two-tailed equivalence of means for UNEP US Respondents: P<0.0023 (President); P<0.0623 (Mayors); P<0.0504 (Mkt 1); P<0.0015 (Mkt 2). When contrasting NOAA, significance levels exceed all those above, and NOAA is also more trusted than the IPCC (P<0.0814) and State Governors (P<0.0001). Among Canadian Respondents, F-test, two-tailed equivalence of means for UNEP: P<0.0006 (Prime Minister); P<0.0000 (Premiers), P<0.0008 (Mayors); P<0.0006 (Mkt 1); P<0.0001 (Mkt 2). Trust in ENRC, the Canadian national agency, is higher on average than all alternatives, except UNEP, at significance levels above those for UNEP.

relatively more trusting of the international agency than their US counterparts, but both show indistinguishable, high levels of trust in their national agency. Among political leaders, US respondents have least trust in the President, and greater trust in state Governors.¹¹¹ Use of the market alternatives reduces average trust for our US respondents compared with more trusted political actors, but this is only marginally significant for the market alternative of the insurers.¹¹² There is no statistically significant difference between the average trust of Canadian respondents among any of the political or market conditions. Canadians trust their national political leader slightly more than their US counterparts and trust regional political leaders less. However, the level of trust among Canadian and US respondents within each institutional condition is generally very similar.

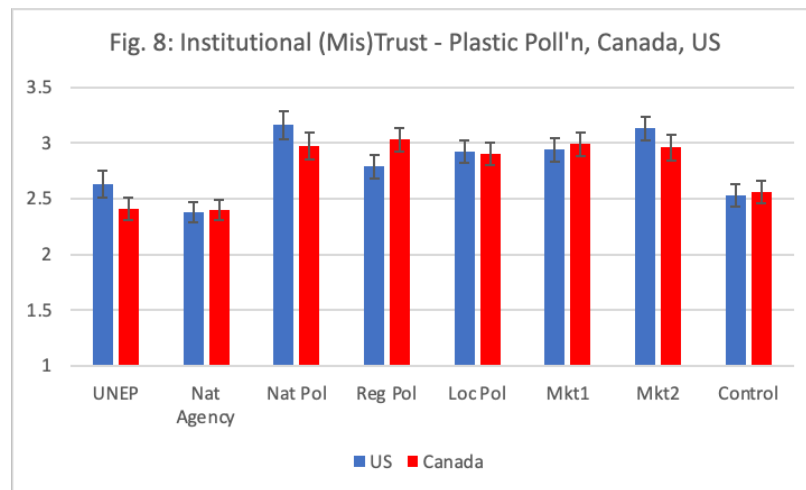
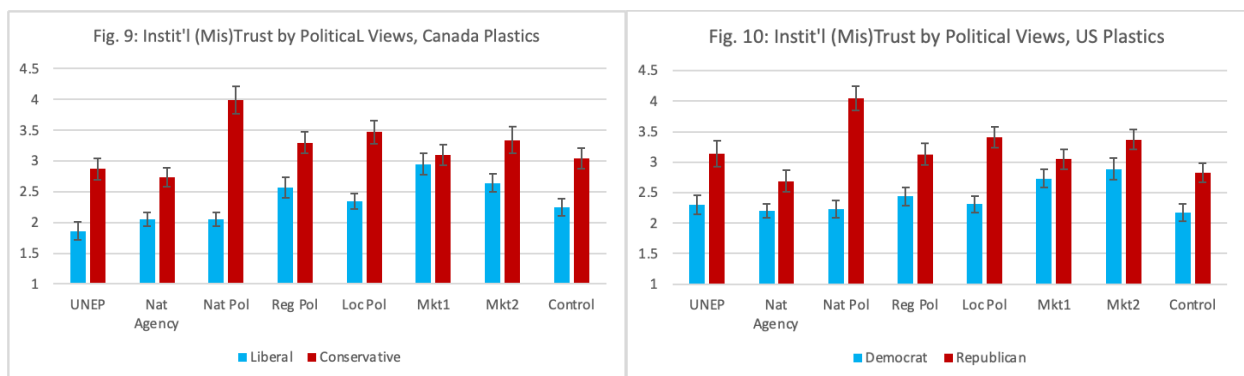


Figure 8 Notes: Means for measures of trust on a 7-point qualitative scale, where 1=extremely trustworthy, 7=extremely untrustworthy; higher means indicate greater mistrust in the institution. Standard errors for means are shown by error bars.

In Figures 9 and 10 we break down trust among our conservative and liberal respondents to assess comparative trust across institutional conditions, in Canada and the US.



¹¹¹ F-test, two-tailed equivalence of means for President: $P < 0.0264$ (vs. Governor). There is a marginally significant difference for a one-tailed null of lower trust in the President relative to the Mayor.

¹¹² F-test, two-tailed equivalence of means for Mkt 2 (Insurers): $P < 0.0229$ (vs. Governors).

Figures 9,10 Notes: Means for individual trust responses for those with liberal vs. conservative, Democrat vs. Republican views. Institutional trust measured on 7-point qualitative scale, 1=extremely trustworthy, 7=extremely untrustworthy, so higher means reflect greater mistrust. Standard errors for estimates of means indicated by error bars.

Patterns similar to the climate context appear again. The general polarization of trust between political liberals and conservatives is obvious for most institutional conditions. However, the trust gap closes in the market conditions, becoming insignificant in Canada for the corporate coalition. The independent agencies enjoy relatively high levels of trust among all respondents compared with other institutions. Among US Republicans, the US agency, NOAA, is more trusted than all alternatives except the market option of the coalition of firms.¹¹³ Conservative respondents in Canada also trust their national agency, ENRC, more than all but the corporate market alternative.¹¹⁴ While Canadian liberals and US Democrats also place high trust in the independent agencies, they are not statistically more trustworthy than the Prime Minister or President respectively. In fact, statistically the only institutional sources that US democrats relatively distrust are the market alternatives. They have an indistinguishable level of trust in all levels of political leaders in relation to our plastic pollution risk information. Canadian liberals are relatively more trusting of the Prime Minister relative to the Premier or Mayor.¹¹⁵ However, Canadian liberals also generally distrust the market alternatives relative to political actors.¹¹⁶ As in the climate context, use of the market alternatives does close the trust gap – which is largest for the national leader – but this occurs mainly through increased liberal distrust.

When we use individual level regression to look across all respondents, in Canada all institutional conditions reduce trust compared with the UNEP, except for the national agency, ENRC. Holding conservative views and use of alternative information sources also significantly reduce individual trust for Canadians.¹¹⁷ Higher trust is associated with being female, having high income, holding liberal views, religiosity, and pro-sociality.¹¹⁸

Among our US respondents, individual trust is enhanced in the NOAA condition, but falls statistically significantly relative to UNEP for the President, Mayor, and both market conditions.¹¹⁹ Holding conservative views and use of alternative information sources also significantly reduce

¹¹³ F-test, two-tailed equivalence of means for NOAA US Republicans: $P < 0.0000$ (President); $P < 0.0834$ (Governors); $P < 0.0040$ (Mayors); $P < 0.1449$ (Mkt 1); $P < 0.0061$ (Mkt 2). Mean trust in the international agency, UNEP, is slightly lower for US Republican respondents. It is significantly more trustworthy only relative to the President ($P < 0.0018$).

¹¹⁴ F-test, two-tailed equivalence of means for ENRC, Canadian conservatives: $P < 0.0000$ (Prime Minister); $P < 0.0147$ (Premier); $P < 0.0026$ (Mayor); $P < 0.1103$ (Mkt 1); $P < 0.0219$ (Mkt 2). Mean trust in the international agency, UNEP, is slightly lower for Canadian conservatives, but it is also significantly more trusted relative to the Prime Minister ($P < 0.0001$), the Premier ($P < 0.0839$), the Mayor ($P < 0.0213$), and the Mkt 2 Insurers ($P < 0.0937$).

¹¹⁵ F-test, two-tailed equivalence of means for Prime Minister, Canadian liberals: $P < 0.0102$ (Premier); $P < 0.0798$ (Mayor).

¹¹⁶ F-test, two-tailed equivalence of means for Mkt 1, Canadian liberals: $P < 0.000$ (Prime Minister); $P < 0.0056$ (Mayor); the corporate coalition is marginally less trusted than the Premier in a one-tailed test of the null. F-test, two-tailed equivalence of means for Mkt 2, Canadian liberals: $P < 0.019$ (Prime Minister); The insurers are marginally less trusted than the Mayor in a one-tail test of the null.

¹¹⁷ Respective P-values for two-tailed t-test, Canadians: $P < 0.000$ (Cons view); $P < 0.000$ (Alt Info Source).

¹¹⁸ Respective P-values for two-tailed t-test, Canadians: $P < 0.001$ (Female); $P < 0.091$ (High Y); $P < 0.000$ (Lib Views); $P < 0.042$ (Relig); $P < 0.000$ (WV Trust).

¹¹⁹ Respective P-values for two-tailed t-test, US: $P < 0.032$ (NOAA); $P < 0.002$ (President); $P < 0.095$ (Mayor); $P < 0.036$ (Mkt1); $P < 0.003$ (Mkt 2).

trust in our US sample.¹²⁰ Increased trust is associated with holding liberal views, religiosity, and pro-sociality.¹²¹

Institutional Trust & Food Pesticide Risk

Our final vignette returns to a health-related risk, considering whether approved pesticides pose a risk in food consumption, relative to organic food alternatives. This risk context is one that is not highly polarized, so again we consider how this affects patterns of institutional trust among respondents. Means for all respondents across our institutional conditions are shown in Figure 11 for both Canada and the US.

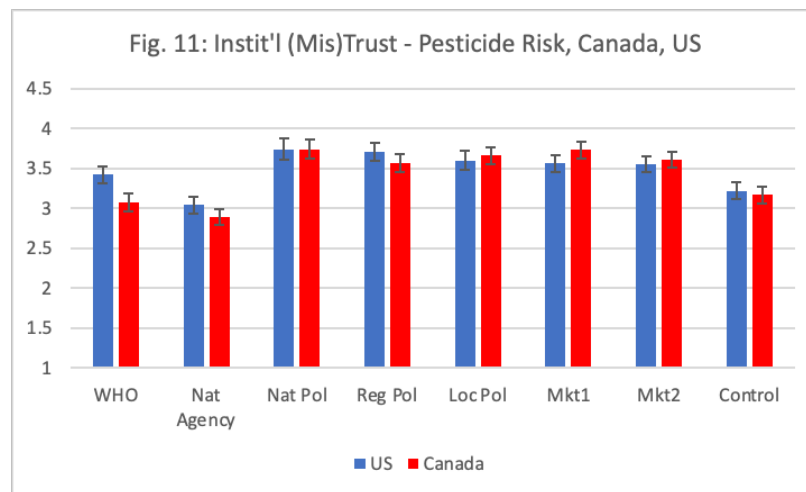


Figure 11 Notes: Means for measures of trust on a 7-point qualitative scale, where 1=extremely trustworthy, 7=extremely untrustworthy; higher means indicate greater mistrust in the institution. Standard errors for means are shown by error bars.

Again, the independent agencies enjoy the highest relative trust. US respondents trust their national agency, the FDA, more than all other institutions, including the WHO.¹²² Canadians also trust *their* national agency, Health Canada (HC) more than any other institution, although not statistically significantly relative to the WHO.¹²³ There is no statistically significant difference in trust among political actors at different levels for either Canadian or US respondents. There is *also* no statistically significant difference in trust when comparing the political actors to market alternatives as sources for our pesticide risk information, for either Canadian or US respondents. While Canadians are more trusting of the WHO than US respondents, otherwise levels of trust across our conditions are very similar. At this general level, the data suggest that beyond the advantage enjoyed by the independent agencies, there is relatively little impact on trust from using different institutional messengers.

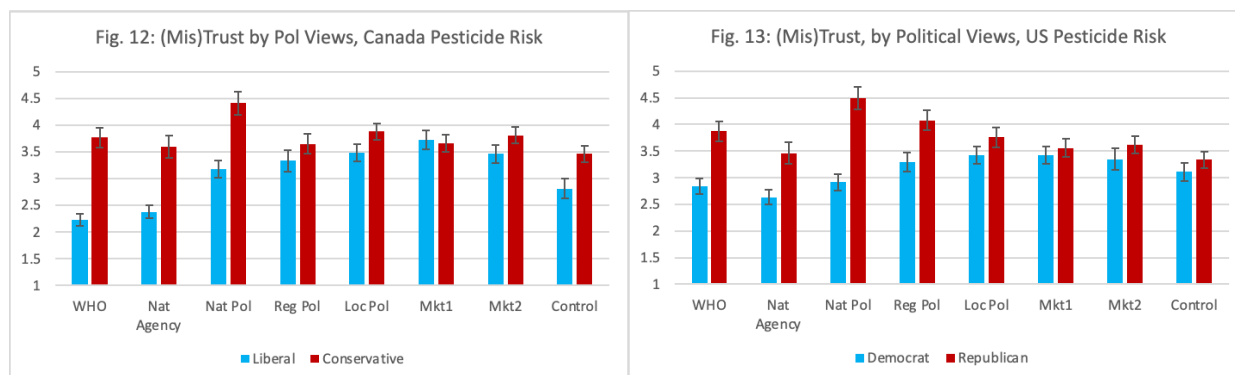
¹²⁰ Respective P-values for two-tailed t-test, US: P<0.000 (Cons view); P<0.000 (Alt Info Source).

¹²¹ Respective P-values for two-tailed t-test, US: P<0.000 (Lib Views); P<0.006 (Relig); P<0.020 (WV Trust).

¹²² F-test, two-tailed equivalence of means for FDA US: P<0.0136 (WHO); P<0.0000 (President); P<0.0000 (Governor); P<0.0004 (Mayor); P<0.0005 (Mkt 1); P<0.0012 (Mkt 2).

¹²³ F-test, two-tailed equivalence of means for HC Canada: P<0.2197 (WHO); P<0.0000 (Prime Minister); P<0.0000 (Premier); P<0.0000 (Mayor); P<0.0000 (Mkt 1); P<0.0000 (Mkt 2).

However, confirming that intuition requires looking to results by political orientation. Figures 12 and 13 provide these data for Canada and the US, respectively.



Figures 12,13 Notes: Means for individual trust responses for those with liberal vs. conservative, Democrat vs. Republican views. Institutional trust measured on 7-point qualitative scale, 1=extremely trustworthy, 7=extremely untrustworthy, so higher means reflect greater mistrust. Standard errors for estimates of means indicated by error bars.

Although there is still obvious polarization in institutional trust in our pesticide vignette, the trust gap is largest relative to the independent agencies and the national political leader. Among both US and Canadian political conservatives, the national political leader remains the least trusted institution.¹²⁴ For Canadian conservatives, there is no statistical difference in trust among the other institutional alternatives. They are as trusting of the WHO as their Premier or a market alternative when it comes to pesticide risk information. US conservatives are also somewhat less trusting of the Governor relative to other institutions. For US conservatives, trust improves as we move from national to local within the federal structure. They trust the Mayor more than the Governor, and also trust the FDA and the market alternatives more.¹²⁵ However, among this “more trusted” group of institutions, there are no statistically significant differences. In contrast, for those with liberal views, their trust in political leaders declines with the move from national to local actors, although not always statistically significantly.¹²⁶ The result is a relatively narrow trust gap between conservatives and liberals in both our samples at the level of local political actors. The similarly low levels of trust by liberals in Canada and the US in the market alternatives also leads to closing of the trust gap in these institutional conditions.

While the aggregate results suggested relatively little difference among institutions, we see that the use of the national leader appears most polarizing. And although the independent agencies have an advantage in mean trust, they are also more polarizing than other institutional alternatives.

When we use regression to examine individual trust for respondents, for Canada none of our institutional conditions are significant compared with the omitted WHO. Trust is reduced as

¹²⁴ US F-test results all significant at 1% or better comparing mean presidential trust with means for other institutions. Canada F-test results all significant at 5% or better comparing mean prime ministerial trust with means for other institutions.

¹²⁵ US F-test results all significant at 5% or better comparing mean trust in Governor with means for alternative institutions above.

¹²⁶ The intermediate step from national to regional is not significant, but the comparison between national and local is at least marginally significant in a one-tailed test in both samples.

individuals' education level increases beyond the omitted category of high school.¹²⁷ It is also reduced with conservative political views and use of alternative information sources.¹²⁸ Trust is increased with liberal views, religiosity, and pro-sociality.¹²⁹

Among US respondents, there is more significant impact of our institutional conditions. Relative to the omitted WHO, the national agency (FDA) improves trust, while the President and Governor reduce trust.¹³⁰ Identifying as female, holding conservative views, and relying on alternative information sources reduce trust. In contrast, holding liberal views, religiosity, and pro-sociality improve trust.

Institutional Trust: Conclusions

Our data indicate that political views do drive trust in institutions for individuals in our survey, in a way that is similar across Canada and the US. Institutional sources do matter. In general, we find that the independent agencies perform well across our risk contexts relative to the other institutional options for communicating risk. Even among conservatives in our samples, the agencies are often at least as well-trusted as other alternatives. Conservatives do not trust the agencies as much on average as liberal respondents, in either Canada or the US. This leads to a trust gap and polarizing effect, notwithstanding conservatives relatively high trust in the agencies. This effect is stronger in our more highly polarized risk contexts of global warming and COVID-19 vaccines.

Among political leaders, the national leader tends to be the most polarizing. In both Canada and the US, the national leader is frequently one of the most trusted sources for liberal respondents and least trusted for conservatives. Conservative respondents are often also more trusting of regional leaders and liberals less trusting. What we do not see is any consistent pattern across political orientation that reflects theories of federalism. There is an absence of evidence consistent with subsidiarity *generally* favouring local government or local capture theory that would suggest enhanced trust in a national government. Instead, results for the national political leader hint at a different driver – alignment between the political orientation of elected leaders and respondents.¹³¹ This would be a result consistent with motivated cognition theory, but one troubling for more conventional legal theories of federalism that see cohesive communities able to form at these different levels of government.

The use of market alternatives to convey risk information is often less polarizing; conservative and liberal respondents often have similar levels of trust in these sources. In some cases, enhancement of conservative respondents' trust contributes, particularly among US respondents. The COVID-19 vaccine scenario provides an example.¹³² More commonly, closing the trust gap in our market conditions is driven by relatively high liberal distrust of markets

¹²⁷ $P < 0.037$.

¹²⁸ $P < 0.000$ for both.

¹²⁹ $P < 0.000$, $P < .001$; $P < 0.000$ respectively.

¹³⁰ $P < 0.052$, $P < 0.038$, $P < 0.045$ respectively.

¹³¹ In both Canada and the US, the elected national leaders at the time the survey was administered (Justin Trudeau, Joe Biden) fall on the liberal side of the political spectrum.

¹³² But note that in Canada this pattern reverses for Mkt 1 – liberals are more trusting of the firm coalition on vaccines, while conservatives lose trust.

compared with other institutional actors. The political conservatives in our sample perhaps do not see these market actors as especially aligned with their interests and values, while liberals generally may see them as counter aligned. This is also potentially consistent with motivated cognition theories, but in a different way than has been suggested in the literature.

Some individual characteristics other than political orientation emerge as consistent potential drivers for institutional trust across our conditions. Prosocial individuals are more trusting in general, but perhaps concerning those who consume their information from alternative media sources are significantly less likely to exhibit institutional trust in both Canada and the US. In some contexts, rural residence plays a role in reducing trust (GW, Vx). Some characteristics seem to operate differently across the two countries. In Canada, high income and religiosity are linked to higher institutional trust, while in the US these same characteristics sometimes correspond with *lower* institutional trust (GW) and at other times religiosity and higher trust are correlated (Pl, Pe).

Overall, political orientation and some personal characteristics play a significant role in the level of trust individuals show in our institutions. This does support the theory that use of alternate institutions to convey climate risk information can impact perceptions of that risk across the political divide. We turn next to our survey results on perceived accuracy across our institutional conditions to explore this effect.

iii) Perceived Accuracy of Risk Communication

Results in the prior section show that use of alternate institutions to convey risk information leads to systematic variation in trust across the political divide, in both Canada and the US. Here we consider how variation in our institutional sources drives perceptions of the accuracy of risk information. As before, we first consider means across institutional conditions for the full sample of respondents, comparing Canada and the US. We then break down means by condition by political orientation. We look across all vignettes to see how the relative initial polarization of risk perceptions may influence our accuracy results.

Perceived Accuracy: Global Warming Risks

The means for perceived accuracy of the information by institution in our global warming vignette are shown in Fig. 14, for all respondents in both Canada US. There is a significant difference in the perceived accuracy of the global warming information between Canadian and US respondents for our independent agency and national and regional political actors. Canadians on average view the information as more accurate than their US counterparts in these institutional conditions. However, when the same information comes from the Mayor, or market institutions, it is perceived as similarly accurate by Canadian and US respondents.

Among Canadian respondents, on average the IPCC information is considered most accurate. It is significantly above mean accuracy for the Prime Minister, Mayor, and Mkt 2 alternatives.¹³³ However, the national agency, ENRC, is only perceived as more accurate than the

¹³³ F-test, two-tailed, $P < 0.0801$; $P < 0.0033$; $P < 0.0637$. The IPCC is also marginally significantly above mean accuracy for Mkt 1 in a one-tailed test.

Mayor.¹³⁴ In Canada, the Mayor produces lowest mean perceived accuracy. The use of market alternatives to deliver information does not produce any statistically significant change in perceived accuracy, except to lower it relative to the most accurate source, the IPCC. These results reflect the earlier trust results for Canada, in that the most trusted institution (IPCC) generates the highest perceived accuracy, while the least trusted political actor (Mayor) is also perceived as most inaccurate. The match is not perfect, since, for example, higher trust in the national agency is not reflected in higher perceived accuracy.

Among US respondents, the IPCC is also perceived as most accurate on average, but statistically so only relative to the state Governor.¹³⁵ For our US respondents, the State Governor is perceived as having the lowest mean accuracy relative to other institutions. It is statistically lower than the means for not just the IPCC, but also the Mayor and the Mkt 1 alternative.¹³⁶ Using market alternatives to deliver information on global warming generally has mixed effects on perceived accuracy in our US sample. The Mkt 1 corporate coalition is perceived as more accurate than the President, and state Governor, but use of the Mkt 2 insurers has no statistically significant effect on mean accuracy relative to any of our other conditions. While we do see some reflection of patterns of institutional trust, with the higher trust in the IPCC reflected in greater perceived accuracy, the match is somewhat weak. For example, greater relative trust in NOAA is not reflected in higher perceived accuracy relative to the other institutions.

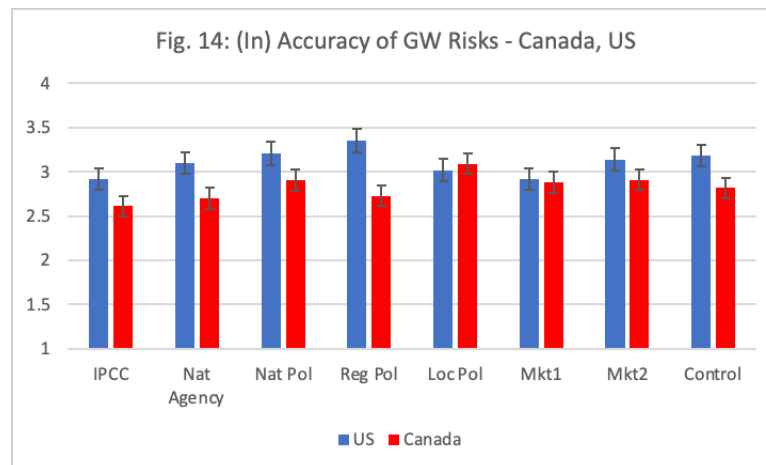


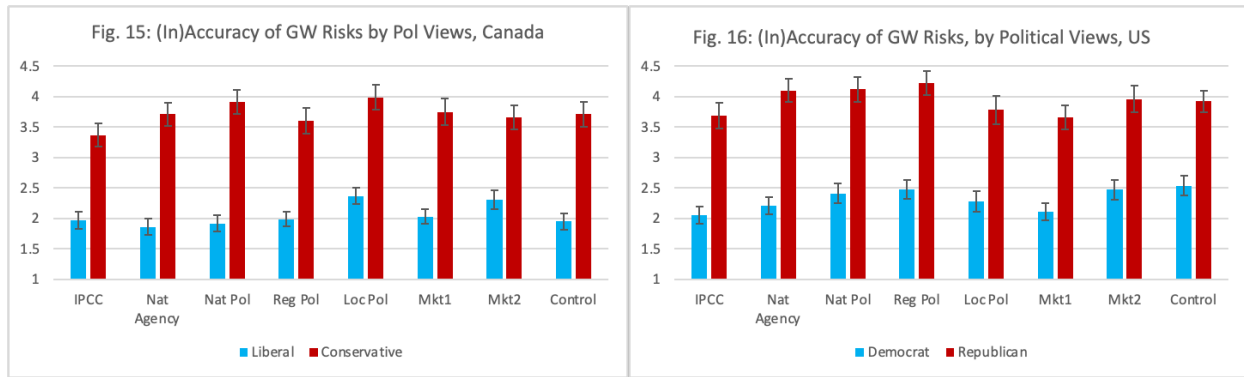
Figure 14 Notes: Means for measures of accuracy on a 7-point qualitative scale, where 1=“completely confident” information is correct, 7=“do not believe information”; higher means indicate less confidence in accuracy of information. Standard errors for means are shown by error bars.

We again are most interested in how our institutions might affect perceived accuracy of risk information across the political spectrum. Do differences in trust translate into an accuracy gap? Figures 15 and 16 break down our results by political orientation, institution, and country.

¹³⁴ F-test, two-tailed, $P < 0.0191$.

¹³⁵ F-test, two-tailed, $P < 0.0167$. The IPCC is significantly more accurate on average than the President in a one-tailed test.

¹³⁶ It is also lower than the NOAA in a one-tailed test.



Figures 15,16 Notes: Mean perceived accuracy of information responses for those with liberal vs. conservative, Democrat vs. Republican views. Means for measures of accuracy on a 7-point qualitative scale, where 1=“completely confident” information is correct, 7=“do not believe information”; higher means indicate less confidence in accuracy of information. Standard errors for estimates of means indicated by error bars.

Figures 15 and 16 reveal a strong and persistent accuracy gap between liberals and conservatives, one that is not really ameliorated by any of our institutional conditions. Although the level of accuracy varies somewhat across institutional conditions, the gap between liberal and conservative respondents remains substantial in terms of their belief in the accuracy of the risk information itself.

Among Canadian liberal respondents, mean accuracy of the information is highest in the ENRC condition, but this is only significantly so compared with the Mayor and the Mkt 2 insurers.¹³⁷ The IPCC and Prime Minister are perceived as similarly accurate by Canadian liberals. Canadian conservatives perceive the IPCC as providing the most accurate information, but significantly so only compared with the Prime Minister and Mayor.¹³⁸ Within the political leaders, mean perceived accuracy falls for Canadian liberals as one moves from national to local leaders, but the difference is significant only in comparison with the Mayor.¹³⁹ Canadian conservatives also perceive information as least accurate on average when it comes from the Mayor, followed closely by the Prime Minister. However, this is only significant when contrasted with mean accuracy for the IPCC. Otherwise, the institutional source makes no statistically significant difference to mean perceived accuracy of global warming information for Canadian conservatives.

Patterns in perceived accuracy among Canadian respondents are reflective of our trust results, albeit imperfectly. The conservative results mirror their higher relative trust in the IPCC. However, their distrust of the Prime Minister does not translate into more generally significant perceptions of inaccuracy. For Canadian liberals, perceptions of accuracy do reflect their higher trust in the independent agencies and the Prime Minister. However, their relative distrust of the market does not translate into generally lower perceived accuracy.¹⁴⁰

Among our US liberal respondents, the IPCC is perceived as having highest mean accuracy, which differs significantly from that for the President, Governor, and the Mkt 2

¹³⁷ F-test, two-tailed, $P < 0.0053$, $P < 0.0249$.

¹³⁸ F-test, two-tailed, $P < 0.0519$, $P < 0.0308$.

¹³⁹ F-test, two-tailed, Mayor: $P < 0.0125$ (Prime Minister), $P < 0.0286$ (vs. Premier).

¹⁴⁰ For example, among liberals, the IPCC is not significantly more accurate on average than the relatively distrusted Premiers, or market alternatives.

Insurers.¹⁴¹ However, there is no difference between perceived accuracy of the national NOAA and any of the other institutions for US liberals. For US conservatives, the IPCC is also perceived as being highly accurate, but only significantly relative to the State Governor.¹⁴² The NOAA does not enhance perceived accuracy among US conservatives.

Within our political leaders, there is no statistically significant difference in perceived accuracy for US liberals. For US conservatives, there is relatively weak support for higher perceived accuracy when comparing Mayors to state Governors.¹⁴³ Neither Conservative distrust of the President nor liberal distrust of the state Governor translates into significant differences in perceived accuracy among political leaders.

When we examine the impact of the market conditions on perceived accuracy in the US sample, we see the interesting result that *both* liberals and conservatives assess the Mkt 1 corporate coalition as highly accurate. For conservatives, mean accuracy is highest for the Mkt 1 corporate coalition, although statistically so relative only to the President and state Governor.¹⁴⁴ Perceived accuracy of the Mkt 1 condition is indistinguishable from that for the IPCC for US conservatives. US liberal respondents perceived mean accuracy of the Mkt 1 corporate coalition is also indistinguishable from the IPCC. The mean accuracy for liberal respondents for the Mkt 1 coalition is significantly higher than for the state Governor, Mkt 2 insurers, and marginally for the President.¹⁴⁵ On the conservative side, this mirrors our trust results – as US conservatives had relatively high trust in markets in our global warming vignette. However, for US liberals, it is somewhat of a departure. Their relatively higher distrust in the market coalition does *not* translate into relatively greater perception of inaccuracy.

[Also have regression results, perceived accuracy across individual respondents. However, running short of time to write up all results. Will add later in detail. US significant: President, Governor reduce accuracy (rel to IPCC); conservative views, religiosity, alt info source reduce accuracy; libview, pro-social improve accuracy. Canada significant: Prime Minister, Mayor, Insurers reduce accuracy (rel to IPCC); age, convview, alt info source reduce accuracy; female, libview, pro-social increase accuracy]

Perceived Accuracy: COVID-19 Vaccine Safety

National level mean perceived accuracy results for the full sample for our vaccine vignette are shown in Fig 17.

¹⁴¹ F-test, two-tailed, IPCC US liberals: $P < 0.0981$ (President), $P < 0.0497$ (Governor), $P < 0.0520$ (Mkt2).

¹⁴² F-test, two-tailed, IPCC US conservatives: $P < 0.0671$ (State Governor). The IPCC would also be more accurate on average than NOAA and the President, in a one-tailed test.

¹⁴³ Mayors enjoy marginally significantly higher perceived mean accuracy in a one-tailed test relative to State Governors among US conservatives.

¹⁴⁴ F-test, two-tailed, Mkt 1 conservatives US: $P < 0.0989$ (President), $P < 0.0467$ (Governor). It is also marginally more accurate than NOAA in a one-tailed test.

¹⁴⁵ F-test, two-tailed, Mkt 1 liberals US: $P < 0.0856$ (Governor), $P < 0.0463$ (Mkt 2). It is also marginally more accurate than the President in a one-tailed test.

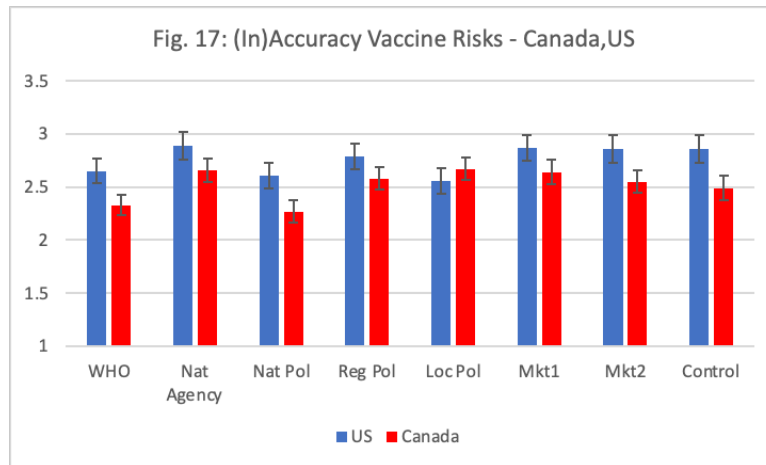
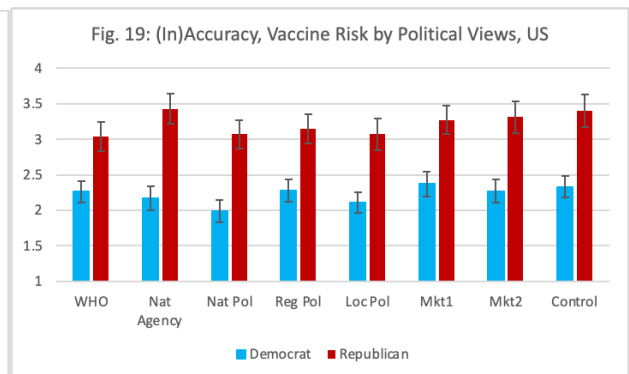
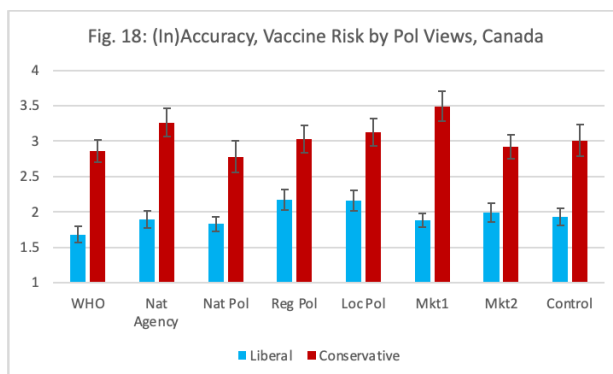


Figure 17 Notes: Means for measures of accuracy for vaccine risk information on a 7-point qualitative scale, where 1=“completely confident” information is correct, 7=“do not believe information”; higher means indicate less confidence in accuracy of information. Standard errors for means are shown by error bars.

Patterns in mean perceived accuracy across institutional conditions are similar in Canada and the US. On average, Canadian and US respondents have relatively high confidence in the accuracy of the WHO; however, they have least confidence in the accuracy of their national agency.¹⁴⁶ In both Canada and the US, respondents place highest confidence in the accuracy of information from the national political leader. They have relatively lower confidence in the accuracy of information from the market actors. However, there are few statistically significant differences between institutional sources in terms of mean accuracy. In general, Canadians perceive the COVID-19 vaccine information as more accurate than their US counterparts, except for when it comes from the local politician. However, in general the results are very similar across countries. The pattern for accuracy is somewhat consistent with our earlier trust results; the relatively higher trust in the WHO translates into more confidence in the accuracy of information. However, the general trust advantage that the WHO enjoyed relative to the national political leader does not translate into an institutional accuracy difference.

To see how use of different institutional conditions affects perceived accuracy across political orientation, we turn to results shown in Figures 18 and 19.



¹⁴⁶ In Canada, perceived accuracy for the PHAC on vaccines is narrowly behind only the MKT 1 coalition in mean (ln)accuracy.

Figures 18,19 Notes: Mean perceived accuracy of COVID-19 vaccine risk information for those with liberal vs. conservative, Democrat vs. Republican views. Means for measures of accuracy on a 7-point qualitative scale, where 1=“completely confident” information is correct, 7=“do not believe information”; higher means indicate less confidence in accuracy of information. Standard errors for estimates of means indicated by error bars.

As in our global warming vignette, breaking results down by political orientation reveals a substantial accuracy gap between perceptions of the risk information by political conservatives and liberals, in both countries. However, in our vaccine context, the size of the gap varies somewhat across our institutional sources for Canadians.

In Canada, liberals perceive information as most accurate when it is attributed to the WHO. It is statistically more accurate on average than information from the Premier, Mayor, and Mkt 2 Insurers for these liberal respondents.¹⁴⁷ However, it is not statistically distinguishable from information attributed to the national agency, PHAC, or from the Prime Minister for Canadian liberals. As one moves from national to local political sources of COVID-19 risk information, Canadian liberals on average view the information as statistically less accurate.¹⁴⁸ Introduction of the market alternatives has mixed results for perceptions of accuracy by Canadian liberals. Information from the Mkt 1 corporate coalition is indistinguishably accurate on average relative to the “most” accurate source - the WHO. However, the Mkt 2 insurers is perceived as less accurate than the WHO.¹⁴⁹

Canadian conservatives also perceive information as most accurate when it is attributed to the WHO. However, they are statistically more confident in its accuracy only compared with the Mkt 1 firm coalition, and marginally the PHAC.¹⁵⁰ When moving from national to local elected political leaders, there is no statistically significant difference in the mean accuracy Canadian conservatives ascribe to these sources. Use of the market alternatives produces mixed results for Canadian conservatives as well. Relative to the WHO, the Prime Minister and (marginally) the Premier, the Mkt 1 firm coalition *reduces* perceived accuracy of the information for conservatives. There is no significant difference between perceived accuracy for the Mkt 2 condition for conservatives and other institutions.

Overall, the results suggest it would be difficult to use an institutional strategy to close the COVID-19 vaccine accuracy gap across the political divide in Canada.

In general, the results are consistent with Canadian institutional trust in the vaccine context. High liberal trust in the WHO is mirrored by strong perceptions of accuracy by these respondents. Lower trust in regional and local leaders, and the Mkt 2 coalition is reflected in statistically lower mean perceptions of the accuracy of information for liberal respondents – at least relative to their most trusted / accurate institution. Conservatives lower trust in the PHAC and Mkt 1 condition are reflected in lower perceived accuracy for information from these sources.

¹⁴⁷ F-test, two-tailed, WHO Canada liberals: $P < 0.0071$ (Premier), $P < 0.0088$ (Mayor), $P < 0.075$ (Mkt 2).

¹⁴⁸ F-test, two-tailed, Prime Minister, Canada liberals: $P < 0.0490$ (Premier), $P < 0.0577$ (Mayor). There is no difference in perceived accuracy of Premiers vs. Mayors.

¹⁴⁹ $P < 0.0715$ (Mkt 2 vs. WHO).

¹⁵⁰ $P < 0.0179$ (WHO vs. Mkt 1) – Canadian conservatives. PHAC – marginally significant in one-tailed test of null greater accuracy in WHO.

Among US liberals, the President is perceived as providing the most accurate information. However, this is marginally significant only compared to their two least accurate alternatives of the state Governor and the Mkt 1 firm coalition.¹⁵¹ Otherwise, there is no difference in the perceived accuracy of the information across institutions by US liberals. US conservatives find information from the WHO most accurate, followed closely by the President and the Mkt 1 corporate coalition. However, there is no statistically significant difference in mean accuracy between these institutions. In fact, there is no statistically significant difference in mean accuracy between any of the institutions for US conservatives.¹⁵² In our vaccine context, there is very little evidence of the choice of institutional messenger having an impact on perceived accuracy among out respondents on either side of the political divide.

One can perhaps see a faint echo of the institutional trust results, as the significant results for US liberals reflect their higher trust in the President and lower trust in the Governor and Mkt 1 coalition. US conservatives' results, however, do not reflect their institutional trust well – as there is no significant difference in perceived accuracy between their most (Mkt 1) and least (President) trusted sources. The accuracy gap on vaccine risk remains large and persistent across the political divide in the US across all our institutional conditions in the highly polarized context of COVID-19 vaccine risk.

[Also have regression results, perceived accuracy across all individual respondents in sample. However, running short of time to write up all results. Will add later in detail. US significant: CDC reduce accuracy (rel to WHO); female, rural, religiosity, conview, alt info source reduce accuracy; age, high Y, libview, pro-social improve accuracy. Canada significant: PHAC, Premier, Mayor, Mkt 1 reduce accuracy (rel to WHO); conview, alt info source reduce accuracy; high Y, lib view, pro-social increase accuracy]

Perceived Accuracy: Risks of Plastics Pollution

The context of plastic risk is one of our less polarized risk scenarios. Figure 20 presents results for mean accuracy across institutions by country for the full sample for this risk context.

Canadians perceive the UNEP, their national leader, and the Mkt 2 insurers as more accurate than US respondents, but otherwise, perceptions of accuracy across countries for our alternative institutions are indistinguishable. Canadians find the UNEP most accurate, statistically so relative to the Premier, Mayor, Mkt 1 corporate coalition, and marginally the Mkt 2 insurers.¹⁵³ Within their political leaders, Canadians on average find the Prime Minister more accurate than the regional leader.¹⁵⁴ Otherwise there are no statistically significant differences across means for institutional accuracy. This is somewhat reflective of Canadian's institutional trust. Higher trust in the UNEP is reflected, as it is viewed as more accurate, but the similar, high trust in the national agency, ENRC, is not mirrored in generally enhanced accuracy.¹⁵⁵

¹⁵¹ Significant at 10% (Governor) and 5% (Mkt 1) in one-tailed test.

¹⁵² The only marginally significant difference is between the WHO and the CDC, significant at 10% in a one-tailed test.

¹⁵³ F-test, two-tailed WHO Canada: $P < 0.0034$ (Premier), $P < 0.0569$ (Mayor), $P < 0.0773$ (Mkt 1), Mkt 2 significant at 10%, one-tailed test.

¹⁵⁴ F-test, two-tailed Prime Minister Canada: $P < 0.0684$ (Premier).

¹⁵⁵ ENRC is significantly more accurate only relative to the Premier, $P < 0.0240$ (two-tailed).

US respondents on average view the President and the Mkt 2 insurers least favourably in terms of accuracy of their information on plastic risk. The President is significantly less accurate than the independent agencies, the state Governor, the Mayor, and the Mkt 1 coalition.¹⁵⁶ They view the Mkt 1 corporate coalition as most accurate, but the difference is significant only relative to the least accurate alternatives of the President and Mkt 2 insurers.¹⁵⁷ The US results are generally reflective of their institutional trust; low trust in the President and Mkt 2 insurers translate into lower accuracy. However, the high trust in their national agency and the UNEP do not appear to significantly affect relative perceptions of accuracy.

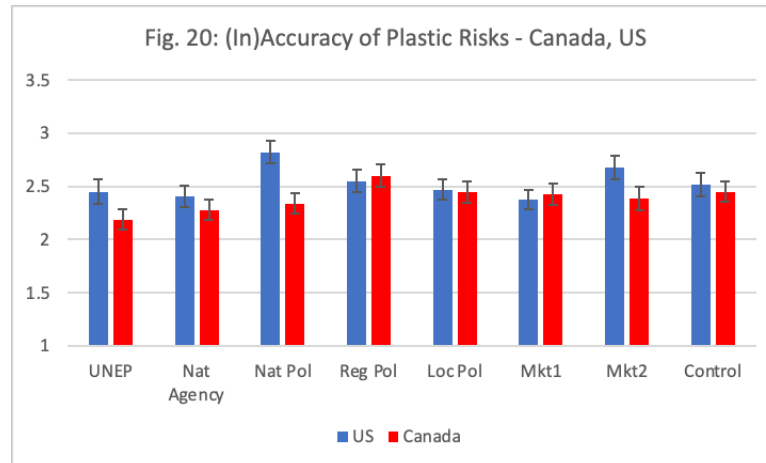
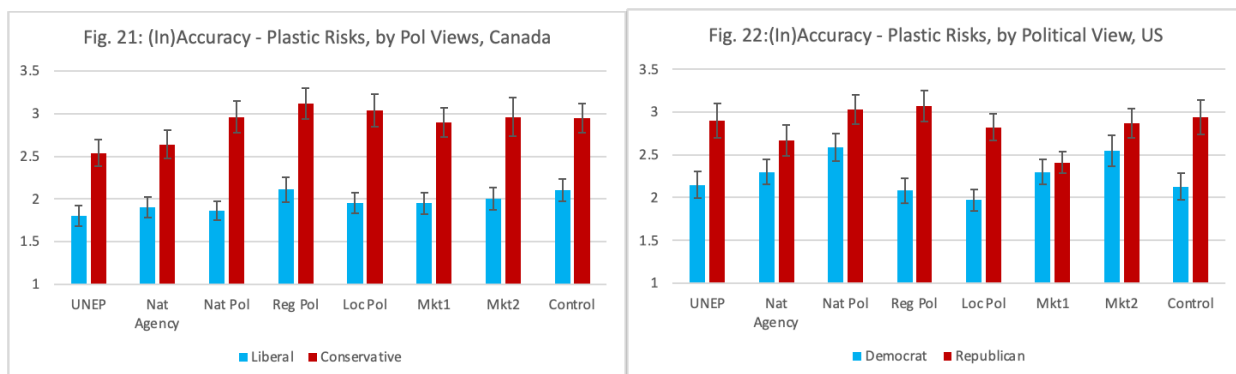


Figure 20 Notes: Means for measures of accuracy for plastic pollution risk information on a 7-point qualitative scale, where 1="completely confident" information is correct, 7="do not believe information"; higher means indicate less confidence in accuracy of information. Standard errors for means are shown by error bars.

As with our other risk context, our main interest is in how alternate institutional messengers affect perceived accuracy across the political divide. Results are shown in Figures 21 and 22 for plastic pollution risks.



Figures 21,22 Notes: Mean perceived accuracy of plastic risk information for those with liberal vs. conservative, Democrat vs. Republican views. Means for measures of accuracy on a 7-point qualitative scale, where

¹⁵⁶ F-test, two-tailed President US: $P < 0.0201$ (WHO), $P < 0.0055$ (NOAA), $P < 0.0666$ (Governor), $P < 0.0139$ (Mayor), $P < 0.0015$ (Mkt 1).

¹⁵⁷ F-test, two-tailed Mkt 1 US: $P < 0.0015$ (President), $P < 0.0362$ (Mkt 2).

1=“completely confident” information is correct, 7=“do not believe information”; higher means indicate less confidence in accuracy of information. Standard errors for estimates of means indicated by error bars.

Several interesting points emerge. The aggregate results showing relatively little difference in accuracy across institutional messengers do not hold when we break down responses by political orientation, particularly in the US. There is far more difference in the size of the political accuracy gap across institutions in the US respondents than in our previous, more polarized contexts. However, among Canadians, this is less true. In Canada, a strong, persistent accuracy gap persists across all institutional conditions, although it is weakened somewhat in the agency conditions.

The UNEP is perceived as the most accurate information source on plastic risk by Canadian liberal respondents. However, this is only marginally significant in comparison with their least accurate information source, the Premier.¹⁵⁸ Canadian liberal respondents draw almost no significant distinctions in their perceived accuracy of plastic risk information across our conditions.¹⁵⁹ This is somewhat at odds with their greater trust in the Prime Minister, and distrust of market condition actors. The UNEP is also Canadian conservatives most accurate information source, followed (indistinguishably) by ENRC, the national agency. Conservatives find UNEP statistically more accurate than any of the political actors.¹⁶⁰ It is also marginally more accurate than the market alternatives for Canadian conservatives.¹⁶¹ This is again somewhat at odds with Canadian conservatives’ trust results. Their higher trust in the agencies is reflected in accuracy results, but their trust in the Mkt 1 coalition does not appear to influence perceived accuracy. These patterns mean that use of institutions other than UNEP or ENRC have little potential to close the accuracy gap.

The US situation is quite different. US liberals perceive information on plastic risk as most accurate when it comes from their Mayor. The Mayor is not statistically more accurate than the UNEP or (marginally) NOAA.¹⁶² But the Mayor is perceived as more accurate than the President or the market alternatives by US liberals on plastic risks.¹⁶³ Liberals also find information from their state Governor relatively accurate, statistically more so than the President and the Mkt 2 insurers.¹⁶⁴ Liberals have varied perceptions of the accuracy of information in the market conditions, finding it relatively more accurate in the Mkt 1 firm coalition and less accurate in the Mkt 2 insurer condition.¹⁶⁵ US liberals did not have statistically higher trust in any institutions, except for relative distrust of the market alternatives. That relative distrust of the market translates into greater inaccuracy in only a few instances.

¹⁵⁸ $P < 0.0985$ (two-tailed).

¹⁵⁹ They also trust the Premier marginally less than the Prime Minister, at 10% in a one-tailed null.

¹⁶⁰ $P < 0.0841$ (Prime Minister), $P < 0.0165$ (Premier), $P < 0.0445$ (Mayor). The national agency, ENRC is more accurate than the Premier, $P < 0.0546$, and marginally more accurate than the Prime Minister or Mayor in one-tailed tests at 10%.

¹⁶¹ Significant at 10%, one-tailed tests for both Mkt 1 coalition, and Mkt 2 Insurers.

¹⁶² $P < 0.1029$ (Mayor vs. NOAA), two-tailed.

¹⁶³ $P < 0.0032$ (vs. President), $P < 0.0918$ (Mkt 1), $P < 0.0096$ (Mkt 2), two-tailed.

¹⁶⁴ $P < 0.0442$ (vs. President), $P < 0.0427$ (Mkt 2), two-tailed.

¹⁶⁵ The difference between the two market conditions mean accuracy is not statistically significant for US liberals, but this slight difference results in statistically different outcomes in comparison with the most and least accurate alternatives.

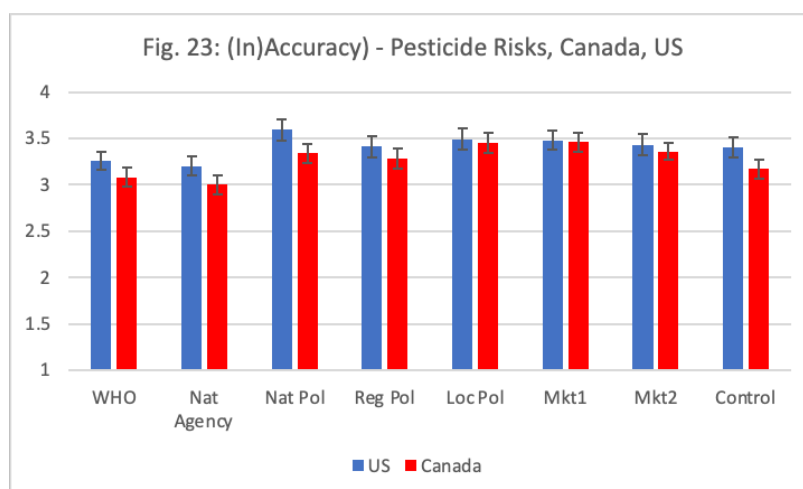
US conservatives on average perceive information as most accurate in the Mkt 1 firm coalition. It is statistically significantly more accurate relative to the means for the UNEP, President, Governor, Mayor, and the Insurers.¹⁶⁶ Only the national agency, NOAA, enjoys an indistinguishably high perceived accuracy among US conservatives on plastic risk. US conservatives show no significant differences in perceived accuracy among political actors. Neither the Mkt 2 insurers nor the UENP are perceived differently from any of the political actors in their mean accuracy. This generally reflects US conservatives higher trust in the Mkt 1 condition and the NOAA.

These patterns in perceived accuracy by political orientation in the US mean that the perceived accuracy gap narrows substantially when information is provided by NOAA, or the Mkt 1 corporate coalition. In fact, there is no significant difference between US Republicans and Democrats in the Mkt 1 condition, and a relatively weak statistical difference for NOAA.¹⁶⁷ This result differs qualitatively from our other risk contexts, in terms of potential for institutional strategy to align perceptions of accuracy. It occurs mainly through improved perception of accuracy for conservatives, but without significant reduction in liberal perceptions of accuracy, except relative to their most accurate source.

[Also have regression results, perceived accuracy across all individual respondents in sample. However, running short of time to write up all results. Will add later in detail. US significant: President reduce accuracy (rel to UNEP); age, lib view improve accuracy, conview, alt info source reduce accuracy. Canada significant: ALL conditions but ENRC reduce accuracy relative to UNEP; conview, alt info source reduce accuracy; lib view, pro-social increase accuracy]

Perceived Accuracy: Pesticide Residue & Health Risks

Our final risk vignette is focused on information about pesticide food residue health risks, and the comparative safety of organic alternatives. Results on mean perceptions of accuracy for this risk information for our full sample of respondents across institutions by country are presented in Figure 23.

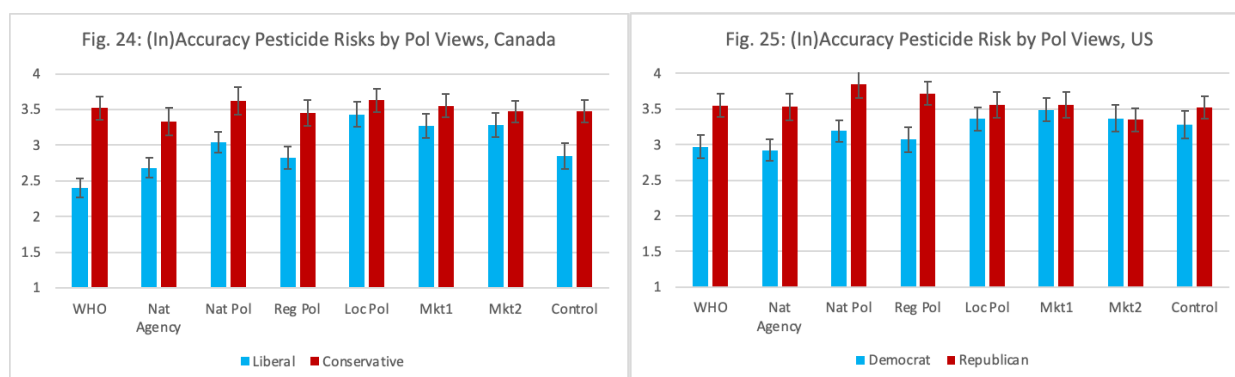


¹⁶⁶ $P < 0.0417$ (UNEP), $P < 0.0040$ (President), $P < 0.0030$ (Governor), $P < 0.0442$ (Mayor), $P < 0.0331$ (Mkt 2).

¹⁶⁷ $P < 0.0586$ (NOAA), one-tailed greater accuracy for liberals, $P < 0.1171$ (NOAA), two-tailed.

Figure 23 Notes: Means for measures of accuracy for pesticide food risk information on a 7-point qualitative scale, where 1=“completely confident” information is correct, 7=“do not believe information”; higher means indicate less confidence in accuracy of information. Standard errors for means are shown by error bars.

The similarity in Canadian and US responses is striking. While Canadians perceive the information as slightly more accurate, in general there is no statistical difference in US and Canadian views within institutional conditions. Differences in perceived accuracy across institutional conditions are also quite muted. The independent agencies, the WHO and Health Canada (HC), have a statistically significant accuracy advantage over other institutions in Canada, but the institutions are otherwise indistinguishable.¹⁶⁸ In the US these agencies, WHO and the FDA, also have an accuracy advantage, but it is only occasionally significant.¹⁶⁹ Other institutions are indistinguishably accurate. This is reflective of the generally higher levels of trust in these independent agencies in both Canada and the US, and the relative indistinguishability of other institutions in terms of the trust of our respondents when considering pesticide risks.



Figures 24,25 Notes: Mean perceived accuracy of pesticide risk information for those with liberal vs. conservative, Democrat vs. Republican views. Means for measures of accuracy on a 7-point qualitative scale, where 1=“completely confident” information is correct, 7=“do not believe information”; higher means indicate less confidence in accuracy of information. Standard errors for estimates of means indicated by error bars.

As with our other vignettes, the picture is incomplete until we examine results broken down by political orientation across our conditions. Figures 24 and 25 present these results for the perceived accuracy of food pesticide risks by political orientation, institution and country.

Relative to our other risk contexts, we see that there is a much smaller accuracy gap in the food pesticide risk setting. It is also one that varies across institutions. In both Canada and the US, the political accuracy gap disappears in the Mayor, and Mkt 1 and Mkt 2 conditions.¹⁷⁰

In Canada, liberals find the international agency, the WHO, most accurate, followed by HC. They find these sources statistically more accurate than the Prime Minister, Premier, Mayor and market alternatives.¹⁷¹ Moving to these alternate sources statistically reduces perceived

¹⁶⁸ Add p-values, less sig for WHO ($P < .10$, $.05$), but much stronger for HC ($P < .25$, $.01$).

¹⁶⁹ Add test stats – significant WHO vs. president ($P < 0.03$), FDA vs. President ($P < 0.0129$), FDA vs. Mayor ($P < 0.0635$), FDA vs. Mkt 1 ($P < 0.0539$).

¹⁷⁰ Insignificant T-stats for comparison of means, liberal vs. conservative within condition, all possible options (one, two-tailed). Remains strongly significant in other conditions.

¹⁷¹ Add test stats – almost all highly significant re WHO ($< .01$). Some less so for HC – e.g. weaker re PM ($.075$), and NOT significant re Premier ($P < .4895$).

accuracy for liberals. Within political leaders, Canadian liberals perceive their Premier as providing the most accurate information on pesticide risks, while the national and local leaders are statistically less accurate. For Canadian liberals, the market alternatives are relatively disfavoured; they are statistically less accurate than all but the least accurate political sources, the Mayor and the Prime Minister.¹⁷² These results are generally consistent with institutional trust for Canadian liberals, reflecting their higher trust in the agencies.

Canadian conservatives perceive the national agency, HC as most accurate on pesticide risks, but there are no statistically significant differences between the accuracy of HC and any other institutions. In fact, Canadian conservatives perceived accuracy of pesticide risk is indistinguishable across all our conditions. This is also relatively consistent with their trust patterns, as although they trusted the Prime Minister statistically less than other institutions, there were no other differences in conservative trust across institutional conditions in the pesticide risk setting.

This means that in Canada for our pesticide risk setting, depolarization of the accuracy gap on pesticides is achieved at the expense of reducing perceived liberal accuracy, rather than improving conservative confidence in the (accurate) risk information.

In the US, liberal respondents perceive the WHO and the FDA as the most accurate of the institutions, but this difference is significant only relative to the Mayor, and the market alternatives.¹⁷³ Among the political leaders, US liberals do not perceive accuracy significantly differently. Use of the market alternatives is also generally indistinguishable from the political leaders for US liberals, with the exception of the Mkt 1 firm coalition reducing trust relative to liberals most accurate political source, the state Governor.¹⁷⁴ US liberals perceptions of accuracy reflect their institutional trust to some degree, as they had high trust in the FDA and the WHO. However, their relatively high trust in the President is not reflected in higher perceived accuracy relative to other political or market alternatives.

For US conservatives, the President is perceived as the least accurate source of information for pesticide health risks. However, this is only statistically significant relative to their most accurate source, the Mkt 2 insurers.¹⁷⁵ The other institutional sources do not generate significant differences in mean perceived accuracy for US conservative respondents. This is consistent with trust results for US conservatives, as they also placed least trust in the President, but otherwise showed no significant differences in trust across institutions.

As in Canada, the closing of the accuracy gap in the US in our Mayor and market conditions is driven by lower perceived accuracy among US liberals for institutions other than the independent agencies. Institutional strategies do not improve the perceived accuracy of the information for US conservatives.

¹⁷² Add test stats.

¹⁷³ WHO US liberals: $P < 0.0903$ (vs. Mayor), $P < 0.0221$ (vs. Mkt 1), $P < .1013$ (Mkt 2). FDA US liberals: $P < 0.0505$ (vs. Mayor), $P < 0.0101$ (vs. Mkt 1), $P < .0604$ (Mkt 2).

¹⁷⁴ $P < 0.0821$.

¹⁷⁵ $P < 0.0460$.

[Regression results, perceived accuracy across all individual respondents in sample, pesticide food risk scenario. Details to be added. US significant: President reduce accuracy (rel to WHO); lib view, religiosity, pro-sociality improve accuracy, female, alt info source reduce accuracy. Canada significant: Prime Minister, Mayor, market alternatives reduce accuracy relative to WHO; female, alt info source, higher education reduce accuracy; lib view, pro-social increase accuracy]

Accuracy: Conclusions

As with our trust results, the institutional choice of messenger for our risk information does have significant effects on perceived accuracy of the information – that varies across the political divide. In general, consistent with our trust results, the independent agencies that are highly trusted also lead to relatively higher perceived accuracy of the information, both for political liberals and conservatives, in Canada and the US.

However, the link between institutional trust and perceived accuracy for our experimental conditions is not always strong or direct. In many cases, strong trust or distrust in a particular source does not lead to any significant difference in the perceived accuracy of information among our respondents. In particular, while trust often varied significantly among political leaders for our respondents, there is much less significant differentiation in perceived accuracy across political actors. In general, we do not see accuracy results across our political actors that consistently support theories of federalism, such as subsidiarity or capture concerns.

Our accuracy results show that there is an accuracy gap between conservative and liberal respondents. However, the nature of this gap, and the potential for institutional choice of messenger to narrow it varies between risk contexts *and* between countries. In general, we see smaller accuracy gaps in our least politicized risk contexts, plastic pollution, and food pesticide risks. These are also the settings in which use of market alternatives can close the accuracy gap, although not in Canada in the plastic pollution context. However, when it is possible to close the accuracy gap, it is often through reductions in perceived accuracy among liberals, and not by improving perceived accuracy for conservatives. In the more highly politicized risk contexts of COVID-19 vaccines and global warming, perceived accuracy is more invariant to the choice of institutional messenger, particularly for US respondents. Even when it is significantly influenced, the nature of the relative effects between liberals and conservatives can make it difficult to use institutions to close the accuracy gap, as in our Canadian sample for COVID-19 vaccines and plastic pollution risk information.

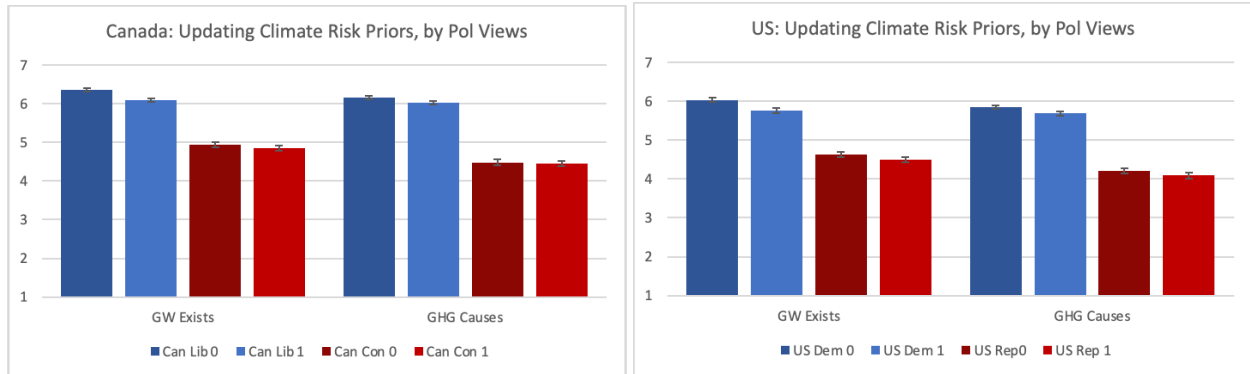
In addition to our institutional conditions and political views, we do find that certain individual characteristics are commonly associated with perceptions of accuracy for our risks. As with our trust results, reliance on alternative information sources is systematically related to lower perceived accuracy of the risk information. In contrast, pro-sociality on the WV Trust question is associated with higher accuracy. In addition to political views, these are the characteristics that most consistently seem to be potential drivers for accuracy across countries and risk contexts. Some other characteristics are relevant in particular contexts, but not always consistently and sometimes with variable effects across countries or risk contexts (e.g., age, female, religiosity, high income, rural residence)

iv) Persuasiveness of Risk Communication

To assess the persuasive effect of information on our respondents, we employ several strategies. First, we compare the change in mean priors across our respondents by political orientation. This allows us to see to what extent the information affects respondents differentially across all our conditions, by political orientation. Second, we use regression analysis to assess the relative persuasive impact of our experimental conditions, taking a variety of individual control characteristics into account. We examine our results by vignette below.

Persuasive Effects: Global Warming

Figures 25 and 26 show the updated mean global warming beliefs of our respondents for Canada and the US respectively.



There is strong similarity apparent between Canada and the US. To the extent there is any updating of beliefs, the effect is to reduce confidence in the existence and human attribution of climate change. The effect is very small in size, but it is statistically significant for liberals in Canada and for both Democrats and Republicans in the US.¹⁷⁶ The effect of providing the information overall has little effect on the gap in beliefs that was apparent in respondents' priors. This is unsurprising, as we would not expect a large change in prior beliefs due to being provided with risk information in a survey on an issue like climate change for which there has been a great deal of public debate on exactly this issue.

Our interest lies primarily with any differential persuasive impact across our experimental risk communication conditions. To explore this, we use a regression strategy. We estimate a regression taking the following general form:

$$y_1 - y_0 = \beta_0 + \beta_1 T + \beta_2 \theta + \varepsilon$$

Where y_0 is the vector of individuals' priors, y_1 is the vector of posterior beliefs, T is the treatment vector, and θ is a vector of individual characteristics, including political orientation and our other

¹⁷⁶ Canada $P < 0.000$ (Liberals, GW exists), $P < 0.001$ (Libs, GW Human caused); US $P < 0.0000$ (Dems, GW Exists), $P < 0.01$ (Rep, GW exists); $P < 0.001$ (Dems, GW Human cause), $P < 0.01$ (Reps, GW Human caused).

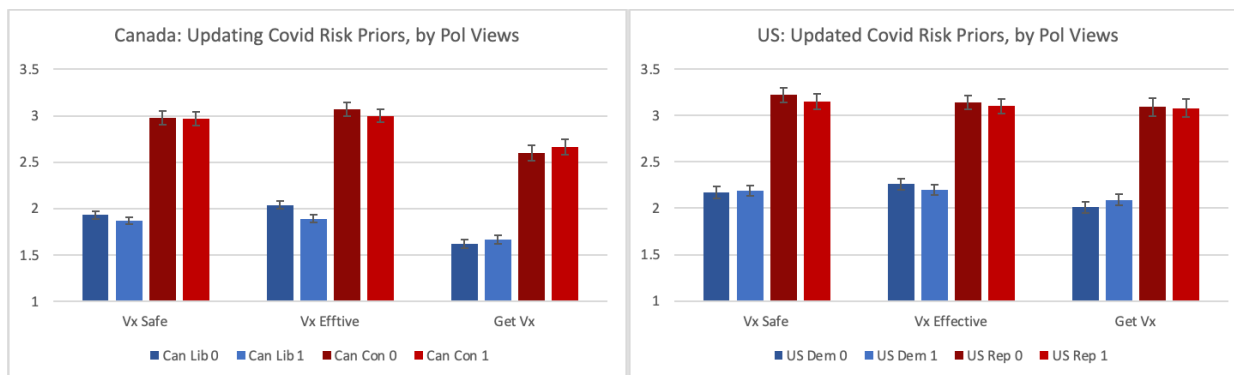
individual controls. In our regression analysis, we include all individuals, not just those who hold liberal or conservative views.

In our Canadian sample, except for the Local Mayor, we find that all our experimental conditions enhance confidence in prior beliefs in global warming across individuals in our sample. However, there is no significant differential effect for any individual condition relative to the IPCC, our omitted condition. Among the individual characteristics, we find that being in the high-income category is marginally significant in reducing confidence, as is holding a liberal political orientation.¹⁷⁷ All other individual characteristics have no significant effect on the updating of priors.

In the US sample, we again find no significant effect of our experimental conditions on the updating of global warming beliefs. There is some variation in the signs for the point estimates, with the State Governor reducing confidence in prior beliefs, while other experimental conditions enhance confidence relative to the IPCC. Among the individual controls, only holding liberal views and consuming information from alternative information sources are associated with significant positive persuasive effects of the information on priors, both improving posterior confidence in global warming when controlling for other characteristics.¹⁷⁸

Persuasive Effects: Covid Vaccines

Figures 27 and 28 below provide evidence of the persuasive impact of our risk information for respondents' Covid vaccine risk assessments.



Recall that in this vignette, the value 1 is associated with highest confidence in the safety and efficacy of vaccines, and the highest intentions to seek vaccination for our respondents.

In the Canadian sample, the risk information leads liberals to have enhanced confidence in the safety and efficacy of the vaccine, but does not significantly change their intentions around vaccination.¹⁷⁹ For conservatives, there is some marginal increase in belief that the vaccine is effective, but otherwise there is no significant change to their priors.¹⁸⁰ Among US respondents,

¹⁷⁷ $P < 0.069$ (High Y), $P < 0.067$ (Lib View).

¹⁷⁸ $P < 0.0075$ (Lib View), $P < 0.084$ (Alt Info).

¹⁷⁹ $P < 0.0168$ (Safety), $P < 0.000$ (efficacy).

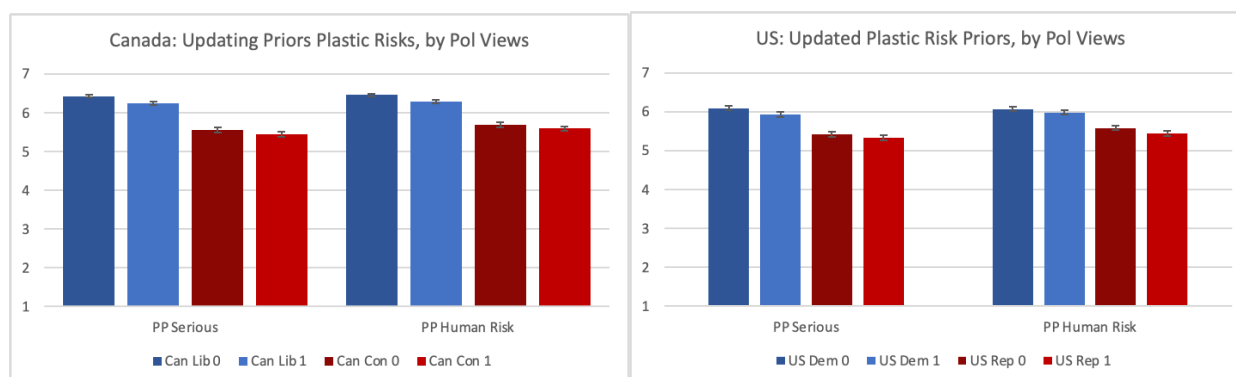
¹⁸⁰ $P < 0.0219$ (Efficacy, Conservative Views).

there is a slight increase in conservatives confidence in vaccine safety, a slight increase in priors around vaccine efficacy for liberals, but no change in priors around vaccination intentions for either group.¹⁸¹

Using our regression approach, we do not find any statistically significant differential persuasion effects across our experimental conditions in the Canadian sample. Among personal characteristics, we find that being female enhances confidence in vaccine safety, while holding conservative views tends to reduce the persuasive effect of the information for vaccine safety once controls are introduced.¹⁸² The results are similar for vaccine efficacy beliefs. We do not see any statistically significant effects from our experimental conditions on persuasion. Among individual characteristics, being female and living in a rural location are both associated with being persuaded to have greater confidence in vaccine efficacy after exposure to the information.¹⁸³ For our vaccine intentions, being female and religiosity both have a significant positive effect on persuasion, increasing the likelihood of vaccination.¹⁸⁴

Among our US respondents, there is almost no persuasive impact of any of our conditions or controls on vaccine beliefs. Holding conservative views is significantly associated with enhanced confidence in vaccine safety after exposure to the information.¹⁸⁵ However, there are no other individually significant effects. The priors of US individuals on Covid vaccines are not particularly susceptible to any persuasive effect from our risk messaging, no matter who delivers it.

Persuasive Effects: Plastics Pollution



Figures 29 and 30 illustrate the general persuasive impact of our vignette risk information on plastic risks across political orientation. While there is a smaller liberal-conservative gap in priors, this does not contribute to the risk information harmonizing beliefs. In this setting, we see that to the extent there is movement to update the priors, there is a slight decrease in both liberals' and conservatives' beliefs that plastic pollution is harmful to the environment and to humans. The

¹⁸¹ $P < 0.0498$ (Conservatives, safety), $P < 0.0441$ (Liberals, efficacy).

¹⁸² $P < 0.063$.

¹⁸³ $P < 0.001$ (female), $P < 0.048$ (rural).

¹⁸⁴ $P < 0.036$ (female), $P < 0.031$ (religious).

¹⁸⁵ $P < 0.050$.

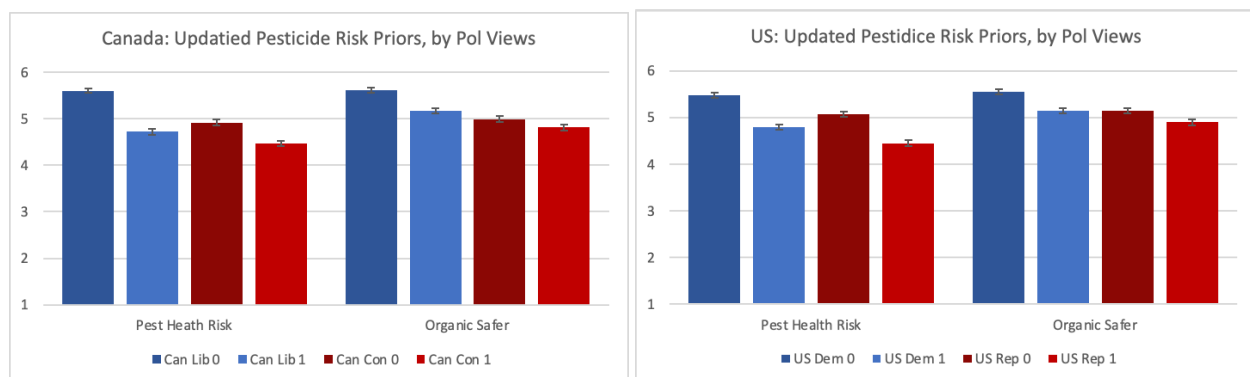
effects are very small in size, but statistically significant for our Canadian respondents.¹⁸⁶ Among our US respondents, the effect is similarly small, and only strongly significant for the decrease in liberals' beliefs around the harmfulness of plastic pollution.¹⁸⁷

Results from our regression analysis do not provide statistically significant evidence of any differential persuasive effect across our conditions in the Canadian sample. This holds for both persuasion effects on beliefs about plastic pollution being generally harmful and posing risks to humans. Among individual characteristics, only age has a statistically significant effect. Older respondents lose confidence in their beliefs that plastic pollution is a serious risk after exposure to the information.¹⁸⁸

In contrast, there is *some* evidence that the messenger matters in our US sample. When updating beliefs about the general risk of plastic pollution, there is a marginally statistically significant decrease in confidence for the national agency and market insurers conditions relative to the omitted international agency.¹⁸⁹ However, there is no similar statistically significant differential effect across conditions for beliefs that plastic pollution is harmful to humans. Among individual characteristics, older respondents lose confidence in beliefs that plastic pollution is harmful after exposure to the information, while both older and female US respondents lose confidence in the risks to humans.¹⁹⁰

Persuasive Effects: Pesticide Risks

Figures 31 and 32 illustrate changes in the mean for beliefs in our pesticide risk vignette, for Canadian and US respondents, respectively.



The results from this vignette are particularly interesting. Recall this was a scenario in which we expected that liberals might have priors that were misaligned with accurate information, in that

¹⁸⁶ $P < 0.000$ (Can lib, plastic pollution harmful), $P < 0.0152$ (Can cons, plastic polln harmful); $P < 0.001$ (Can lib, plastic risk to humans), $P < 0.0058$ (Can cons, plastic risk to humans).

¹⁸⁷ $P < 0.004$ (US libs, plastic pollution harmful), $P < 0.0835$ (US cons, plastic pollution harmful); $P < 0.0970$ (US libs, plastics risk to humans), $P < 0.0669$ (US cons, plastics risk to humans). All P-values are for one-tailed test for equal means for priors and posteriors against the alternative of a lower mean for posterior beliefs.

¹⁸⁸ $P < 0.055$.

¹⁸⁹ $P < 0.103$ (US agency), $P < 0.095$ (market – insurers).

¹⁹⁰ $P < 0.013$ (Age, plastics harmful); $P < 0.058$ (Age, plastics risk to humans), $P < 0.060$ (Female, plastics risk to humans).

they might have too great a fear around approved use of pesticides in food production. We thought that conservatives might have beliefs closer to the accurate information in our vignettes.

It is in this scenario that we see the largest effects on priors for our respondents – although mostly in relation to beliefs around pesticide risks for food production, rather than in beliefs about the benefits of organics. In the Canadian sample, mean beliefs of liberals in the risks of pesticides in food production drop by almost a full point on the 7-point scale, while the mean for conservatives drops by $\frac{1}{2}$ a point, both highly significant changes.¹⁹¹ Canadian liberals' beliefs that organics are safer drop by almost $\frac{1}{2}$ a point, while on this belief there is less movement for conservatives although both changes remain significant.¹⁹² We see a very similar pattern for US respondents. Mean belief that pesticides pose a risk in foods drops, highly significantly, by almost $\frac{3}{4}$ of a point for US liberals, and approximately $\frac{1}{2}$ a point on the 7-point scale for US conservatives.¹⁹³ Beliefs that organics are safer also drop statistically significantly, but with smaller effect sizes.¹⁹⁴

Turning to our regression results, we also see some evidence of differential messenger effects in this setting for persuasion. Among our Canadian respondents, exposure to the information from the Provincial Premier, Local Mayor, either of the market alternatives, or the unattributed control leads to a drop in confidence in pesticide risks relative to the omitted international agency, the WHO.¹⁹⁵ However, there are no statistically significant “messenger” effects on persuasion for beliefs that organics are safer.

Looking to the individual controls, age, living in a rural location, employment other than as a full time-employee, and holding liberal views produce statistically significant positive effects increasing beliefs that pesticides pose a risk in foods.¹⁹⁶ In contrast, holding conservative views, religiosity and consuming information from alternative sources leads to reduced beliefs in pesticide food risk after exposure to the information for Canadian respondents.¹⁹⁷ When we turn to beliefs that organics are safer, female respondents, those employed other than as fulltime employees, and high income respondents have enhanced confidence after exposure to the information.¹⁹⁸ Respondents who hold conservative views and consume information from alternative sources have statistically significantly lower posterior confidence in organics' safety.¹⁹⁹ Overall, we see far more statistically significant impact in the Canadian data from both our messenger conditions and the individual controls in explaining persuasive effects from exposure to the information for our pesticide risk vignette.

¹⁹¹ Pesticide food risk – Canadian liberals – priors mean 5.6, posteriors mean 4.72, $P<0.0000$; Canadian conservatives – prior mean 4.92, posteriors mean 4.47, $P<0.0000$.

¹⁹² Organics safer – Canadian liberals – priors mean 5.6, posteriors mean 5.16, $P<0.0000$; Canadian conservatives – prior mean 4.98, posteriors mean 4.81, $P<0.0000$.

¹⁹³ Pesticide food risk – US liberals – priors mean 5.47, posteriors mean 4.79, $P<0.0000$; US conservatives – prior mean 5.07, posteriors mean 4.45, $P<0.0000$.

¹⁹⁴ Organics safer – US liberals – priors mean 5.55, posteriors mean 5.15, $P<0.0000$; US conservatives – prior mean 5.14, posteriors mean 4.90, $P<0.0000$.

¹⁹⁵ $P<0.086$ (Premier), $P<0.104$ (Mayor), $P<0.010$ (Market – firms), $P<0.016$ (Market – insurers), $P<0.031$ (Control).

¹⁹⁶ $P<0.047$ (Age), $P<0.014$ (Rural), $P<0.025$ (Employ't), $P<0.012$ (Liberal views).

¹⁹⁷ $P<0.032$ (Conservative views), $P<0.005$ (Religiosity), $P<0.003$ (Alt info sources).

¹⁹⁸ $P<0.048$ (Female), $P<0.033$ (Employ't), $P<0.061$ (High Y).

¹⁹⁹ $P<0.075$ (Conservative views), $P<0.070$ (Alt info sources).

The US results, however, do not show the same pattern. There are no statistically significant differential persuasion effects across our experimental conditions in the perception of pesticide risk. Only the use of the market – insurers condition leads to an increased belief that organics are safer among our US respondents, relative to the alternative of the WHO.²⁰⁰ Among individual controls, age is associated with increased confidence that pesticides pose a food risk, while rural residence and consuming information from alternative sources leads to reduced confidence after exposure to the information.²⁰¹ Beliefs among US respondents that organics are safer are only significantly affected by high income status, which leads to reduced confidence in their superiority.²⁰² Overall, while there is greater evidence for impacts of our conditions and controls in the US data for our pesticide risk vignette, compared with our other risk scenarios, it is not extensive.

Persuasion: Conclusions

Identifying differential persuasive effects across our experimental conditions is difficult. In part, this is likely because many of our liberal respondents expressed high values of confidence to start with, leaving little room for persuasion. However, it also appears that the size of any persuasive effects on conservative beliefs is also relatively small. While the aggregate changes in beliefs for both liberals and conservatives are often significant, the small size of the effects may make it difficult to identify differential impacts reliably across conditions.

To the extent that we do see persuasive effects in our data, the aggregate effects are often somewhat averse to the goals of exposing individuals to information. Liberals in our global warming and plastics vignettes lost confidence in their prior beliefs about these risks – which we expected to be aligned with the risk information. However, this “perverse” effect was not universal – for example there was some enhanced belief in Covid vaccine safety and efficacy among liberals, especially Canadians, that we expect would be aligned with the risk information. The “down-grading” of beliefs by liberals that pesticides pose food risks also reflects a persuasive effect aligned with what we expect is a positive impact of providing the (accurate) information. The lack of any significant effects across our experimental conditions and controls makes it more challenging to understand how these differential persuasive effects arise. In a number of scenarios, movement in conservatives’ beliefs mirrors that of liberals, but with even smaller effect sizes. Again, this makes it difficult to pick up any significant differential persuasion effects across conditions.

To the extent we find significant differences in our aggregate persuasion results, they vary across our risk vignette contexts, sometimes even across risks within our vignettes, across conditions, controls and across countries. As with our trust and accuracy results, our persuasion results caution against drawing broad-brush conclusions when it comes to the impact of communicating risk information.

V. Conclusions

²⁰⁰ US Organics safety - $P < 0.080$ (Market – insurers).

²⁰¹ US Pesticide food risks - $P < 0.000$ (Age), $P < 0.107$ (Rural), $P < 0.022$ (Alt info source).

²⁰² US Organics safety – $P < 0.025$ (High Y).

Our primary results are from analysis of data generated by the survey itself. Equivalence of means analysis across our institutional source conditions allow us to assess the causal impact on perceived institutional trust, accuracy and persuasiveness of the information across our risk scenarios. We test for causal associations between these institutional source effects and respondents' self-reported political affiliation. Our data allows us to test whether the same risk information is perceived as more or less persuasive based on who delivers it and who is hearing it. By comparing across our risk scenarios, we can assess how general any institutional source effects are, and whether they operate similarly across political lines in our risk vignette contexts. Using our survey outcome measures as dependent variables, we use regression analysis to identify the potential role of respondents' co-variables in explaining variation, in addition to the experimental conditions: e.g., political views, age, gender, education, income, employment, religiosity and media preferences. By conducting our survey in both Canada and the US, we are able to determine whether similar governance channels have a different partisan valence in communicating information about contentious risks in a comparative setting.

In general, the evidence from our experimental surveys supports the hypothesis that independent agencies constructed to be apolitical sources of expertise are perceived as more trustworthy and accurate than political actors. There is variation across countries and contexts behind this conclusion – sometimes it is the national agency that is more trusted (FDA), in other contexts, the international agency (IPCC). Agencies are not always *the* most trusted source, but they are commonly among the indistinguishably most trusted, accurate sources for both liberals and conservatives.

We see little evidence that theories of federalism such as subsidiarity or capture theory help explain relative trust or perceived accuracy between political actors at different levels of government. Instead, to the extent that we see significant results of differential trust and accuracy, they vary by political orientation and hint at a different theory of institutional motivated cognition that depends on respondents' political alignment with these actors.

In some contexts, the use of market alternatives does have a significant impact on perceived trust and accuracy of the risk information in our vignettes. However, the results are mixed. In some cases, use of market alternatives does improve conservative trust and perceptions of accuracy. But this is not consistent across vignettes or even across our two market alternatives. In some cases, (Canada, vaccines) the market alternative can reduce conservative trust. Similarly, in general, the use of market alternatives is associated most with reductions in liberal trust and perceptions of accuracy, but it can increase these outcomes (Canada vaccines). The general patterns across the political divide when using market alternatives do make these relatively less polarizing than other institutions. To the extent that trust and perception gaps are viewed as problematic *in themselves*, engaging these alternate governance institutions may be helpful.

In general, there are many strong similarities between Canadian and US results. However, there are also some significant differences, particularly in the interaction of institutional messenger and perceptions of accuracy of risk information. Context does matter – even within our country samples, there is variation in the effect of institutions across our vignette settings. Researchers should be cautious in suggesting broad institutional communication strategies based on motivated

cognition, as the nature of the motivational cues appears to be more complex than some early literature has suggested.

We hope that our results will contribute to understanding how the different governance channels we study contribute to effective communication of policy relevant risk information – whether about climate change, vaccines, or other threats not yet on our radar. Meaningful policy debate in a democracy is difficult when partisan divides cloud our view of the facts. We hope to contribute to understanding how it may be possible to bridge this communication gap.

Appendix: Survey Vignette Text

Climate Condition and Questions:

Sample text and questions. The language in square brackets, [example], is specific to each institutional source condition within this scenario. The language for each institutional source condition is included on the next page.

Climate Change Risks

The [US National Oceanic and Atmospheric Administration (NOAA) Report]

The [US Center for Environmental Information at NOAA] has recently released a report on the risks of allowing climate change to exceed 1.5 degrees Celcius. Without urgent action to curb emissions, [NOAA] says that climate change will result in:

- Severe and widespread risk to unique and threatened ecosystems, including loss of species and degradation of habitats
- Severe and widespread risk of extreme weather events, including higher average average temperatures, increased heat waves and droughts, increased heavy precipitation events and flooding, and increases in severe storms and coastal flooding.
- Rising sea levels will put small islands, coastal areas and deltas at risk of damage from saltwater contamination, flooding and damage to infrastructure
- Climate-related risks to health, livelihoods, food security, water supply, human security, and economic growth

[NOAA] says that to avoid the worst effects of climate change, the US must take immediate action to drastically reduce and remove greenhouse gas emissions.

Q1. How confident are you that the information about climate change above is correct?

- 7-point qualitative scale: Completely Confident – Do not believe information²⁰³

Q2 How would you rate the trustworthiness of [the US NOAA] as a source of the climate change information above?

- 7-point qualitative scale: Extremely Trustworthy – Extremely Untrustworthy

Q3 Taking this information into account, how likely do you think it is that the earth's climate is changing so that the earth's climate system is warming?

- 7-point qualitative scale: Very Unlikely – Very Likely

Q4 Taking this information into account, how likely do you think it is that human activity, mainly in the form of greenhouse gas emissions, is the major cause of any warming of the earth's climate?

- 7-point qualitative scale: Very Unlikely – Very Likely

²⁰³ Alternative – continuous (slider) scale 0-10, qualitative labels to orient, may provide measures more easily translated to probabilities. Consider as alternative for all likelihood measures?

Institutional Source Conditions: Climate Risk Scenario

Government

International Independent Agency: The Intergovernmental Panel on Climate Change (IPCC)

US Agency: The Center for Environmental Information and the National Oceanic and Atmospheric Administration (NOAA)

Canadian Agency: Environment and Natural Resources Canada

National political: US President; Canadian Prime Minister

Regional political: State Governor; Provincial Premier

Local political: the local Mayor

Market

Market #1 large corporate actors collective: Amazon recently released a Climate pledge, joined by other major companies including Best Buy and Verizon;

Market #2 large insurers: A group of major insurance companies recently released a Climate Change Statement

Corona Virus Vaccine Risks

Sample text and questions. The language in square brackets, [example], is specific to each institutional source condition within this scenario. The language for each institutional source condition is included on the next page.

The [Public Health Agency of Canada (PHAC)] Statement

The Public Health Agency of Canada (PHAC) has recently released a statement on vaccines for the new Corona virus (COVID-19). The PHAC says that safe and effective vaccines will be a critical tool to help fight the COVID-19 pandemic. The Public Health Agency of Canada emphasized important aspects of developing and approving COVID-19 vaccines:

- Vaccines are approved only after review of data from manufacturers and large clinical trials shows that they are safe and effective and that known potential benefits outweigh known potential harms.
- There are several different types of vaccines in development. All of them teach our immune systems how to recognize and fight the virus that causes COVID-19. This protects you from getting sick.
- Sometimes this process can cause symptoms, such as fever. These symptoms are normal and are a sign that the body is building protection against the virus that causes COVID-19.
- None of the approved vaccines can cause you to get sick with COVID-19.
- While some approved vaccines use new approaches (messenger-RNA vaccines) none of them change or interact with your DNA in any way.
- Approved vaccines so far appear to be highly effective

The PHAC says that vaccines save millions of lives around the world each year. Approved vaccines will be critical in the fight against the COVID-19 pandemic in Canada and bringing it to an end.

Q1 How confident are you that the information about COVID-19 vaccines above is correct?

- 7-point qualitative scale: Completely Confident – Do not believe information

Q2 How would you rate the trustworthiness of the PHAC as a source of the COVID-19 vaccine information above?

- 7-point qualitative scale: Extremely trustworthy – Extremely untrustworthy

Q3 Taking this information into account, how safe do you believe approved COVID-19 vaccines are?

- 7-point qualitative scale: Extremely safe – Extremely unsafe

Q4 Taking this information into account, how effective to prevent COVID-19 do you believe approved COVID-19 vaccines are?

- 7-point qualitative scale: Highly Effective – Highly Ineffective

Q5 Taking this information into account, If the vaccine was freely available to anyone who wanted it, how likely are you to get an approved COVID-19 vaccine?

- 7-point qualitative scale: Very Likely – Very Unlikely

Institutional Source Conditions: COVID-19 Vaccine Risk Scenario

Government

International Independent Agency: The World Health Organization (WHO)

US Agency: The Center for Disease Control (CDC)

Canadian Agency: The Public Health Agency of Canada (PHAC)

National political: US President; Canadian Prime Minister

Regional political: State Governor; Provincial Premier

Local political: the local Mayor

Market

Market #1 large corporate actors collective: a group of major pharmaceutical companies released a Joint Statement

Market #2 large insurers: a group of major insurance companies released a Statement on vaccines

Plastic Pollution Risks

Sample text and questions. The language in square brackets, [example], is specific to each institutional source condition within this scenario. The language for each institutional source condition is included on the next page.

The [United Nations Environment Program (UNEP) Report]

The [United Nations Environment Program (UNEP)] has been considering the issue of plastic pollution. It recently released information on the risks of plastic pollution. Without urgent action to reduce plastic use, [UNEP] says we can expect to see:

- More plastic than fish in the sea by 2050 - plastic is entering oceans at a rate equivalent to dumping a garbage truck full every minute. Little plastic is actually recycled.
- Plastics accumulating in the environment, because they don't biodegrade. Plastics can float, either as larger pieces or very tiny micro-particles. Accumulation of plastic can lead to debris on shorelines and beaches, large plastic "garbage islands", and widespread contamination of freshwater and marine environments.
- Threats to marine life from plastic pollution, including damage to their habitats, entanglements and consumption of plastic micro-particles mistaken for food.
- Plastics entering the food chain for humans - widespread human plastic use in everything from cars to clothing, personal care products, and disposable items like packaging will lead to human food from marine life containing micro-plastics with unknown health risks.

The [UNEP] says that to avoid the risks from growing marine plastic pollution, all countries need to take action to drastically reduce their use of plastics and increase efforts to recycle existing plastic products.

Q1 How confident are you that the information about plastic pollution above is correct?

- 7-point qualitative – 1-completely confident, 7-do not believe information

Q2 How would you rate the trustworthiness of [the UNEP] as a source of the plastic pollution information above?

- 7-point qualitative – 1-extremely trustworthy, 7- extremely untrustworthy

Q3 Taking this information into account, how likely do you think it is that plastic pollution is a serious problem?

- 7-point qualitative – 1-very unlikely, 7- very likely

Q4 Taking this information into account, how likely do you think it is that plastic pollution creates environmental risks, especially for marine ecosystems, that can affect humans?

- 7-point qualitative – 1-very unlikely, 7- very likely

Institutional Source Conditions: Plastics Pollution Risk Scenario

Government

International Independent Agency: United Nations Environment Program (UNEP)

US Agency: National Oceanic and Atmospheric Administration (NOAA)

Canadian Agency: Environment and Natural Resources Canada (ENRC)

National political: US President; Canadian Prime Minister

Regional political: State Governor; Provincial Premier

Local political: the local Mayor

Market

Market #1 large corporate actors collective: a group of major companies released a statement on plastics pollution

Market #2 large insurers: a group of major insurance companies with clients that make and use plastics

Pesticides and Food Risks

Sample text and questions. The language in square brackets, [example], is specific to each institutional source condition within this scenario. The language for each institutional source condition is included on the next page.

The [United Nations World Health Organization (WHO)] Statement

The [United Nations World Health Organization (WHO)] has recently released a statement addressing fears about the use of pesticides for food production. The [WHO] says that pesticides play an important role in making sure there is enough food for everyone, by protecting crops from pests like insects, weeds, and fungal diseases. The [WHO] emphasized that human safety is important to the approval of pesticides:

- Pesticides used for food production are tested for any small amounts that may remain on foods (residue).
- Maximum residue levels (MRLs) are established scientifically for foods grown using pesticides and apply whether food is grown domestically or imported.
- These MRLs are set far below the amount of pesticide residue that could cause health concerns. The levels are set taking into account all of the population including infants, children, and pregnant women.
- Some foods are grown organically or naturally, without pesticides.
- However, there is no scientific evidence to show that there is a health risk from eating conventionally grown produce because of pesticide residues, or that organic foods are safer to eat than conventionally produced foods.

The [WHO] says that pesticides will continue to be important to protecting our food supply. With science-based limits on pesticide residue, food will be safe and healthy to eat.

Q1 How confident are you that the information about pesticides and food safety above is correct?

- 7-point qualitative – 1-completely confident, 7-do not believe information

Q2 How would you rate the trustworthiness of [the WHO] as a source of the pesticide safety information above?

- 7-point qualitative – 1-extremely trustworthy, 7- extremely untrustworthy

Q3 Taking this information into account, how likely do you think it is that approved pesticides pose significant health risks?

- 7-point qualitative – 1-very unlikely, 7- very likely

Q4 Taking this information into account, how likely do you think it is that natural products or organic methods are a healthier alternative?

- 7-point qualitative – 1-very unlikely, 7- very likely

Institutional Source Conditions: Pesticide Food Risk Scenario

Government

International Independent Agency: United Nations World Health Organization (WHO)

US Agency: US Food & Drug Administration (FDA)

Canadian Agency: Health Canada

National political: US President; Canadian Prime Minister

Regional political: State Governor; Provincial Premier

Local political: the local Mayor

Market

Market #1 large corporate actors collective: a group of major companies in the food industry

Market #2 large insurers: a group of major insurance companies with clients in the food industry