

Motivated Reasoning and Implicit Carbon Prices: Overcoming Public Opposition to Carbon Taxes and Emissions Trading Schemes

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Analysts agree that public opposition is one of the main factors that hinder ambition in many countries' carbon pricing policy agenda. This article argues that motivated reasoning contributes to this opposition by inducing the public to underestimate the effectiveness of carbon pricing to mitigate climate change and yield co-benefits. This article also argues that measures of implicit carbon pricing can help overcome public opposition to carbon taxes and emissions trading schemes due to motivated reasoning. These measures are becoming increasingly available thanks to recent work by the International Monetary Fund, the Organisation for Economic Co-operation and Development and private-sector actors, and therefore they offer a potential instrument for reducing public opposition to carbon taxes and emissions trading schemes in various countries. A strength of the approach proposed in this article – compared to some of the mainstream approaches to risk regulation – is that it tries to keep the regulation of climate risks in line with public attitudes towards these risks.

I. INTRODUCTION

The COVID-19 crisis has highlighted the challenge of catalysing public support for policy action in situations where policies are costly but a delay can cause a severe increase in social harm, such as climate change mitigation.¹ Prominent economists and policymakers support carbon pricing as a measure to mitigate climate change cost-effectively,² and the number of jurisdictions that have implemented carbon taxes or emissions trading schemes (ETSs) has increased substantially in the last two

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¹ D Klenert et al., “Five Lessons from COVID-19 for Advancing Climate Change Mitigation” (2020) 76 *Environmental and Resource Economics* 751.

² Recently, many economists, including twenty-seven Nobel Laureate Economists, four former chairs of the US Federal Reserve and two former secretaries of the US Department of Treasury have signed a statement supporting the introduction of a US carbon tax: see <<https://www.econstatement.org/>>. See also CPLC, “Report of the High-Level Commission on Carbon Prices” (2017); IPCC, “Mitigation Pathways Compatible with 1.5°C in The Context of Sustainable Development” (2018); IMF, “Fiscal Policies for Paris Climate Strategies-From Principle to Practice” (2019).

decades.³ However, when confronted with benchmark price levels, carbon pricing policy in many parts of the world is not sufficiently ambitious to cost-effectively mitigate climate change or to internalise the climate externality (measured as the social cost of carbon).⁴ Low levels of public support for carbon pricing is a key factor that hinders policy ambition in carbon pricing.⁵

Research shows that a key determinant of this opposition is that a large segment of the public believes that carbon taxes and ETSs are not effective at reducing pollution and delivering co-benefits, such as improved air quality, reduced traffic congestion and reduced traffic accidents,⁶ although substantial evidence indicates the opposite.⁷ An explanation for this mismatch between public expectations and the evidence is that people underestimate the price elasticity of demand for carbon-intensive products.⁸

In this article, I put forward two claims. First, I build on the work of Lucas Jr⁹ and argue that motivated reasoning is a factor that contributes to maintaining – or even increasing – the mismatch between the evidence and the perceived effectiveness of carbon pricing. My second argument is that policymakers can use measures of *implicit carbon pricing* (ie carbon prices imposed via fuel taxes and fossil fuel subsidies reforms¹⁰) to overcome the motivated reasoning that hinders public support for *explicit carbon pricing instruments*, such as carbon taxes and ETSs.

Measures of implicit carbon prices are becoming increasingly available thanks to the growing interest of international institutions¹¹ and private-sector actors.¹² These organisations provide estimates for a large number of countries, potentially allowing governments in many parts of the world to increase public support for carbon taxes and ETSs.

³ <https://carbonpricingdashboard.worldbank.org/map_data>.

⁴ G Dominioni and D Heine, “Behavioural Economics and Public Support For Carbon Pricing: A Revenue Recycling Scheme To Address The Political Economy of Carbon Taxation” (2019) 19 *European Journal of Risk Regulation* 554; World Bank, “State and Trends of Carbon Pricing 2019” (2019).

⁵ A Baranzini and S Carattini, “Effectiveness, Earmarking and Labeling: Testing the Acceptability of Carbon Taxes with Survey Data” (2017) 19 *Environmental Economics and Policy Studies* 197; S Carattini, M Carvalho and S Fankhauser, “Overcoming Public Resistance to Carbon Taxes” (2018) 9 *Wiley Interdisciplinary Reviews: Climate Change* e531; World Bank, supra, note 4; IMF, supra, note 2.

⁶ S Dresner et al, “Social and Political Responses to Ecological Tax Reform in Europe: An Introduction to the Special Issue” (2006) 34 *Energy Policy* 895; Carattini et al, supra, note 5.

⁷ On the effect of carbon taxes at reducing carbon emissions, see JJ Andersson, “Carbon Taxes and CO₂ Emissions: Sweden as a Case Study” (2019) 11 *American Economic Journal: Economic Policy* 1; B Murray and N Rivers, “British Columbia’s Revenue-Neutral Carbon Tax: A Review of the Latest ‘Grand Experiment’ in Environmental Policy” (2015) 86 *Energy Policy* 674. On the air quality benefits in the USA, see TM Thompson et al, “A Systems Approach to Evaluating the Air Quality Co-Benefits of US Carbon Policies” (2014) 4 *Nature Climate Change* 917; JJ Buonocore et al, “Climate, Air Quality, and Health Benefits of a Carbon Fee-and-Rebate Bill in Massachusetts, USA” (2018) 13 *Environmental Research Letters* 114014. On the air quality benefits in China, see M Li et al, “Co-Benefits Of China’s Climate Policy for Air Quality and Human Health in China and Transboundary Regions in 2030” (2019) 14 *Environmental Research Letters* 084006.

⁸ Carattini et al, supra, note 5.

⁹ GM Lucas Jr, “Voter Psychology and the Carbon Tax” (2017) 90 *Temple Law Review* 1.

¹⁰ I refer here exclusively to reforms to subsidies to fossil fuel consumption, not to production. See also World Bank, supra, note 4.

¹¹ OECD, “Effective Carbon Rates: Pricing CO₂ through Taxes and Emissions Trading Systems” (2016); OECD, “Effective Carbon Rates 2018: Pricing Carbon Emissions through Taxes and Emissions Trading” (2018); IMF, supra, note 2.

¹² VividEconomics and the Overseas Development Institute, “Estimating Effective Carbon Prices: Accounting for Fossil Fuel Subsidies” (2019).

This article has clear policy relevance. Policymakers are increasingly interested in overcoming public resistance to carbon pricing, and communication is seen as a critical tool for doing so.¹³ For instance, the World Bank has recently released a guide on how to communicate about carbon pricing that includes the recommendation to stress the co-benefits of carbon pricing in order to increase public support for these measures.¹⁴ This article can inform these efforts.

This article contributes to the growing research on how citizens' psychology affects lawmaking and risk regulation.¹⁵ This article offers novel insights into how motivated reasoning reduces lawmakers' ability to pass critical climate legislation and offers potential solutions to this problem. The solutions offered in this article aim to overcome the psychological barriers to adequate public information on the costs and benefits of carbon pricing. This approach, if effective, allows for the aligning of risk regulation with public attitudes towards risks. As such, it has the potential advantage of relying more on the input legitimacy of climate action than a traditional response to public misperception of environmental risks,¹⁶ which focuses on increasing the power of technical and relatively politically insulated authorities.¹⁷

The solutions proposed in this article also complement existing proposals on how to increase ambition in carbon pricing policy¹⁸ and implement the "polluter pays" principle in climate change mitigation.¹⁹ Previous legal scholarship has argued that motivated reasoning due to identity and ideology may explain Republicans' rejection of carbon taxes in the USA and has offered some solutions to this issue.²⁰ In this article, I expand this research in two ways: by highlighting additional reasons why motivated reasoning reduces public support for carbon pricing; and by offering novel solutions to the problem.

The remainder of this article is structured as follows: In Section II, I review the existing research on behaviourally informed strategies to increase public support for explicit carbon pricing and highlight its limits. Section III discusses the climate benefits and co-benefits of carbon pricing and argues that low levels of public support for these policy instruments are often due to public distrust towards the effectiveness of carbon pricing at yielding these benefits. Section IV argues that motivated reasoning is a

¹³ World Bank, supra, note 4; IMF, supra, note 2; MA Pigato, *Fiscal Policies for Development and Climate Action* (Washington, DC, World Bank 2019).

¹⁴ PMR-CPLC, *Guide to Communicating Carbon Pricing* (Washington, DC, World Bank 2018).

¹⁵ S Breyer, *Breaking the Vicious Circle: Toward Effective Risk Regulation* (Cambridge, MA, Harvard University Press 1993); D Kahan, "Two Conceptions of Emotion in Risk Regulation" (2007) 741 *University of Pennsylvania Law Review*. 156; D Kahan et al, "Motivated Numeracy and Enlightened Self-Government" (2017) 1(1) *Behavioural Public Policy* 54; GM Lucas Jr and S Tasic, "Behavioral Public Choice and the Law" (2015) 118 *West Virginia Law Review* 199; P Slovic, "Trust, Emotion, Sex, Politics, and Science: Surveying the Risk-Assessment Battlefield" (1999) 19(4) *Risk Analysis* 689.

¹⁶ For an example of this traditional approach to risk regulation, see Breyer, supra, note 15.

¹⁷ For a call in favour of this approach that keeps risk regulation aligned with public perception of risks, see Kahan et al, supra, note 15.

¹⁸ I Ayres, "Voluntary Taxation and Beyond: The Promise of Social-Contracting Voting Mechanisms" (2017) 19 *American Law and Economics Review* 1; Carattini et al, supra, note 5; Dominioni and Heine, supra, note 4; Lucas Jr, supra, note 9.

¹⁹ D Heine, M Faure and G Dominioni, "The Polluter-Pays Principle in Climate Change Law: An Economic Appraisal" (2020) 10(1) *Climate Law* 94.

²⁰ Lucas Jr, supra, note 9.

factor that helps to maintain or even to increase public scepticism towards the effectiveness of carbon pricing in delivering benefits. In this section, I also argue that policymakers can use measures of implicit carbon pricing in order to overcome opposition that is due to motivated reasoning and discuss the limits to this possibility. Section V highlights a general limit to the use of measures of implicit carbon pricing to address motivated reasoning and discusses some possible solutions. Section VI concludes.

II. BEHAVIOURALLY INFORMED STRATEGIES TO INCREASE PUBLIC SUPPORT FOR CARBON PRICING

Traditionally, governments address public opposition to explicit carbon pricing with phasing-in (ie the practice of implementing carbon pricing instruments at a low price and gradually increasing it over time). Governments widely adopt this practice,²¹ and prominent scholars support it.²² While potentially useful, phasing-in also has severe drawbacks, because it delays mitigation outcomes, may lead to overconsumption of fossil fuels²³ and may reduce public awareness of the benefits of carbon pricing policy.²⁴ Elaborating complementary strategies to address the political economy of carbon pricing can help to limit the use of phasing-in. In this vein, a growing strand of research proposes strategies to address public opposition to carbon pricing building on insights from behavioural economics. In this section, I briefly review this research and highlight some of its limits.

A complementary measure is to distribute citizens' (forecasted) carbon revenues on visible – but frozen – bank accounts before a carbon tax is implemented, and to unfreeze these accounts only after the law is enacted.²⁵ If the reform is blocked, recipients will lose cash transfers.²⁶ Antedating the cash transfers on visible bank accounts may increase public support for the carbon tax because people tend to value more the things they have than equal things that they do not have (ie the so-called endowment effect).²⁷ Despite the promise of this revenue recycling scheme increasing public support for carbon pricing, it is not necessarily practicable in every jurisdiction for at least two reasons. On the one hand, strategies that focus on carbon revenue use might not be feasible nor desirable in countries that have alternative and more compelling fiscal needs, such as reducing a high

²¹ To have a sense of how commonly this strategy is used in practice (consciously or not), it is sufficient to look at the evolution throughout time of the levels of carbon prices around the world. These data are available at the following link: https://carbonpricingdashboard.worldbank.org/map_data.

²² Carattini et al, *supra*, note 5.

²³ HW Sinn, "Public Policies against Global Warming: A Supply Side Approach" (2008) 15 *International Tax and Public Finance* 360; F Van Der Ploeg and C Withagen, "Global Warming and the Green Paradox: A Review of Adverse Effects of Climate Policies" (2015) 9 *Review of Environmental Economics and Policy* 285.

²⁴ Dominioni and Heine, *supra*, note 4.

²⁵ *ibid.*

²⁶ *ibid.*

²⁷ *ibid.*

public debt. On the other hand, the public may not support this revenue recycling scheme, as it sometimes does not support other types of nudges.²⁸

Other proposals build on framing (ie the psychological phenomenon by which people's preferences towards a set of options vary depending on how the choice is presented, even though the payoffs of the choices remain constant).²⁹ For instance, in a 2019 report, the World Bank suggests discussing the introduction of a carbon price as a form of subsidy removal in order to reduce its perceived coerciveness.³⁰ The idea underlying this proposal is that the negative externalities of fuel consumption can be seen as a subsidy, if not internalised.³¹ Carbon taxes can reduce or eliminate this subsidy. While appealing, the effectiveness of this proposal is far from guaranteed, chiefly because it rests on a theoretical premise (the economic theory of Pigouvian taxation) that might not be particularly convincing or ethically appealing to segments of the general public.

Some research shows that naming a carbon tax as a "climate contribution" or "carbon fee" reduces public opposition to these measures.³² These strategies are low cost and thus easily implementable. Various jurisdictions seem to have adopted this strategy in recent years. It is not uncommon to see carbon pricing bills in the USA use of the word "fee" instead of "tax", such as the 2018 Connecticut Bill 5363³³ and the 2020 Maryland House Bill 1543;³⁴ the Federal government of Canada named its 2019 carbon pricing scheme "fee".³⁵ While potentially useful, experience shows that this strategy sometimes fails to catalyse sufficient public support for carbon taxes.³⁶ For instance, in 2018, the Washington Carbon Emissions Fee and Revenue Allocation Initiative was rejected in a public ballot by almost 57% of the voters.³⁷

Lucas Jr proposes various strategies to overcome public opposition to carbon pricing.³⁸ For instance, he suggests relying on communication techniques such as identity affirmation and pluralistic advocacy. Identity affirmation refers to the practice of presenting information in a way that affirms values held by the target audience, and pluralistic advocacy is to seek support for a policy (eg carbon taxes) from experts and public figures associated with a diverse range of values and identities. While

²⁸ On the public acceptability of nudges, see C Sunstein, *The Ethics of Influence: Government in the Age of Behavioral Science* (Cambridge, Cambridge University Press 2016); C Sunstein, "Do People Like Nudges?" (2016) 68 *Administrative Law Review* 177. Of course, ethical considerations may also recommend not manipulating citizens' biases; see Lucas Jr, *supra*, note 9.

²⁹ A Tversky and D Kahneman. "The Framing of Decisions and the Psychology of Choice" (1981) 211(4481) *Science* 453.

³⁰ Pigato, *supra*, note 13.

³¹ *ibid.*

³² Baranzini and Carattini, *supra*, note 5; S Kallbekken, S Kroll and TL Chery, "Do You Not Like Pigou, or Do You Not Understand Him? Tax Aversion and Revenue Recycling in the Lab" (2011) 62 *Journal of Environmental Economics and Management* 53.

³³ <<https://www.cga.ct.gov/2018/TOB/h/2018HB-05363-R00-HB.htm>>.

³⁴ <<https://legiscan.com/MD/text/HB1543/id/2128820>>.

³⁵ A popular video shows the Prime Minister of Canada, Justin Trudeau, calling by mistake the carbon pricing scheme "carbon tax" during a parliamentary audition, and members of the opposing parties laugh in response (see <<https://www.youtube.com/watch?v=5ndd3YKEBxM>>).

³⁶ Lucas Jr, *supra*, note 9; B Rabe and CP Borick, "Carbon Taxation and Policy Labeling: Experience from American States and Canadian Provinces" (2012) 29 *Review of Policy Research* 358, 360–80.

³⁷ <[https://ballotpedia.org/Washington_Initiative_1631,_Carbon_Emissions_Fee_Measure_\(2018\)](https://ballotpedia.org/Washington_Initiative_1631,_Carbon_Emissions_Fee_Measure_(2018))>.

³⁸ Lucas Jr, *supra*, note 9.

potentially effective, the possibility of implementing pluralistic advocacy is dependent on the political situation of each country. In countries where carbon pricing is a highly contentious issue, it might be challenging to find experts or public figures from the political side that opposes carbon pricing to support this policy publicly. Instead, identity affirmation is often less constrained by the contingent political situation of a country; below, I elaborate on how it could be implemented in practice in the context of carbon pricing.

Lucas Jr also discusses various possibilities for manipulating voters' biases to increase their support for a carbon tax but highlights the limits of all these approaches.³⁹ Options include, for instance, adopting the carbon tax when the market price for gasoline is falling, as suggested by Summers:⁴⁰ consumers would be anchored to the higher price, so they would therefore feel less the effect of the carbon tax on energy prices. Besides the potential ethical concerns that manipulating voters' biases may pose,⁴¹ Summers' approach risks being a partial solution: if the market price for gasoline rises, it can become difficult for governments to increase the carbon tax rate to reflect the rising social cost of carbon. The French Yellow Vests experience supports this idea.

Lastly, Ayres proposes a social contracting mechanism in which citizens can express their preferred provision points to increase voluntary participation in a carbon tax.⁴² This study shows that allowing people to express their preferred provision point enables the achievement of higher levels of support for a carbon tax compared to a situation in which the provision point is exogenously determined.⁴³ While potentially useful, the applicability of this strategy might be limited in some contexts. For instance, applying this strategy to the road transport sector might require setting up a system that applies a differentiated price depending on whether the gasoline/diesel purchaser is a member of the tax scheme or not. Some countries may not have the capacity to put in place such a scheme and to effectively monitor compliance.

This short review highlights that, while the behaviourally informed research on increasing public support for carbon pricing is growing quickly, there are still challenges ahead. This article aims to contribute to this research by describing an alternative strategy for overcoming public resistance to carbon prices. My proposal also has limits, which I discuss below, and should be seen as complementary to the approaches discussed above.

III. PUBLIC BELIEFS ABOUT THE EFFECTIVENESS OF CARBON PRICING

This section discusses the climate benefits and co-benefits of carbon pricing and argues that low levels of public support for these measures are often the result of public distrust towards the effectiveness of carbon pricing at yielding these benefits.

³⁹ *ibid.*

⁴⁰ L Summers, "Let This Be the Year When We Put a Proper Tax on Carbon" (*Financial Times*, 5 January 2015) <<http://www.ft.com/content/10cbla60-9277-11e4-afd-00144feabd0>>.

⁴¹ Lucas Jr, *supra*, note 9.

⁴² Ayres, *supra*, note 18.

⁴³ *ibid.*

1. The climate and non-climate benefits of carbon pricing

Substantial evidence indicates that carbon taxes are an effective instrument for curbing carbon emissions.⁴⁴ Andersson analyses the impact of the Swedish carbon tax on emissions from transport fuels by using a synthetic control method.⁴⁵ He finds that the Swedish carbon tax reduced emissions by about 6% per year between 1990 and 2005. Murray and Rivers⁴⁶ review the existing research on the abatement impact of the British Columbia carbon tax. This research, conducted using various methods (eg time-series analysis and difference in difference analysis), suggests that the British Columbia carbon tax has reduced emissions by between 5% and 15% since its implementation in 2008. Other research looks at the impact of ETSs on emissions. A large part of this literature focuses on the EU ETS – the largest ETS worldwide in terms of carbon emissions covered until the Chinese ETS will be fully implemented. Bel and Joseph find that the abatements induced by the EU ETS in the period 2005–2012 range between 33.78 and 40.76 MgT.⁴⁷ Their article provides a more conservative estimate of the abatements yield by the EU ETS than previous studies because it better isolates the mitigation effects of the EU ETS from those of the 2008 economic crisis. Evidence on the Regional Greenhouse Gas Initiative (RGGI) suggests that, in the absence of this ETS, emissions in the consortium of north-eastern US states could have been 24% higher from the start of this programme (2009) to 2012.⁴⁸

Research also indicates that carbon pricing can yield co-benefits, such as improved air quality. For instance, Thompson and co-authors analyse the air quality-related health benefits of a hypothetical US ETS in a scenario analysis.⁴⁹ Their results suggest that, while the health benefits of the policy vary per type of scenario, in some scenarios they outweigh the economic costs of the policy.⁵⁰ Another study finds that a hypothetical carbon tax implemented in Massachusetts with a tax rate that increases from US\$10 to US\$40 per tonne of carbon in the period 2017–2023 would save about 340 lives, both in Massachusetts (about 63% of the total) and in nearby states.⁵¹ Studies conducted outside of the USA confirm these results. For instance, a study finds that if China implements a carbon price that is consistent with its Nationally Determined Contribution pledge under the Paris Agreement to peak emissions in 2030, air quality improvements will prevent about 160,000 premature deaths.⁵²

⁴⁴ Andersson, *supra*, note 7; Murray and Rivers, *supra*, note 7.

⁴⁵ Andersson, *supra*, note 7.

⁴⁶ Murray and Rivers, *supra*, note 7.

⁴⁷ G Bel and S Joseph, “Emission Abatement: Untangling the Impacts of the EU ETS and the Economic Crisis” (2015) 49 *Energy Economics* 531.

⁴⁸ BC Murray and PT Maniloff, “Why Have Greenhouse Emissions in RGGI States Declined? An Econometric Attribution to Economic, Energy Market, and Policy Factors” (2015) 51 *Energy Economics* 581.

⁴⁹ Thompson et al, *supra*, note 7.

⁵⁰ *ibid.*

⁵¹ Buonocore et al, *supra*, note 7.

⁵² Li et al, *supra*, note 7.

Carbon pricing can also yield other domestic co-benefits, such as improved energy security related to the incentives to invest in renewable energy technology⁵³ and reduced traffic congestion and accidents if implemented in the road transport sector.⁵⁴

2. Public distrust in the effectiveness of carbon pricing

Despite the evidence discussed in the previous section, in many countries, large segments of the public are sceptical of the environmental effects of carbon pricing, and this scepticism is a primary cause of public opposition to carbon taxes.⁵⁵ For instance, focus group research in Denmark indicates that many citizens see environmental taxes as instruments to raise revenues and doubt their abatement effects; this study shows that businesses share similar views.⁵⁶

A survey conducted by Baranzini and Carattini in the Geneva canton (Switzerland) finds that 52% of respondents do not trust that a carbon tax can reduce carbon emissions.⁵⁷ In addition, this study finds that many do not expect the measure to deliver co-benefits: only 42% believe that the measure would yield health improvements, and the share is even lower for traffic congestion (27%) and road accidents (18%).⁵⁸ Importantly, this study finds that beliefs about the environmental effects of the carbon tax represent a strong predictor of support for the measure.⁵⁹

Recent evidence from France hints in the same direction. Douenne and Fabre survey a representative sample of the French population regarding their expectations on the environmental effects of increasing the tax rate of the French carbon tax by €50 per tonne of carbon on heating fuel and gas (one condition) or on gasoline and diesel (other condition).⁶⁰ Revenues from this hypothetical tax reform are rebated to households. They find that only 17% of the respondents believe that the tax would be effective at reducing pollution and fighting climate change, 66% do not believe that the tax reform would be effective and the remaining answer: “Don’t know”.⁶¹ They also find that beliefs about the environmental effects of the reform have a substantial influence on its public acceptance.⁶²

An explanation of why the general public does not trust the effectiveness of carbon pricing is that the public understands environmental taxes as instruments that aim to raise revenues in order to fund environmental projects. Therefore, these instruments

⁵³ A Baranzini et al, “Carbon Pricing in Climate Policy: Seven Reasons, Complementary Instruments, and Political Economy Considerations” (2017) 8 *Wiley Interdisciplinary Reviews: Climate Change* e462.

⁵⁴ I Parry, C Veung and D Heine, “How Much Carbon Pricing Is in Countries’ Own Interests? The Critical Role of Co-Benefits”, IMF Working Paper (2014).

⁵⁵ Carattini et al, *supra*, note 5.

⁵⁶ J Klok et al, “Ecological Tax Reform in Denmark: History and Social Acceptability” (2006) 34 *Energy Policy* 905.

⁵⁷ Baranzini and Carattini, *supra*, note 5.

⁵⁸ *ibid.*

⁵⁹ *ibid.*

⁶⁰ T Douenne and A Fabre, “Yellow Vests, Carbon Tax Aversion, and Biased Beliefs” (2020), working paper.

⁶¹ *ibid.*

⁶² *ibid.*

are perceived as ineffective unless revenues are earmarked for green spending.⁶³ Evidence on public preferences for carbon revenues spending supports this claim because public support for carbon pricing tends to increase when revenues are devoted to green spending.⁶⁴ Data on carbon revenue use also corroborate the claim: as of 2018, governments devote a large share of carbon revenues (almost 42% worldwide) to supporting environmental policies.⁶⁵ Relatedly, Carattini and co-authors find that informing citizens of the environmental effects of carbon taxes reduces public demand for green earmarking of carbon revenues.⁶⁶ Another, not necessarily incompatible, explanation of the mismatch between expectations and reality is that people underestimate the price elasticity of demand for carbon-intensive products (ie they underestimate how much a carbon tax can reduce the consumption of these products).⁶⁷

In the next section, I argue that motivated reasoning is an additional factor that contributes to maintaining – or even increasing – the mismatch between the evidence and the perceived effectiveness of carbon taxes. I also argue that governments can use measures of implicit carbon pricing to overcome the motivated reasoning that hinders public support for explicit carbon pricing.

IV. MOTIVATED REASONING AND THE PERCEIVED EFFECTIVENESS OF CARBON TAXES

Directed motivated reasoning refers to the human tendency to hold beliefs in order to pursue specific goals other than accuracy,⁶⁸ and it is often a product of unconscious and automatic processes.⁶⁹

Prior literature has linked motivated reasoning with differences in perception of climate change risks.⁷⁰ More recently, Lucas Jr has argued that politically orientated motivated reasoning (ie directed motivated reasoning due to identity and ideology) may explain Republicans' rejection of carbon taxes in the USA.⁷¹ Below, I expand this argument in two ways: first, by elaborating on additional reasons as to why motivated reasoning reduces public support for carbon pricing within and outside the USA. Second, I argue that measures of implicit carbon pricing can help overcome public opposition to carbon pricing that is due to directed motivated reasoning.

⁶³ Dresner et al, *supra*, note 5; H Sælen and S Kallbekken, "A Choice Experiment on Fuel Taxation and Earmarking in Norway" (2011) 70 *Ecological Economics* 2181.

⁶⁴ D Klenert et al, "Making Carbon Pricing Work for Citizens" (2018) 8 *Nature Climate Change* 669.

⁶⁵ PMR, *Carbon Revenue Use* (Washington, DC, World Bank 2019).

⁶⁶ S Carattini et al, "Green Taxes in A Post-Paris World: Are Millions of Nays Inevitable?" (2017) 68 *Environmental and Resource Economics* 97.

⁶⁷ Carattini, *supra*, note 5.

⁶⁸ JN Druckman and MC McGrath, "The Evidence for Motivated Reasoning in Climate Change Preference Formation" (2019) 9 *Nature Climate Change* 111.

⁶⁹ B Bénabou and J Tirole, "Mindful Economics: The Production, Consumption, and Value of Beliefs" (2016) 30 *Journal of Economic Perspectives* 141.

⁷⁰ D Kahan et al, "The Polarizing Impact of Science Literacy and Numeracy on Perceived Climate Change Risks" (2012) 2(10) *Nature Climate Change* 732.

⁷¹ Lucas Jr, *supra*, note 9.

1. Energy price increases and the benefits of carbon pricing

Empirical evidence from various countries indicates that one of the reasons as to why the public tends to reject carbon pricing is because it fears the personal costs of this policy.⁷² Douenne and Fabre find that the perceived personal costs of the measure represent critical factors that affect acceptance.⁷³ This article also finds that people tend to overestimate the impact that carbon pricing has on their households (compared to estimated effects). These findings confirm previous research that shows a correlation between self-interest – measured in the number of cars owned – and the acceptance of carbon taxes in a post-ballot vote survey.⁷⁴

Research on directed motivated reasoning suggests that people tend to update their beliefs less when they receive negative news than when exposed to positive news.⁷⁵ When a government proposes a carbon tax, citizens that fear energy price increases may engage in directed motivated reasoning and update little (or not update) their beliefs on the climate and non-climate benefits of carbon pricing, even when exposed to information that points in this direction. Fear for the personal costs of carbon pricing can thus contribute to public underestimation of the benefits of carbon pricing. A recent survey experiment provides some evidence that supports this hypothesis. Douenne and Fabre find that respondents that *oppose* an increase in the tax rate of the French carbon tax update less their belief about the impact of the measure on their households when informed that the measure is likely to have a positive impact on their disposable income than when they are informed that the measure would worsen their financial situation.⁷⁶ These results indicate that people that oppose carbon taxes are more likely to reject positive information on the effects of the policy relative to negative information. A similar effect may occur regarding the environmental effects of carbon taxes.

One could argue that the opposite effect could occur, too (ie people focus on the benefits of carbon pricing and do not update their beliefs regarding its costs). While possible, there are reasons to believe that motivated reasoning will tend to work in the direction of rejecting information on the benefits of carbon pricing. A key reason for this is the temporal distribution of costs and benefits of carbon pricing. The introduction of a carbon price will increase energy prices from the outset and deliver climate benefits in a more extended period.⁷⁷ Mitigation benefits do not necessarily occur immediately after the government reforms environmental taxes. Although carbon pricing can reduce fuel consumption in the short term, some of the abatements induced by this policy will take place only when businesses replace existing polluting assets with greener ones.⁷⁸ The investments can take decades, and their viability may

⁷² Carattini et al, *supra*, note 5.

⁷³ Douenne and Fabre, *supra*, note 60.

⁷⁴ P Thalmann, “The Public Acceptance of Green Taxes: 2 Million Voters Express Their Opinion” (2004) 119 *Public Choice* 179.

⁷⁵ Z Kunda, “The Case for Motivated Reasoning” (1990) 108 *Psychological Bulletin* 480.

⁷⁶ Douenne and Fabre, *supra*, note 60.

⁷⁷ Pigato, *supra*, note 12.

⁷⁸ JD Jenkins, “Political Economy Constraints on Carbon Pricing Policies: What Are the Implications for Economic Efficiency, Environmental Efficacy, and Climate Policy Design?” (2014) 69 *Energy Policy* 467.

depend on future technological advancements. Relatedly, some of the co-benefits (eg improved air quality) may not necessarily occur in the short term. In addition, the benefits of carbon pricing from carbon revenue use depend on the specific spending plan. For instance, if governments distribute revenues via cash transfers, citizens may benefit in the short term.⁷⁹ However, if governments use revenues for green spending, some of the benefits are delayed, at least the climate ones. The temporal distribution of the cost and benefits of carbon pricing can make the costs more salient in the minds of citizens than the benefits, thus triggering directed motivated reasoning that prevents the education of the public regarding the benefits of these policies. In addition, many of the benefits of carbon pricing are more diffuse and less tangible than energy price increases. It is thus plausible that the energy price increases will tend to be more salient in citizens' minds and induce people to engage in motivated reasoning that reduces support for explicit carbon pricing.

A public debate or a campaign on the environmental effects of (existing) implicit carbon prices can help address this problem because it does not, by itself, threaten a fuel price increase. Therefore, this debate may enable policymakers to educate people about the virtues of carbon pricing by discussing the existing fiscal framework, without the need to push for a policy change. After governments persuade citizens about the benefits of carbon pricing, the latter may become less opposed to the introduction of a carbon tax or an ETS at a later stage.

Notice that there are two reasons as to why learning about the benefits of implicit carbon pricing can induce people to trust more in the effectiveness of explicit carbon pricing after the government announces the intention to introduce the latter measure. First, if citizens have more confidence in the environmental effects of carbon pricing before hearing about the benefits of carbon taxes and ETSs, they may end up holding more positive expectations about the environmental effects of these policies, even if they update this belief as much as they would have done if they had not heard about implicit carbon pricing first. Second, when people trust in the environmental effects of carbon pricing more before learning about carbon taxes and ETSs, they may update their beliefs more when hearing about the benefits of these measures. To illustrate this point, a person that is very sceptical of the environmental effects of carbon taxes may perceive evidence that counters this belief as weak. This person may hence update their belief less when confronted with such evidence than a person that trusts more in the effectiveness of carbon taxes and ETSs.⁸⁰ Notice that, in this case, the low magnitude of the update can result from a desire to reach accurate beliefs or to maintain a prior belief. In both cases, persuading citizens about the benefits of carbon pricing before announcing the intention to introduce a carbon tax or an ETS may induce citizens to update more their beliefs regarding the benefits that these measures can yield.

⁷⁹ PMR, *supra*, note 65.

⁸⁰ Evidence of this "prior attitude effect" outside of the context of climate change is provided in CG Lord, L Ross and MR Lepper, "Biased Assimilation and Attitude Polarization: The Effects of Prior Theories on Subsequently Considered Evidence" (1979) 37 *Journal of Personality and Social Psychology* 2098. For a discussion of the prior attitude effect in the context of climate change communication, see Druckman and McGrath, *supra*, note 68.

To implement a campaign of this type, governments need to produce reliable estimates of the benefits of carbon pricing, if necessary by also relying on collaborations with institutions that have a strong capacity to produce such estimates, such as the Organisation for Economic Co-operation and Development (OECD), the International Monetary Fund (IMF) or the World Bank. Communication campaigns could then aim to help the public to associate these benefits with carbon pricing.

2. Identity, values and the benefits of carbon pricing

People may update less (or not update) their beliefs about the environmental effectiveness of carbon taxes because they pursue identity-protective goals.⁸¹ Some studies suggest that people reject information on climate change when this is presented in a fashion that threatens self-identity.⁸² For instance, conservatives may become more open to environmental issues when this information conforms with their moral commitments than when the same issues conform to moral standards that appeal more to liberals.

An alternative hypothesis (the cultural cognition hypothesis) is that people reject climate change-related information that is incompatible with their and their peers' values and identities because this information is a threat to their social standing.⁸³ A person derives benefits (material and psychological) from their peers, and holding beliefs that are compatible with theirs helps people to acquire or maintain status in their groups.⁸⁴ In the context of carbon pricing, individuals that hold free-market values and feel that carbon taxes are not in line with these values may reject information on the benefits of these policies. Experimental evidence supports this hypothesis. In an incentivised study, Cherry and co-authors find that worldviews are a key factor associated with the rejection of carbon taxes among people that hold hierarchical/individualistic worldviews.⁸⁵ Scholarship refers to motivated reasoning that is due to these dynamics as politically motivated reasoning.

I argue that a public discourse on implicit carbon pricing may induce citizens to perceive carbon pricing less as a partisan policy in countries where fuel tax and fossil fuel subsidy reforms are less partisan than carbon taxes themselves.⁸⁶ An example of this situation is the US context, where existing energy taxes are likely to be perceived as less politically charged instruments than carbon taxes and ETSs. Historically, both Democratic and Republican governments have introduced fuel taxes, and thus the two main parties in the US political scene can take credit for any climate and non-climate benefits that these policies may produce. Moreover, some of these taxes have been in

⁸¹ Lucas Jr, *supra*, note 9.

⁸² M Feinberg and R Willer, "The Moral Roots of Environmental Attitudes" (2013) 24 *Psychological Science* 56.

⁸³ RK Garrett, "Strategies for Countering False Information and Beliefs about Climate Change" in *Oxford Research Encyclopedia of Climate Science* (2017).

⁸⁴ D Kahan, "Ideology, Motivated Reasoning, and Cognitive Reflection: An Experimental Study" (2013) 8 *Judgment and Decision Making* 407.

⁸⁵ TL Cherry, S Kallbekken and S Kroll, "Accepting Market Failure: Cultural Worldviews and the Opposition to Corrective Environmental Policies" (2017) 85 *Journal of Environmental Economics and Management* 193.

⁸⁶ Notice that, in some countries, public opposition to fuel subsidy reforms might be more politically contentious than carbon taxes and ETSs. For instance, in 2017, protests erupted in Mexico against a sharp cut in fossil fuel subsidies; see D Agren, "Mexico Protests: How Gas Prices Lit the Flame Under a Quietly Smoldering Rage" (*The Guardian*, 9 January 2017) <<https://www.theguardian.com/world/2017/jan/09/mexico-gasoline-price-protest-gasolinazo>>.

place for decades, introduced by politicians who may no longer be part of the political scene. To the extent that this strategy works, citizens may become more open to learning about the non-climate benefits of carbon pricing and may be less averse to explicit carbon pricing at a later stage.

There is one crucial exception to this hypothesis. Individuals that hold hierarchical/individualistic worldviews tend to be sceptical of climate change risks and tend to be more worried about the economic burden that climate change mitigation policies may impose on productive activities.⁸⁷ It might, therefore, be the case that discussing fuel taxes as carbon prices does not help to close the gap between the perceived and actual environmental benefits of carbon taxes among individuals that hold hierarchical/individualistic worldviews. It is also possible that if hierarchical/individualistic individuals start perceiving fuel taxes as climate change policies, their support for these measures decreases (the communication strategy would backfire). Empirical evidence on this effect is needed, however. Findings that point in this direction would recommend adopting specific communication strategies that overcome this barrier. Below, I discuss three options that look in this direction.

A first option would be to avoid discussing the climate-related benefits of fuel taxes and fossil fuel subsidy reforms and limit the public debate to their co-benefits. This approach might prevent citizens that hold hierarchical/individualistic worldviews from rejecting information about the co-benefits of carbon pricing because there will be no reference made to the climate effects of these instruments. However, this approach may also reduce support for implicit (and explicit) carbon pricing among individuals that are in favour of more ambitious policy action on climate change mitigation. Which of the two approaches, if any, yields greater public support for carbon pricing may depend on context, such as on the proportions of hierarchical/individualistic and communitarian/egalitarian individuals in the population reached by the communication campaign.

Second, a potential strategy to overcome politically motivated reasoning is to communicate climate change-related information using a two-channel strategy, as suggested by Kahan and co-authors.⁸⁸ While the first channel focuses on furnishing accurate and scientifically sound information, the second channel focuses on cultural meanings to ensure that the information is presented so that it does not threaten the standing of the individual in its group. In the context of carbon pricing, highlighting that revenues from energy taxes can support activities that facilitate entrepreneurship and commerce, such as reducing taxes on capital⁸⁹ or finance infrastructure projects that enable trade growth (eg increasing ports capacity), may activate the second channel. Empirical evidence from climate change communication suggests that this strategy might be successful. Kahan and co-authors find that exposing survey

⁸⁷ D Kahan et al, "The Polarizing Impact of Science Literacy and Numeracy on Perceived Climate Change Risks" (2012) 2 *Nature Climate Change* 732.

⁸⁸ D Kahan et al, "Geoengineering and Climate Change Polarization: Testing a Two-Channel Model of Science Communication" (2015) 658 *Annals of the American Academy of Political and Social Science* 192.

⁸⁹ Some research suggests that reducing taxes on capital can deliver a double dividend: increased economic activity and reduced pollution. See LH Goulder, "Environmental Taxation and the Double Dividend: A Reader's Guide" (1995) 2 *International Tax and Public Finance* 157.

respondents to information about geoengineering as a potential solution to climate change increases the acceptance of information on climate change risks among individuals that uphold hierarchical/individualistic worldviews.⁹⁰ Stressing geoengineering as a potential solution to climate change highlights that addressing climate change does not necessarily harm commerce and industry development, and it is thus more appealing to individuals that hold hierarchical/individualistic worldviews.⁹¹ Policymakers might be able to achieve similar results by providing information on carbon revenue spending that is pro-industry/commerce.

A third, potentially complementary, strategy consists of making sure that experts on both sides of the value/identity spectrum deliver the information on the climate benefits and co-benefits of implicit carbon pricing – so-called pluralistic advocacy. When bipartisan experts support the truthfulness of the information, people may perceive it as less threatening to their identity/values, and may thus be more open to accepting it.⁹² As mentioned above, the possibility of implementing this strategy is contingent on the political situation of each country.

Notice that the effectiveness of these three strategies at overcoming politically motivated reasoning remains an empirical question that calls for empirical investigations.

V. A GENERAL CHALLENGE AND A POTENTIAL SOLUTION

In the previous section, I have discussed why measures of implicit carbon pricing could be used to overcome motivated reasoning that induces the public to reject information on the climate and non-climate benefits of carbon pricing. In this section, I discuss a general reason as to why communicating with the public about implicit carbon pricing may not increase public support for explicit carbon pricing and a possible solution to this problem.

A public debate on implicit carbon pricing may induce people to believe that existing implicit carbon prices are sufficient to address climate change and thus increase public opposition to the introduction of new carbon prices. This risk exists because the communication regarding implicit carbon prices would highlight that other instruments that are already in place in the jurisdiction have mitigation effects that are similar to those of explicit carbon prices (ie they both result in a marginal incentive to reduce carbon emissions).

One way to mitigate this risk is to inform the public that other countries impose much higher implicit carbon prices than those imposed domestically. This communication strategy can be easily implemented in many developed countries, including the USA and the EU. Recent IMF estimates show that implicit carbon prices are much higher in some low-income countries (especially African countries) than in most Western countries because, in the former, most of the emissions come from the road transport sector, and road transport fuels are heavily taxed.⁹³

⁹⁰ Kahan et al, *supra*, note 88.

⁹¹ *ibid.*

⁹² D Kahan, “Fixing the Communications Failure” (2010) 463 *Nature* 296.

⁹³ IMF, *supra*, note 2.

Informing the public about the higher implicit carbon prices implemented abroad could trigger a positive response in the population towards these instruments because learning that others are contributing more to public goods can induce people to increase their own contributions, as well as in the context of global commons, such as climate change mitigation.⁹⁴ Ostrom proposes that a proportion of the global population is composed of conditional cooperators (ie of individuals that are willing to mitigate climate change as long as they believe that others will reciprocate fairly).⁹⁵ Studies on public goods games in the lab, as well as evidence from studies on peer effects on cooperation on climate change mitigation,⁹⁶ support this claim. In the context of the present article, informing citizens that other countries have more ambitious implicit carbon prices in place may induce greater acceptance of carbon prices in the population targeted by the information campaign.

VI. CONCLUSION

In this article, I have argued that motivated reasoning contributes to maintaining low levels of public trust in the environmental effectiveness of carbon pricing, thereby keeping low levels of public support for these measures. In particular, my argument is that the public may reject information on the benefits of carbon pricing because the public perceives of carbon pricing as being incompatible with its values or identity⁹⁷ or because it fears energy price increases.

The article also discusses a strategy that may help to overcome this problem, thereby contributing to the literature on elaborating strategies to overcome public opposition to carbon pricing.⁹⁸ This article also contributes to the research on implementing the “polluter pays” principle in climate change policy.⁹⁹ I built on recent OECD and IMF work that estimates measures of implicit carbon prices, and I argue that governments can use these measures in communication campaigns to communicate with the public about the benefits of carbon pricing within the existing fiscal framework, without the need to threaten new price increases. In addition, I have argued that, in some countries, policy instruments that price carbon implicitly tend to be less politically polarised policies because, historically, they have been implemented by governments supported by various political parties. Often, these measures have also been implemented many years ago by politicians that may not be part of the current political landscape.

⁹⁴ E Ostrom, “Polycentric Systems for Coping with Collective Action and Global Environmental Change” (2010) 20 *Global Environmental Change* 550; S Carattini, S Levin and A Tavoni, “Cooperation in the Climate Commons” (2019) 13 *Review of Environmental Economics and Policy* 227.

⁹⁵ *ibid.*

⁹⁶ I Ayres, S Raseman and A Shih, “Evidence from Two Large Field Experiments That Peer Comparison Feedback Can Reduce Residential Energy Usage” (2013) 29 *Journal of Law, Economics, and Organization* 992; Carattini et al, *supra*, note 94; J Rode and A Weber, “Does Localized Imitation Drive Technology Adoption? A Case Study on Rooftop Photovoltaic Systems in Germany” (2016) 78 *Journal of Environmental Economics and Management* 38.

⁹⁷ Lucas Jr, *supra*, note 9.

⁹⁸ Ayres, *supra*, note 18; Carattini et al, *supra*, note 5; Dominiononi and Heine, *supra*, note 4; Lucas Jr, *supra*, note 9.

⁹⁹ Heine et al, 2020, *supra*, note 19.

Lastly, this article has discussed various limits to the use of measures of implicit carbon pricing in order to overcome motivated reasoning, and it has illustrated various strategies that may help us to overcome these limits.

The solutions proposed in this article are in line with the idea of addressing public resistance to accurate information on risks,¹⁰⁰ thereby enabling us (at least potentially) to implement risk regulation that is aligned with public attitudes towards these risks.

¹⁰⁰ Kahan et al, *supra*, note 15.