

Effectiveness of Carbon Pricing

Question:

How effective are carbon prices?

Answer:

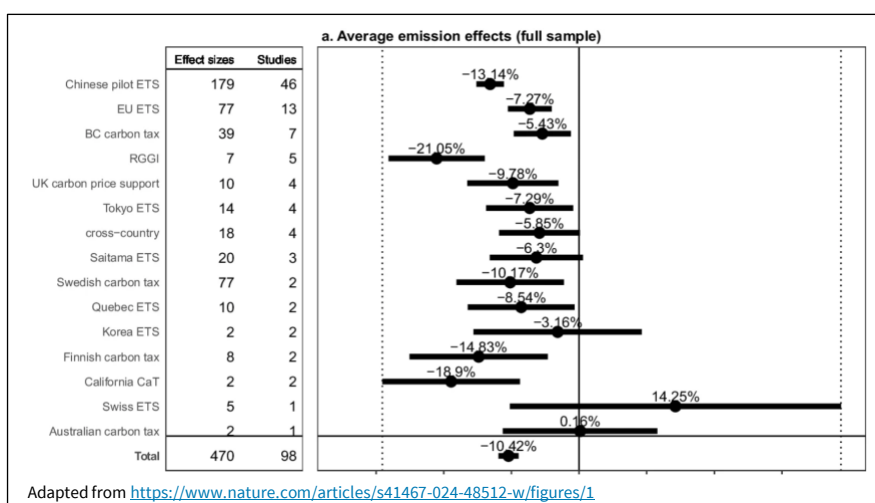
Economists overwhelmingly favour carbon taxes as “[the most cost-effective lever to reduce carbon emissions at the scale and speed that is necessary](#),”¹ but specific empirical evidence for the benefits of carbon pricing in real-world applications is surprisingly sparse and uneven.

It is difficult to determine causality when myriad factors influence greenhouse gas emissions—changes in GDP, new technology, the shifting mix of industrial production, variations in international trade, and even the weather. The same problem afflicts a wide range of empirical assessments, ranging from the clinical value of new drugs to the effectiveness of anti-poverty programs. Thousands of empirical economists spend their time developing and implementing sophisticated statistical methods to measure the true impact of key inputs on outcomes of interest. Their answers, unfortunately, are rarely cut and dried.

A [major new study](#)² published in *Nature Communications* offers reassurance that carbon taxes really are effective. The paper provides a “rigorous, machine-learning assisted systematic review and meta-analysis” of 80 evaluations of 21 carbon pricing policies around the world. It finds at least 17 of those policies “yielded immediate and substantial emission reductions” and “statistically significant emissions reductions” ranging from 4% to 15%, despite low carbon prices in most cases.

One promising finding is that emissions appear to fall more as years go by, likely as new investments and new technologies take root in response to carbon prices. Evidence also confirms that rising carbon prices within a country (greater “policy stringency”) do indeed lower emissions.

Until now, policy makers have had to draw mostly from unsystematic literature reviews—laundry lists



of empirical papers offering brief synopses of often-conflicting results. One of the first systematic attempts to summarize the empirical literature on carbon pricing effectiveness was [published in 2021](#)³ by the Canadian political scientist Jessica Green.

Green concluded that carbon pricing had only “a

¹ <https://www.econstatement.org>

² <https://www.nature.com/articles/s41467-024-48512-w>

³ <https://iopscience.iop.org/article/10.1088/1748-9326/abdae9>

limited impact on emissions,” probably reducing them less than 2% per year. That finding wasn’t particularly helpful, since it did not relate the effectiveness of the policy to the price. That was be akin to judging the effectiveness of drugs without noting the dose.

Nonetheless, her study was highly influential. The authors of the new study mention Green’s study only briefly, dismissing it for lacking “any formal methodology” for evaluating the studies she considered. In contrast, they boast, “our methodology is transparent and reproducible,” and thus suitable for incorporating new studies as they appear.

Moreover—and this is no criticism of Green—many relevant studies have appeared since she pulled together the papers for her article. Time and again they support the overall effectiveness of carbon pricing, particularly when prices rise to meaningful levels. Jonathan Marshall discusses some of these studies in his recent book, [Carbon Pricing: Why We Need It, How It’s Working, and How to Build Support](#)⁴.

Recent relevant empirical studies of carbon pricing effectiveness:

- Rohan Best, et al., “[Carbon Pricing Efficacy: Cross-Country Evidence](#),” *Environmental and Resource Economics*, 77 (June 2020), 69–94.
- Mojtaba Khastar et al., “[How does carbon tax affect social welfare and emission reduction in Finland?](#)” *Energy Reports*, 6 (November 2020), 736-744.
- Klaus Gugler et al., “[Effectiveness of climate policies: Carbon pricing vs. subsidizing renewables](#),” *Journal of Environmental Economics and Management*, 106 (March 2021).
- Ryan Rafaty, et al., “[Carbon Pricing and the Elasticity of CO2 Emissions](#),” Resources for the Future Working Paper (21-33), October. 25, 2021.
- Torben Medeksa, “[Pricing for a Cooler Planet: An Empirical Analysis of the Effect of Taxing Carbon](#),” CESifo Working Paper, No. 9172, Munich, 2021.
- Jan Abrell et al., “[How Effective Is Carbon Pricing?—A Machine Learning Approach to Policy Evaluation](#),” ZEW-Leibniz Centre for European Economic Research, Discussion Paper 21-039, April 2021.
- Emanuel Kohlscheen et al., “[Effects of Carbon Pricing and Other Climate Policies on CO2 Emissions](#),” CESifo Working Paper No. 9347, October 18, 2021.
- Marion Leroutier, “[Carbon pricing and power sector decarbonization: Evidence from the UK](#),” *Journal of Environmental Economics and Management*, 111 (January 2022).
- Filippo D’Arcangelo, et al., “[Estimating the CO2 emission and revenue effects of carbon pricing: New evidence from a large cross-country dataset](#),” OECD Economics Department Working Papers, no. 1732, November 14, 2022.
- Diego R. Känzig and Maximilian Konradt, “[Climate Policy and the Economy: Evidence from Europe’s Carbon Pricing Initiatives](#),” NBER Working Paper 31260, August 2023.
- Klaus Gugler, et al., “[Carbon pricing and emissions: Causal effects of Britain’s carbon tax](#),” *Energy Economics*, 121 (May 2023).
- Massimo Bordignon et al., “[Third Time’s a Charm? Assessing the Impact of the Third Phase of the EU ETS on CO2 Emissions and Performance](#),” *Sustainability*, 15 (2023).
- Antoine Dechezleprêtre et al., “[The joint impact of the European Union emissions trading system on carbon emissions and economic performance](#),” *Journal of Environmental Economics and Management*, 118 (2023).
- Bertrand Candelon and Jean-Baptiste Hasse, “[Testing for causality between climate policies and carbon emissions reduction](#),” *Finance Research Letters*, May 2023.

⁴ <https://static.prod01.ue1.p.pcomm.net/cclobby/content/resources/economics/Carbon-Pricing-Book-Marshall.pdf>