



# Carbon pricing and the elasticity of CO<sub>2</sub> emissions

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**Abstract** We study the impact of carbon pricing on CO<sub>2</sub> emissions across five sectors for a panel of 39 countries over 1990-2016. Using newly constructed sector-level carbon price data, we implement a novel approach to estimate the changes in CO<sub>2</sub> emissions associated with (i) the introduction of carbon pricing regardless of the price level; (ii) the implementation effect as a function of the price level; and (iii) post-implementation marginal changes in the CO<sub>2</sub> price. We find that the introduction of carbon pricing has reduced growth in CO<sub>2</sub> emissions by 1% to 2.5% on average relative to counterfactual emissions, with most abatement occurring in the electricity and heat sector. Exploiting variation in carbon pricing to explain heterogeneity in treatment effects, we find an imprecisely estimated semi-elasticity of a 0.05% reduction in emissions growth per average \$1/metric ton (hereafter abbreviated as: ton) of CO<sub>2</sub>. After the carbon price has been implemented, each marginal price increase of \$1/tCO<sub>2</sub> has temporarily lowered the growth rate of CO<sub>2</sub> emissions by around 0.01%. These are disappointingly small effects. Simulating potential future emissions reductions in response to carbon price paths, we conclude that –in the absence of complementary non-pricing policy interventions – carbon pricing alone, even if implemented globally, is unlikely to be sufficient to achieve emission reductions consistent with the Paris climate agreement.

**Keywords** Carbon Pricing, CO<sub>2</sub> Emissions, Decarbonization, Carbon Tax, Climate Change, Climate Policy

**JEL Classification** Q43, Q48, Q54, Q58, H23

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