How Effective was the UK Carbon Tax?—A Machine Learning Approach to Policy Evaluation

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While carbon pricing is largely viewed as a rationale policy response to climate change by the economics discipline, surprisingly little is known about its performance from an ex-post perspective. This paper evaluates the environmental and cost effectiveness of the UK Carbon Price Support, a carbon tax levied on all fossil-fueled power plants in the market. We propose a novel approach for estimating the treatment effect of a policy intervention in the absence of a control group which leverages machine learning techniques, high-frequency market data, and economic theory. We find that between 2013 and 2016 the carbon tax reduced emissions by 6.2 percent at an average cost of 18.2 Euro per tonne. Simulating the machine-learned model, we characterize the empirical conditions influencing the effectiveness of the tax policy. We find that the ratio of carbon tax-exclusive prices for coal and natural gas is by far the most important driver. (JEL Q41, Q42, Q58)