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Detecting Impact of Allowance Trading Behaviors on Distribution of NOx Emission Reductions under the Clean Air Interstate Rule

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Abstract : Emissions trading, or 'cap-and-trade', has been long promoted by economists as a more cost-effective pollution control approach than traditional performance standard approaches. While there is a large body of empirical evidence for the overall effectiveness of emissions trading, relatively little attention has been paid to other unintended consequences brought by emissions trading. One important consequence is that cap-and-trade could introduce the risk of creating high-level emission concentrations in areas where emitting facilities purchase a large number of emission allowances, which may cause an unequal distribution of environmental benefits. This study will contribute to the current environmental policy literature by linking trading activity with environmental injustice concerns and empirically analyzing the causal relationship between trading activity and emissions reduction under a cap-and-trade program for the first time. To investigate the potential environmental injustice concern in cap-and-trade, this paper uses a differences-in-differences (DID) with instrumental variable method to identify the causal effect of allowance trading behaviors on emission reduction levels under the clean air interstate rule (CAIR), a cap-and-trade program targeting on the power sector in the eastern US. The major data source is the facility-year level emissions and allowance transaction data collected from US EPA air market databases. While polluting facilities from CAIR are the treatment group under our DID identification, we use non-CAIR facilities from the Acid Rain Program - another NOx control program without a trading scheme – as the control group. To isolate the causal effects of trading behaviors on emissions reduction, we also use eligibility for CAIR participation as the instrumental variable. The DID results indicate that the CAIR program was able to reduce NOx emissions from affected facilities by about 10% more than facilities who did not participate in the CAIR program. Therefore, CAIR achieves excellent overall performance in emissions reduction. The IV regression results also indicate that compared with non-CAIR facilities, purchasing emission permits still decreases a CAIR participating facility's emissions level significantly. This result implies that even buyers under the cap-and-trade program have achieved a great amount of emissions reduction. Therefore, we conclude little evidence of environmental injustice from the CAIR program.

Keywords : air pollution, cap-and-trade, emissions trading, environmental justice
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