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Opinion Article

The Role of Policy Strength in Reducing Air Pollution in China

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DESCRIPTION

Joint prevention and control of atmospheric pollution policies are vital in addressing regional pollution problems. This study utilizes the Latent Dirichlet Allocation (LDA) model to create two policy strength measures based on effectiveness and quantity. The effects of policy strength on air pollutant emissions are investigated for four types of joint prevention and control policies. The results reveal that economic incentive policy tools and supporting policy tools have effects on emission reduction that are inconsistent with their policy preferences. Economic incentive policies are the most effective in reducing emissions of sulfur dioxide, nitrogen oxides and dust but are the least effective in practice. Supporting policies, which have the highest strength, have limited impact on reducing emissions. Command-control policies and persuasion policies are both relatively abundant in terms of quantity and effectiveness. Furthermore, policy strength is more influential in reducing air pollutants in key regions compared to non-key regions. Joint prevention and control policies have evolved from single policy tools to multiple tools, with the government focusing more on improving the legal effectiveness of policies after 2015. The study also suggests policy implications to optimize joint prevention and control policies and address regional air pollution.

Air pollution has become an increasingly significant issue in China, with distinct regional characteristics due to the mobility of air. Traditional governance methods have been ineffective in controlling regional air pollution. For instance, although the national goal of reducing sulfur dioxide emissions by 10% was achieved during 2006-2012, regional compound air pollution problems, particularly those involving particulate matter and ground ozone, emerged and worsened. In response to this, the government has adopted joint prevention and control of atmospheric pollution as a central strategy to alleviate regional air pollution. This approach involves interprovincial and multisectoral cooperation, clarifying responsibilities and establishing a scientific air pollution prevention and control system. Examples such as the 2008 beijing olympic fames and the 2014 Asia-Pacific economic cooperation meeting showed that regional cooperation was key to addressing China's air pollution challenges.

China's haze pollution exhibits path-dependent characteristics and spatial spillover effects across time and space. Scholars have identified key areas with consistent pollutant concentrations, providing a basis for delineating key regions for joint prevention and control. For instance, the Beijing-Tianjin-Hebei region, the Yangtze River Delta and the Fenwei Plain have been designated as priority areas for pollution control under the three-year action plan. Studies have shown that regional pollution prevention and control can reduce the costs of air pollution treatment and alleviate environmental inequality due to the regional transport of pollutants. Furthermore, other research has focused on the effects of specific policies, such as the Atmosphere Ten Plans and SO_2 control policies, showing that these measures contribute to air quality improvement.

To address these gaps, this paper quantitatively analyzes China's joint prevention and control policies. Using the LDA model, the study classifies policy texts into five groups and constructs two policy strength measures based on policy subject, type and quantity. The study evaluates how policy effectiveness and quantity influence pollutant emission reductions. This paper makes three contributions: First, it evaluates the impact of joint prevention and control policies on pollutant reduction for the first time, focusing on emission reductions in different policy types and regions. Second, based on these evaluations, the study provides policy suggestions to improve the effectiveness of joint prevention and control. Lastly, the use of the LDA model to quantify policy strength provides an objective and accurate measure of policy effectiveness. The results of this study can inform future policy evaluations and offer insights for improving China's air pollution control strategies.

CONCLUSION

This study highlights the importance of joint prevention and control policies in addressing China's regional air pollution. By utilizing the LDA model, it evaluates the effectiveness and quantity of various policy types, revealing that economic incentive and supporting policies have significant but inconsistent impacts. The study emphasizes that policy strength is more influential in key regions, suggesting the need for

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targeted improvements. As China continues to tackle air pollution, the findings offer valuable insights for optimizing policies, improving legal effectiveness and encouraing interregional cooperation to reduce emissions and improve air quality.