Mathematical model provides new support for environmental taxes

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A new mathematical model provides support for environmental taxation, such as carbon taxes, as an effective strategy to promote environmentally friendly practices without slowing economic growth. Xinghua Fan and colleagues at Jiangsu University, China, publish their model and findings

in the open-access journal *PLOS ONE* on September 4, 2019.

A worldwide "green development" movement calls for reducing pollution and increasing resource utilization efficiency without hindering economic expansion. Many governments have proposed or imposed environmental taxes, such as taxes on carbon emissions, to promote environmentally friendly economic practices. However, few studies have rigorously quantified the effects of environmental taxes on the interconnected factors involved in green development.

To help clarify the impact of environmental taxation, Fan and colleagues developed and validated a mathematical model that reflects the closely integrated relationships between environmental taxes, economic growth, pollution emissions, and utilization of resources, such as water and fossil fuels. Then they applied the model to real-world data in order to analyze the effects of environmental taxes on green development in China.

The analysis suggests that environmental taxes can indeed help to stimulate economic growth, decrease emissions, and improve resource utilization. The researchers explored several different scenarios, finding that the beneficial effects of an environmental tax are enhanced by advanced technology, elevated consumer awareness, and—especially—firm government control.

The authors suggest that their model could be applied to explore the effects of environmental taxes in other countries beyond China. Researchers may also seek to modify the model for application to different industries or economic sectors, as opposed to countries or regions. The model could potentially be improved by identification and incorporation of more sophisticated mathematical relationships between the various green development factors.

More information: Fan X, Li X, Yin J (2019) Impact of

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environmental tax on green development: A nonlinear dynamical system analysis. *PLoS ONE* 14(9): e0221264.
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