

## How does the low-carbon development of urban agglomeration narrow income inequality in China?

Topic: Input-Output Modelling: Energy Policies - II

Author: Xiaoyu Li

Co-Authors: Ye Yao, Zhenni CHEN, ZHAO ZENG, Huibin Du, Shuxian Xu

Low-carbon development of urban agglomeration can not only optimize the allocation of resources by promoting the rapid and unimpeded flow of capital, technology, and other factors across administrative borders. It also can promote fairness through benefit-sharing while achieving the overall carbon targets of urban agglomeration. For addressing climate change, promoting the low-carbon development of urban agglomeration in China is inevitable. However, how does the low-carbon development of urban agglomeration narrow income inequality is unknown, which makes it difficult to provide suggestions for achieving effective and fair coordinated development of urban agglomeration. Therefore, our research question is how does the low-carbon development of urban agglomeration narrow income inequality in China?

In the process of low-carbon development, revenue recycling to complement carbon tax is a way to compensate or even offset the welfare loss induced by mitigation policies, and thus it is conducive to achieving social equity. Our paper evaluates the impacts of integrated carbon tax policy in the urban agglomeration on economics and household welfare and discusses the pathway to narrow income inequality by combining revenue recycling schemes. Among China's 19 national urban agglomerations, the Jing-Jin-Ji urban agglomeration is one of the largest urbanized and most carbon-intensive regions. Therefore, our paper takes the Jing-Jin-Ji urban agglomeration as a study region. The paper constructs a multi-regional computable general equilibrium (CGE) model for urban agglomeration based on various datasets, including a city-level multi-regional input-output (MRIO) table for Jing-Jin-Ji urban agglomeration 2012, national and city-level statistics yearbooks, and city-level statistical bulletin.

For the novelty of our paper, it lies in:

The first contribution is establishing a modeling tool to evaluate the effects of low-carbon policies of urban agglomeration. Existing modeling tools for assessing low-carbon policies mainly focus on the national and regional dimensions, and ignore the policy evaluation from the perspective of the city. Cities play a vital role in global carbon mitigation, and urban agglomeration, a highly developed spatial form of integrated cities, may become an important platform for future international competition. Lacking the city-level modeling tool is difficult to provide guidance for the implementation of low-carbon policies of urban agglomeration. Therefore, our paper for the first time tries to establish a city-level multi-regional CGE model to evaluate the low-carbon policies in China, which can fill the gap that existing research can not provide detailed suggestions for urban agglomeration to address climate change.

The second contribution is designing a carbon tax policy aiming to narrow income inequality under the background of the low-carbon development of urban agglomeration. Actually, the imbalance within the urban agglomeration has become a serious problem, which is against the role of the community of interests for urban agglomeration, and is detrimental to playing the role of radiation. Under the background of addressing climate change, discussing how the low-carbon development of urban agglomeration narrows income inequality has become important. Existing research indicated that the low-carbon development of urban agglomeration is conducive to promoting social equity, while the specific pathways are unknown, which can not provide guidance for the coordinated development of urban agglomeration. Therefore, our paper would provide an effective pathway for urban agglomeration to narrow income inequality based on the integrated carbon tax policy supplemented by revenue recycling, which fills the gap that existing research can not provide suggestions for the coordinated development of urban agglomeration.

There are three preliminary findings in this paper. First, revenue recycling to complement

carbon tax can compensate or even offset the GDP and welfare loss in the whole Jing-Jin-Ji urban agglomeration and each city. Second, not all revenue recycling schemes to complement carbon tax can reduce income inequality. Third, there is the least GDP loss when the carbon revenue is returned to all rural households in the cities of Hebei, and there is the least welfare loss and income inequality when the carbon revenue is returned to rural households with lower income in cities in Hebei.