DISTRIBUTIONAL EFFECTS OF A CARBON TAX ON URBAN AND RURAL HOUSEHOLDS OF CHINA

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Overview

Energy and environmental taxation, especially the carbon taxation, have been demonstrated both theoretically and empirically to be effective policy tools in curtailing carbon emissions resulting from fossil-fuel consumption. However, the imposition of a carbon tax on energy consumption will generally lead to economy-wide price changes through the differential cost changes of producing different goods. While households with different income levels are observed to have different consumption mix of goods, carbon taxation is said to have different tax burden on households in different income groups, which will then lead to a change in the distribution of income of the economy.

The imposition of a carbon tax to mitigate excessive carbon dioxide emissions has been an ongoing policy issue and has attracted extensive discussion for a period of time in China. One of the focal points of discussion is the regressivity of the tax. Researches along this line are not many, however, and existing papers mainly use the input-output quantity model to measure the impact of a carbon tax on the expenditure of goods for different groups. The disadvantage of this method is that the input-output quantity model cannot reflect the price-linked changes in the production sectors, and it is therefore impossible to examine the increase in expenditure caused to consumers. As a result, the burden of consumer spending may be underestimated, leading to biased conclusions. In addition, existing literature seldom examines the different effect of a carbon tax on the income distribution of urban and rural households across China.

Methods

Following the method and steps proposed by Metcalf (1999), this paper uses the input-output price model to calculate the extent of producer price changes for all sectors of the Chinese economy after taxing on primary energy usage. Then, based on the structure of household consumption, the changes in consumption expenditure of different income groups in urban and rural areas are calculated, and the resulting changes in the distribution of household income and the regressivity of carbon tax are finally analyzed.

Results

Our results show that the carbon tax will cause differential price changes for eight categories of consumption goods and, hence, differential tax burden on urban and rural households. Whether in urban or rural areas, the increase in household gas fuel expenditure is found to be much higher than that of other categories of products, followed by the increase in the expenditure of clothing, household equipment and supplies, and transportation and communications products. Comparing urban and rural areas, there is a difference in the price growth of the same consumer product. At the same time, due to the differences in the consumption structure between different income groups in urban and rural areas, there are differences in the increase in expenditure of different income groups in urban and rural areas.

Conclusions

By estimating the proportion of rising expenditures in revenue and the Suits index, we found that carbon taxes are regressive in both urban and rural areas, and rural areas are significantly more regressive than urban. That is to say, relative to income, the increase in consumption expenditures borne by low-income groups is greater than in high-income groups. The increase in expenditures borne by residents in rural areas is higher than that in urban areas. Therefore, we believe that if the government does not adopt some proper tax-recycling measures, the levy of a carbon tax will widen the gap between different income groups in urban and rural areas in China, which is detrimental to the establishment of a harmonious society.

References

[1]Poterba, J.M.,1991,"Is the gasoline tax regressive?",Tax Policy Econ,Vol.5:145–164.

[2]Metcalf,G.E.,1999,"A distributional analysis of green tax reform",Natl. Tax J,Vol.52:655–682.

[3]Jacobsen,H.K.,Birr-Pedersen,K.,Wier,M.,2003,"Distributional implications of environmental taxation in Denmark",Fisc. Stud.,Vol.24:477–499.

[4]Kerkhof,C.A.,Moll,C.H., Drissen,H.,Wilting, C.H.,2008,"Taxation of multiple greenhouse gases and the effects on income distribution: a case study of the Netherlands",Ecol. Econ.,Vol.67:318–326.

[5]Shammin,R.M.,Bullard,W.C.,2009,"Impact of cap-and-trade policies for reducing greenhouse gas emissions on U.S. households",Ecol. Econ.,Vol.68:2432–2438.

[6]Sun wenjun,Kazuhiro Ueta,2011,"The distributional effects of a China carbon tax: a rural–urban assessment",Kyoto Econ. Rev.,Vol.80:188–206.

[7]Qiao-Mei Liang,Yi-Ming Wei,2012,"Distributional impacts of taxing carbon in China: Results from the CEEPA model",Applied Energy,Vol.92: 545–551.

[8]Zhujun Jiang,Shuai Shao,2014,"Distributional effects of a carbon tax on Chinese households: A case of Shanghai",Energy Policy,Vol.73:269–277.