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Estimating the economic cost of China's new desulfur policy during her gradual accession to WTO: The case of industrial SO_2 emission☆

Jie HE*

CERDI, University of Auvergne, 65, Bd. F. Mitterrand, 63000 Clermont-Ferrand, France

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Abstract

To understand the potential impacts of China's accession to WTO on her new desulphur policy (gradual reduction of 10% of annual SO_2 emission by 2005 with respect to that of 2000), we construct a CGE model in which SO_2 emission is directly linked to energy input consumption in production. The model equally considers the substitution possibility between energies of different SO_2 effluent ratios by including energy as labor and capital in the constant elasticity of transformation production function. The positive externality of trade in China's economy is also included. This model is then calibrated into a 55-sector Chinese SAM for the year 1997. Four policy simulations (Business as Usual, Openness policy only, desulfur policy only, and the combination of openness and desulfur policy) are made for the period from 1997 to 2005. The results show that the environmental impact of trade, though proven to be "negative", stays rather modest. This is owing to the industrial composition transformation that deviates the specialization of the Chinese economy towards labor-intensive sectors under the new trade liberalization process. We do not find evidence for the "pollution haven" hypothesis. Seemingly ambitious, the new desulphur policy will only bring small economic growth loss. The pollution reduction objective will be realized mainly by substitution between polluting and less or non-polluting energies. The combination of trade liberalization and pollution control policy seems to give China more flexibility in adapting her economy to the new desulphur objective. Considering these different aspects together, the total

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* Tel.: +33 473177423; fax: +33 473177428.
E-mail address: Jie.HE@u-clermont1.fr.

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economic loss due to the new desulphur policy will be limited to only −0.26% under the presence of trade liberalization.
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1. Introduction

In the last 10 years the Chinese economy was characterized by high growth rates. According to official statistical data, the average growth rate of its real GDP stayed steadily over 8% during 1990–2000. Per capita GDP almost tripled, from 1634 Yuan in 1990 to 3843 Yuan in 2000. Like many other East Asian countries, China experienced remarkable expansion of its industrial sector (from 37% of total GDP in 1990 to 52% in 1999),[1] and its economy is quickly integrating into the world economy. This is not only reflected in fast growth of her ratio of international trade to GDP, but also marked by the enormous inflow of foreign direct investments.

However, China's economy and openness success were accompanied by obvious environmental deterioration. Due to concentration of industrial activities and high population density since the 1980s, SO_2 pollution in urban regions has increased dramatically. Over one-third of Chinese big cities have SO_2 concentration levels of at least double the standard of 60 $\mu g/m^3$ fixed by the WHO (World Health Organization) for the developing countries.[2] Some studies revealed negative impact of SO_2 pollution on people's health in China, especially as a significant cause of respiratory diseases.[3] Due to SO_2 emission, the ever-expanding acid rain problem in both south and north China has resulted in rapid reduction in equipment and soil productivity.[4]

What are the impacts of SO_2 pollution in China's economy growth and trade openness trajectory? In spite of the various theoretical assumptions, the trade–environment nexus still stays partially unrevealed. Grossman (1995) regarded pollution as a "joint-product" of production activities, which is determined by three economic characteristics: scale, composition and technical effect. Different hypotheses predict different influences of trade on the three effects. The trade–environment relationship can be explained first from the scale aspect. Regarding pollution as a "joint-product" of production, trade's role in economic expansion predicts a positive impact on pollution increases through the scale aspect. Concerning the aspect of industrial composition, the "pollution haven" hypothesis assumes China's relatively less strict environmental regulation compared to developed countries will turn China into an attractive migration destination for polluting industries. However, Copeland and Taylor (1994, 1997) indicated that besides comparative advantages coming from relative environmental regulation strictness, the traditional

[1] China Statistic Yearbook, (1990–2000) (State Statistic Bureau, 1998–2000).
[2] China's Environment Statistic (1998).
[3] Xu and Johnson (1997); World Bank (1996); Xu, Gao, Dockery, and Chen (1994); Xu, Li, and Huang (1996).
[4] World Bank, 1996.

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