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“A General-Equilibrium Analysis on Emission Regulation Policies”

Environmental problems have attracted much attention for a long time. Especially after Kyoto Protocol, many countries have made plans to reduce their carbon emissions in the near future. Among the various regulation approaches, the emission tax and emission trading scheme (ETS) are two of the most widely adopted policies around the world. In contrast to the traditional tax, emission trading was not formally applied until the launch of EU ETS in 2005. As a market-driven policy, the ETS is supposed to be more cost-saving and efficient. However, the existing literature shows a controversial result on the efficiency comparison between the two policies. Therefore, theoretical research is necessary to clarify the mechanical difference between these two policies before discussing the implication of ETS.

This self-planned project plans to provide theoretical support to the implication of ETS. It started from 2021.11.20 and was extended to around 9 months due to Covid-19. This research was conducted under the guidance of Prof.Wang from Shanghai University and my supervisor Prof.Zeng. During the internship, We had a long discussion for 1 or 2 times each month by phone calls, with some daily communication on WeChat. Based on the analysis, we are able to show the following two results.

First, we verify that productivity heterogeneity is a crucial determinant of the superiority between the two policies. Under the same level of total emission, an economy with low heterogeneity is better to adopt ETS, whereas emission tax is superior in a highly heterogeneous economy. The different mechanisms induce a different resource allocation between sectors and economic efficiency.

Secondly, we find that the two policies have different performances if the country has a different level of emission target. On one hand, environmental awareness differs in different countries; On the other hand, the negotiation on the climate change conferences allocates different emission caps for the participants. Both of these factors may contribute to a distinguished emission target for different countries, especially between developing and developed countries. Our result suggests that a country with a strict total emission target is more suitable to adopt ETS, while the emission tax is more efficient otherwise.

These two results can be illustrated by two numerical examples plotted in the following figures.

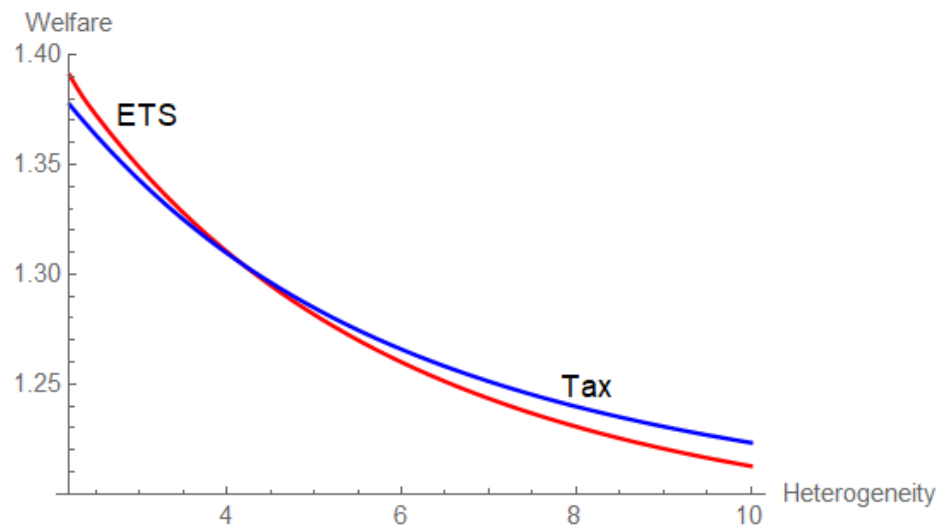


Figure 1 Result 1

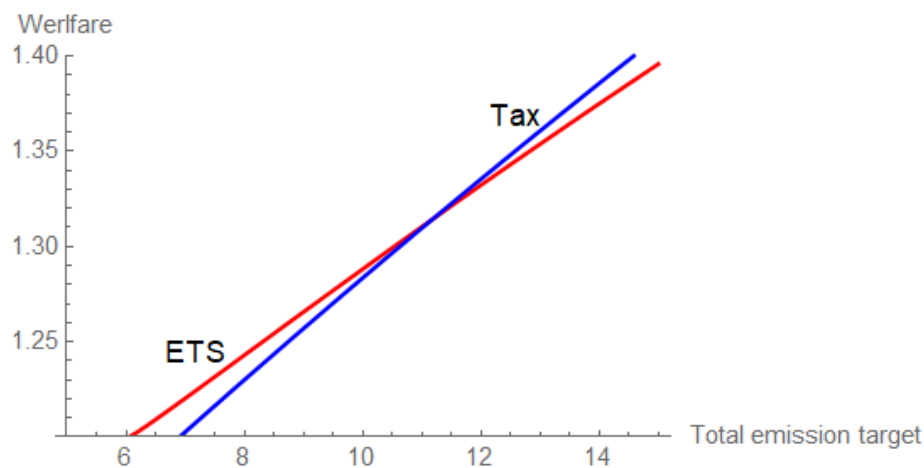


Figure 2 Result 2

This self-planned project can be regarded as the preparation for my future research on the implications of ETS. It is a pleasant collaboration for both sides as we thought of and discussed many interesting ideas. As for myself, it broadens my research orientation and connects my previous research to environmental topics. Unfortunately, this research does not include empirical study yet as the time is limited and we did not find a suitable dataset.

林 柯夫 (情報科学研究科 人間社会情報科学専攻 D3)