

First and Second Best Environmental Taxation of Plastics and Their Substitutes

Authors and affiliation: Tenaw G. Abate¹ and Katarina Elofsson¹

¹Department of Environmental Science, Århus University

Abstract:

Different policy instruments have been used to reduce the production and consumption of plastic products, and increase recycling. In particular, several countries have imposed either a ban or a tax on single-use plastic packaging, motivated by their contribution to marine plastic pollution. However, a separate tax on plastic products alone could lead consumers to choose similar unregulated products, for example, paper, and cotton packaging. Such incomplete environmental regulations can imply that the intended effect of the policy instrument is weakened or even counteracted due to an increase in the use of unregulated substitute products. Life-cycle-analysis studies show that substitutes for plastic products that are made of plant-based materials could have a significantly higher carbon footprint, and hence their contribution to climate change could be higher. The purpose of this study is to theoretically and empirically compare the welfare effects of applying first-best Pigouvian taxes to two alternative second-best policy instruments: a tax on plastic products alone and a uniform tax on all packaging materials. We consider two different types of environmental externalities: marine pollution and greenhouse gas emissions. The results show that if a regulator cannot implement the first-best solution, a common uniform tax across products would result in a relatively higher welfare gain than a tax on only plastic products. Sensitivity analysis suggests that the level of the second-best taxes and their welfare economic impacts are sensitive to the assumptions about the damage functions. However, the welfare ranking of the second-best taxes is robust to these assumptions.