

Climate Change Adaptation Investment under Disaster Ambiguity

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Abstract

This paper models two commonly adopted regulatory policies (the minimum requirement regulation vs. subsidy) on port adaptation investment to mitigate the damage caused by climate change-related disasters. The ambiguity of the disaster occurrence probability and the decision makers' attitudes towards risk are explicitly modelled. It is found, under the minimum requirement regulation, ports balance the option of increasing their adaptation vs. reducing their economic activities. In comparison, subsidies promote adaptation without introducing any incentive for ports to reduce outputs, but they can be less efficient than minimum requirement regulations in addressing market failures, such as that caused by a spill-over externality. The ambiguity of disasters changes the optimal designs of minimum requirement regulation and subsidy policy but does not change their relative ranking qualitatively. Decision makers' risk attitudes also play important roles. Higher degrees of pessimism (more risk aversion) lead to lower port outputs but can also increase the level of port adaptation to achieve full insurance against disaster loss. Higher degrees of pessimism also make the government more conservative to intervene in the ports' adaptation and thus less likely to impose the two regulatory policies. Our analysis also explains why it is justified for the government to withhold intervention under ambiguity, and also shows that the ambiguity does not necessarily bring worse expected social welfare.

Keywords: Port adaptation investment; Climate change-related disaster; Disaster ambiguity; Regulation; Subsidy; Minimum requirement