Abstract

[Project Information]

Project Title :	Development of Economic Assessment Methods for Impact of Climate Change and Adaptation Options
Project Number :	JPMEERF20S11850
Project Period (FY) :	2020-2024
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Keywords :	Climate Change, Temperature Rise, Flood Damage, Economic Impacts, Acaptation Policy

[Abstract]

This project conducts a comprehensive analysis of the economic impacts of climate change on Japan, which consists of two subprojects. The first subproject focuses on the impacts of rising temperatures on the agricultural sector and human health, while the second one focuses on the impact of flooding on the agricultural and manufacturing sectors.

In the first sub-project, we will conduct 6 studies to investigate

(1) how daily temperature affects crop yield (by 32 crops) and how a 2°C rise in temperature changes crop yield (by 32 crops) in each city;

(2) how the daily temperature affects the land use of crops (by crops) and how a 2°C rise in temperature changes the land use;

(3) how the daily temperature affects the agricultural income and how a 2°C rise in temperature changes the agricultural income by city;

(4) which farmer characteristics (age, farm size, etc.) affect farmers' adoption of adaptation measures, such as smart agricultural technology, use of heat-tolerant varieties, water management, etc.;

(5) how the daily temperature affects the mortality rate and how a 2°C rise in temperature changes the mortality rate of each city;

(6) how the negative economic shock in the agricultural sectors caused by the temperature rise is diffused to the non-damaged regions (prefecture) through the supply chain (economic transaction between the damaged prefectures and the non-damaged prefectures) by using the 47 prefectures computable equilibrium model.

In the second sub-project, we will conduct 6 studies to explore:

(1) how flood/heavy rain damages the agricultural sector;
(2) how flood/heavy rain damages production in the manufacturing sectors;
(3) how the management risk caused by climate change affects the adaptation behavior of farmers;
(4) the willingness of a household to pay to avoid outages caused by the natural disasters;
(5) how the negative economic shock in the manufacturing sectors caused by the floods is diffused to the non-damaged regions (prefectures) through supply chain (economic transaction between the damaged prefectures and non-damaged prefectures) by using the 47 prefectural computable equilibrium model.

[References]

Yoshida, J., Uchida, S., Nohara, K., Hibiki, A. (2021) “Natural Disasters and Firm Selection: Heterogeneous Effects of Flooding Events on Manufacturing Sectors in Japan”, Tohoku University Policy Design Lab Discussion Paper, TUPD-2021-007, p.1-23.
https://www2.econ.tohoku.ac.jp/~PDesign/007en.html

Itakura, K., Iwamoto, T. (2024) “Regional Computable General Equilibrium Model of Japan and the Global Economy”, Tohoku University Research Center for Policy Discussion Paper, TUPD-2024-016, p.1-26.
https://www2.econ.tohoku.ac.jp/~PDesign/4016en.html

Nohara, K., Hibiki, A., Uchida, S., Yoshida, J. (2025) “Determinants of Farmers’ Strategies for Adapting to Climate Change in Japan”, in **Climate Change Impacts and Adaptation Strategies in Japan - Integrated Research toward Climate Resilient Society**, Mimura, N., Takewaka, S. (Eds.), p.315-326, Springer Singapore
https://doi.org/10.1007/978-981-96-2436-2_22

Itakura, K., Hibiki, A., Yoshida, J., Tamura, M., Yokoki, H. (2025) “Direct and Indirect Economic Impacts of Sea Level Rise”, in **Climate Change Impacts and Adaptation Strategies in Japan - Integrated Research toward Climate Resilient Society**, Mimura, N., Takewaka, S. (Eds.), p. 327-341, Springer Singapore
https://doi.org/10.1007/978-981-96-2436-2_23

Ko, Y.C., Uchida, S., Hibiki, A. (2025) “Aging farmers and the role of community in adaptation to extreme temperature effects on crop yields”, Tohoku University Research Center for Policy Discussion Paper, TUPD-2025-006, p.1-36
https://www2.econ.tohoku.ac.jp/~PDesign/5006en.html

This study was supported by the Environment Research and Technology Development Fund of the ERCA(JPMEERF20S11850) funded by the Ministry of the Environment.