Climate Change Impacts on Agriculture: Regional Economic Adaptation through 2050

Abstract

Future changes in climate, demography, and consumer preferences pose significant challenges to agricultural production, and socio-economic development will determine how easily agricultural production systems can adapt. Five global economic models, with a focus on agriculture, provide analysis of selected world regions across a range of scenarios based on Shared Socio-economic Pathways (SSPs) and Representative Concentration Pathways. Results from three general circulation models are combined with one crop model to examine regional economic adaptation to climate change for coarse grains, rice, wheat, oil seeds and sugar crops to 2050. Results show that an overall economic response pattern from an exogenous change in productivity to realized crop yield, crop area, crop consumption, production, and crop prices generally holds across crops and regions. Differences across SSPs are not so large globally and in developed countries, but more so in developing countries where population and income growth (and productivity) remain major drivers. International trade is an important means of adjustment over time with or without climate change.

Table. Scenario definitions (scenario label in parentheses)

Radiative forcing	SSP 1	SSP 2	SSP 3	SSP 4	SSP 5
RCP 8.5			HadGEM (3.1) IPSL (3.2) MIROC (3.3)		
RCP 6.0		HadGEM (2.1) IPSL (2.2) MIROC (2.3)			
RCP 4.5	HadGEM (1.1) IPSL (1.2) MIROC (1.3)				
RCP 2.6					
No climate change	Reference (1.0)	Reference (2.0)	Reference (3.0)		