

Economic impacts of climate change on production of cereals in Iran

Agriculture has a very important contribution to GDP, exports, employment, and, in general, the economies of many developing countries. In these countries, agriculture is highly dependent on the climate, and any climate change can have adverse effects on agricultural production. Most studies on the effects of climate change have focused on direct sectoral effects ignoring the indirect effects. This study combines general equilibrium and partial equilibrium models to analyze both the direct and indirect effects of change in climate on the Iranian cereals production. To do this, this study uses Structural Ricardian and the generalized least squares (FGLS) models to analyze the impact of climate change on yields of major cereals crops of Iran (wheat, barley and corn) from 1986 to 1993, as the first step. The results show that wheat yield is quite sensitive to rainfall and temperature changes (the results for rice and corn are not sufficiently significant). Climate variables have a positive and significant effect on wheat productivity to a threshold level and a negative effect on the yields beyond the threshold. Also, according to the results, cereal production in Iran is more sensitive to increase in temperature than precipitation. Therefore, the marginal effects of precipitation are negligible. At the second step, a CGE model was used to analyze the logical structure of the Iranian economy. The climate change induced productivity parameters were introduced as shocks in the macro model. This allows for the analysis of the impact of climate change on macro aggregates like gross sectoral output, import and exports as well as aggregate welfare measures like GDP and equivalent variation. The findings suggest that climate change-induced productivity shocks will have a negative impact on GDP and, in particular, on household consumption. The results show that household groups will experience lower income compared to baseline. Particularly, the decline in income for rural households will be higher than urban households. In addition, as a result of cereal productivity reduction and the resulted effects on production, incomes and prices, all households will face welfare decline compared to the baseline. In addition, the adverse effects of climate change will be more severe in the long run. Repeated droughts can ruin large areas of the country, and in the absence of compatibility measures, irreparable damage to the economy will occur.

Key words: CGE model, Climate change, Iran, Ricardian model, Stochastic production function.



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