

Title: Climate, Food & Farming: An Analysis of Climate Change Effects on the Structure of Agriculture, Food Prices and Land Rent Using a Neoclassical Market Equilibrium Model

Abstract:

Natural resources including land and climate are a major input into agriculture. Any significant, sustained change in climate warrants concern because of the potential impact of that such change might have on food and fibre production particularly at this time because current, observed changes in weather patterns appear to be global, deleterious to food production and exacerbated, if not caused, by human activity. The model presented here facilitates an examination of some of the possible effects of climate change on agriculture. The mathematical, quasi-general equilibrium model developed here is clearly within the neoclassical tradition in that it assumes that farmers optimally adapt to any change in their economic environment. A novel feature of the model is that it assumes that all farm firms are different in terms of their human capital input and consequently all farm firms earn different levels of profit. This is somewhat at variance with the usual models of competitive industries in which all firms using the same technology and facing the same factor input prices, are identical. The competitive equilibrium model is shown to have the same first-order conditions as those of an optimizing social planner. The model has elements in common with Malthusian population theory (limited land and diminishing returns in agriculture), and Ricardian differential rent theory. The implicit function theorem is applied to the model to obtain comparative static results which might reasonably be a consequence of climate change. Some of these results might be regarded as counter intuitive. Some policy implications are discussed.