Local Sectoral Specialization in a Warming World

Bruno Conte, Klaus Desmet, Dávid Krisztián Nagy, and Esteban Rossi-Hansberg

This paper quantitatively assesses the world's changing economic geography and sectoral specialization due to global warming. It proposes a two-sector dynamic spatial growth model that incorporates the relation between economic activity, carbon emissions, and temperature. The model is taken to the data at the 1 degree by 1 degree resolution for the entire world.

Over a 200-year horizon, rising temperatures consistent with emissions under Representative Concentration Pathway 8.5 push people and economic activity northward to Siberia, Canada, and Scandinavia. Compared to a world without climate change, clusters of agricultural specialization shift from Central Africa, Brazil, and India's Ganges Valley to Central Asia, parts of China, and northern Canada. As global warming reduces the temperature penalty of these cold areas, these regions emerge as highly productive agricultural producers, boosting global productivity growth in agriculture. Equatorial latitudes that lose agriculture specialize more in nonagriculture but, due to their persistently low productivity, fail to emerge as industrial powerhouses. In the aggregate, by the year 2200, predicted losses in real GDP and utility are 6 percent and 15 percent, respectively.

Higher trade costs make adaptation through changes in sectoral specialization more costly, leading to more climate-induced migration. This implies that trade and migration are substitutes in their responses to climate shocks; as adapting by shifting specialization becomes harder, adapting by migrating becomes more attractive. This suggests that trade policy can help reduce the magnitude of climate related migration.