Persistence of Natural Disaster Shocks in Shrinking Regions: Evidence from the Great East Japan Earthquake

Abstract

This paper uses the Great East Japan Earthquake (GEJE) as a case study to examine whether large-scale natural disaster shocks have semi-permanent effects on the spatial distribution of economic activity and population, particularly in shrinking and ageing regions. We apply a two-stage least squares (2SLS) approach using damage data as instrumental variables to identify the impact of the disaster as a clean shock. Our analysis reveals a striking divergence in recovery trajectories. While the manufacturing sector showed a certain degree of recovery, the shock to the population distribution remained almost completely persistent, even 12 years after the disaster. Furthermore, as the persistence of the shock tends to be more severe in the group of municipalities with a higher pre-disaster share of the elderly population, our results suggest that in the presence of population ageing, demographic dynamics can diverge from industrial recovery. These findings provide novel empirical evidence supporting the existence of multiple spatial equilibria in population distribution within shrinking regions. This extends the existing literature, which has predominantly relied on data from periods of economic and demographic expansion, and highlights the need for spatial economic models incorporating heterogeneous agents by age. From a policy perspective, the results underscore the considerable difficulty of regaining lost population shares and raise an important question regarding the validity of setting the restoration of pre-disaster population distributions as a reconstruction target in a society facing severe population ageing.