

Dynamic Geography of the Population and Economic Response to Sea Level Rise*

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Abstract

Sea-level rise and ensuing permanent coastal inundation will cause spatial shifts in population and economic activity over the next 200 years. Using a highly spatially disaggregated, dynamic model of the world economy that accounts for the dynamics of migration, trade, and innovation, this paper estimates the consequences of probabilistic projections of local sea-level changes under different emissions scenarios. Under an intermediate greenhouse gas concentration trajectory (Representative Concentration Pathway [RCP] 4.5), permanent flooding is projected to reduce global real GDP by an average of 0.22% in present value terms, with welfare declining by as much as 0.76% as people move to places with less attractive amenities. By the year 2200 a projected 0.79% of world population will be displaced (with a 95% credible interval 0.20%-1.51%). Losses in many coastal localities are more than an order of magnitude larger, e.g., 10% of $1^\circ \times 1^\circ$ coastal cells lose more than 8% of real GDP in present discounted value terms.

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