

The present study developed a climate-economy growth model by incorporating climate change shocks into neo-classical growth model assuming that labour productivity and rate of capital formation are determined by economic, financial, technological and climate change factors. Later, the long term relationship between economy and climate change variables in the region was empirically tested through constructing 178 models and using PMG-ARDL approach over the period 1971-2021 for Asian region comprising of four panels and forty-five countries. The empirical results reveal that a 1°C increase in population weighted mean surface temperature causes a total decrease in GDP growth rate by 7.74% for climate risk and water stressed lower middle income countries in the region (Panel IV), 7.53% for climate risk and water stressed countries (Panel III), 7.09% in whole region (Panel I) and 6.14% in climate risk countries (Panel II). However, precipitation insignificantly impacted output growth in the region. Moreover, this Panel data study analyzed the long-run effects of anthropogenic climate change on economic growth in Asia by using extended model during the period 1971-2021 using PMG-ARDL approach. The Panel consisted of thirty-one countries from the whole Asian region. The empirical results of the study highlight four key findings. First, the rising temperature impacts economic growth negatively at national level and positively in urban agglomerations, where the latter impact is smaller. Second, the overall net effect of rising temperature on economic growth is negative. Third, the impact of rising rainfall in urban agglomerations is found to be negative on economic growth. Fourth, in long run, the effect of temperature on economic growth, in absolute terms, remained to be the highest Page among other key factors in the model including exports, gross capital formation, government expenditures and private consumption.

Further, this study analyzed the long run impact of climate change on potential output under various scenarios of Shared Socio-economic Paths (SSPs) developed by United Nations' Inter-Governmental Panel of Climate Change (IPCC) over the period 2022-2100 to determine optimum temperature & GHGs emissions reduction targets aligned with climate resilient optimal growth pathways across forty-five Asian countries during transitional period towards green growth. The results highlight that without adopting mitigation and adaptation measures at regional level, the projected output losses by 2100 are estimated upto 58% collectively in the case of all selected Asian economies; 63%, if the region is high climate risk; 67%, if the region is both high climate risk & water stressed; and 74%, if the region is both high climate risk & water stressed and falls under the category of lower middle income level. These output losses can be optimized by 2100 upto the levels of 0.83% for all Asian regions by limiting the temperature levels upto SSP2-4.5. All regions of Asia could gain by limiting the temperature levels upto SSP1-2.6, where the maximum gains could be achieved through further limiting the temperature levels upto SSP1-1.9. To conclude, this study identifies the sequential optimum temperature limiting and GHGs emissions reduction targets for each country to keep the economy on the climate resilient optimal growth pathway during transitioning period towards green growth.