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Does regional carbon dioxide emissions impact on regional temperature variations? An econometric analysis on South Asia

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South Asia, home to over one-fourth of the world's population is vulnerable to climate change. Given the rapid industrial growth in India, and the industrial expansion in countries of Sri Lanka, Pakistan, Bangladesh, Maldives, Bhutan, Nepal, and Afghanistan, the Carbon Dioxide Emission (CO_2E) in the region is projected to escalate further. An increase in the concentration of atmospheric carbon dioxide, a greenhouse gas, is known to increase the atmospheric temperature, an effect identified as global warming. The region is already experiencing increased atmospheric warming with frequent heatwaves and temperature extremes. The rapid warming trend in the region affects local climate dynamics affecting rainfall patterns, and soil moisture content, and cause the rise of sea levels, droughts, and flooding. With existing research focusing on cumulative CO_2E and the resulting global climate change, the primary objective of the study was to determine whether regional CO_2E impacts regional Mean Surface Temperature (MST) variations. The study utilized secondary data for all the eight countries in the region from 1993 to 2020. CO_2E measured in kilotons and MST in degrees of Celsius were obtained from the World Bank Indicators and IMF climate indicators dashboard. The stationarity of the panels was tested using the Levin-Lin-Chu test while the stability of the model was tested with Panel Vector Auto Regression. The Panel regression analysis revealed that the regional CO_2E increased the regional MST at a 99% level of significance. Additionally, seven of the eight countries in the region indicated that the local CO_2E exerts a significantly positive impact on local MST variations. The study findings underscored that the country-specific policy implications and CO_2E mitigation efforts would yield immediate positive regional and local consequences, highlighting the necessity for effective CO_2E reduction strategies.

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