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**Can Increase in Productive Efficiency Mitigate Climate Impact on Agriculture in the South Asian Region?**

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**Abstract**

South Asia is still a predominantly agrarian society, where a majority of the population is dependent on agriculture for their livelihoods. Rural poverty is higher than urban poverty, reflecting the heavy dependence on natural resources that are directly influenced by changes in weather and climate. The majority of South Asian agriculture is still based on a rain-fed system and is directly affected by climate change. The impacts of climate change on food production and food security in South Asia will vary by country, with many countries experience a decline in productivity. This paper examines the impact of climate change on agricultural production and the role of efficiency increment as an adaptation strategy for climate change in South Asia. First, a stochastic production frontier was estimated for South Asian agriculture. Then the climate change impact on agricultural production was predicted for 2050 using the estimated frontier. Finally, this paper assessed whether improvements in technical efficiency can offset the effect of climate change in this region. For this, a true random effect stochastic frontier with an exponentially distributed time varying inefficiency model was estimated. For this analysis, secondary data from the World Bank, Food and Agriculture Organization (FAO) and International Labour Organization (ILO) were used. Output of gross production values were calculated using agricultural land use, pesticide use, total labour use, total fertilizer use data with climate normals pertaining to eight countries in the south Asian region were collected from 1991 to 2017. The results indicate that with the expected climate change by 2050, Bhutan, Nepal and Pakistan will have a positive impact on their agricultural production while Bangladesh, India, Maldives and Sri Lanka will have a negative impact on their production. Overall technical efficiency of agricultural production in South Asia is 75.12% while individual countries show varying levels of technical efficiency, viz., Bangladesh 69.41% Bhutan 85.64%, India 71.83%, Maldives 44.91%, Nepal 82.78%, Pakistan 85.68%, and Sri Lanka 75.89% of efficiency. Prediction using the estimated model and efficiencies show that the negative impacts of climate change could be mitigated if these countries try to increase their levels of productive efficiencies such as following dissemination of technology, crop protection, training and development strategies, crop insurances to increase agriculture production.

**Keywords:** Panel data, South Asia, Stochastic frontier analysis, Technical efficiency, True random effect