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Climate Change, Regional Weather and Economic Activity in the Global North: The Case of Germany

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An accurate assessment of the impact of climate change benefits from a granular analysis of local climates. This paper attempts to estimate the effect of mean annual temperatures along with extreme temperatures and precipitation intensity on the German economy by using novel data on German counties. The German economy exhibits vulnerabilities to extreme temperatures and high intensity precipitation, but the marginal effect of mean temperatures remains positive, thus the country will benefit from an increase in mean annual temperature. However, heat and cold stresses reduce the growth rate by 0.03% and high intensity precipitation reduces it by 0.13%. Thus, low baseline temperatures protect the economy against warming, but it remains vulnerable to extreme events.

There are multiple factors that make Germany particularly interesting when estimating the impact of rising temperatures. First, Germany is a cold country and despite hot summers, mean temperatures remain lower than heat-stress levels. Secondly, temperatures are highly variable within a year and the local population has largely adapted to this phenomenon. Third, Germany is a wealthy economy and the service sector is the major employer so the optimal working temperatures can be expected to differ from economies that are primarily agricultural. Finally, the socio-political history also makes Germany an interesting case study since technological convergences between former East and West Germany are still under investigation. Germany is one of the largest economies in the world and its productivity is especially vital to Europe, thus, as temperatures rise and extreme events become more frequent, it is necessary to estimate a response function for this country.

We apply a two-ways fixed effects panel regression to the data with county and year fixed effects and cluster the standard errors at county level. The first result is that the marginal effect of rising mean annual temperature is robustly significant and positive; this marginal effect increases till 12°C and then declines between 12°C and 13°C, but remains positive. Second, an additional day of extremely cold temperatures reduces the growth rate by 0.03% in the same year, while an additional day of extremely high temperatures reduces the growth rate by 0.03% in the following year. Finally, an increase in the average precipitation per day by 1mm reduces the growth rate by 0.13%.

Climate change is a growing concern for Europe's largest economy and adaptation measures are being deployed in response to specific environmental concerns. The losses to life, standard of living and livelihoods feature majorly in policy discussions that address the future of the country in the context of a shifting climate. Investigating the impact of climate change on Germany serves as a case study on the vulnerabilities of industrial economies. We find that while the low baseline temperatures protect from warming, technological advancements do not necessarily mitigate the damages caused by extreme temperatures and precipitation.

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