# ANALYSIS OF TEMPERATURE SHOCKS AND ECONOMIC GROWTH ON 21ST CENTURY DATA

Submitted by
Uday Agarwal
18817828

# OBJECTIVE

- Panel data analysis of temperature shocks on GDP per capita growth.

- To test the hypothesis that temperature shocks do not affect the economic growth.

# JUSTIFICATION

- Replication of the work by Melissa Dell, Benjamin F. Jones, and Benjamin A. Olken (2021)

- The time period used from 2006-2020 and 71 countries under consideration.

- Temperature and output are very related in extreme heat/ cold the productivity of humans decrease thus resulting in poor economic growth.

- Used the baseline panel data equation of the above work

# METHODOLOGY

- The following baseline equation has been used

$$g_{it} = \theta_{rt} + \theta_i + \sum_{j=0}^{L} \rho T_{it-j} + \varepsilon_{it}$$

  - $g_{it}$ is the GDP per capita growth;
  - $\theta_{rt}$ is the time fixed effects
  - $\theta_i$ is the country fixed effects
  - $T_{it-j}$ is a vector of annual average temperature and precipitation
  - $\varepsilon_{it}$ is error term

- The above equation captures the relationship between GDP per capita growth and Temperature shocks.

- No lag model has been estimated

# METHODOLOGY

- Hypothesis tested on without any conditions

- We then add poor country dummy and precipitation as control variable

- Poor countries are defined as countries with PPP adjusted GDP per capita lower than the median

- Hot countries are defined as countries with average annual temperature greater than mean temperature of the year.

# DATA

- The mean annual temperature and precipitation data used in this paper has been taken from world bank's climate change knowledge portal.

- Data for GDP per capita growth, PPP adjusted GDP per capita has been taken from World Bank.

- The temperature, precipitation and growth indicator data has been taken for years 2006-2020.

# OBSERVATION TABLE

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                    Dependent variable:
             ------------------------------------------
                        growth_per_capita
               (1)        (2)        (3)        (4)
-------------------------------------------------------
mean_temp   -0.863*** -0.825*** -0.794*** -0.794***
             (0.299)    (0.300)    (0.303)    (0.303)


poor_dummy              -0.747*    -0.749*    -0.749*
                         (0.425)    (0.425)    (0.425)


preci                                0.001      0.001
                                    (0.001)    (0.001)


-------------------------------------------------------
Observations  1,080      1,080      1,080      1,080
R2            0.008      0.011      0.012      0.012
=======================================================
Note:                      *p<0.1; **p<0.05; ***p<0.01
```

Table 1 Panel Data Results

# FINDINGS

- The first column shows negative and statistically significant coefficient for the temperature variable, through this we can say that higher the temperature lower is the growth rate of a country.

- In the second column we add poor country dummy. The result we obtain from the regression are like what we see in the paper suggesting a substantial heterogeneity between poor and rich countries.

- Precipitation data is added as control variable shows mild effects of precipitation on GDP growth.

- Further we add dummy for hot country.

- We find a very high correlation between mean temperature and hot dummy

# CONCLUSION

- Analyzed the impact of temperature shocks on economic growth.

- Ran a panel data regression of 71 countries for the period 2006-2020.

- Rejected the null hypothesis that temperature does not affect the economic growth of a country

- The results of this regression and base paper we find similar results in terms of effect of temperature on economic growth

# CHALLENGES

- Finding and collating temperature and precipitation data was difficult and a bit redundant task.

- Never had a hands-on experience on fixed effects model and thus learning the application of this kind of model was a new thing for me.

# REFERENCES

- Dell, M., Jones, B.F. and Olken, B.A., 2012. Temperature shocks and economic growth: Evidence from the last half century. American Economic Journal: Macroeconomics, 4(3), pp.66-95.

- https://climateknowledgeportal.worldbank.org/download-data (for precipitation and temperature data)

- https://data.worldbank.org/ (for growth indicator data)