The Vulnerability of Countries to Sea-level Rise Versus CO2 Emissions per Capita and GDP per Capita

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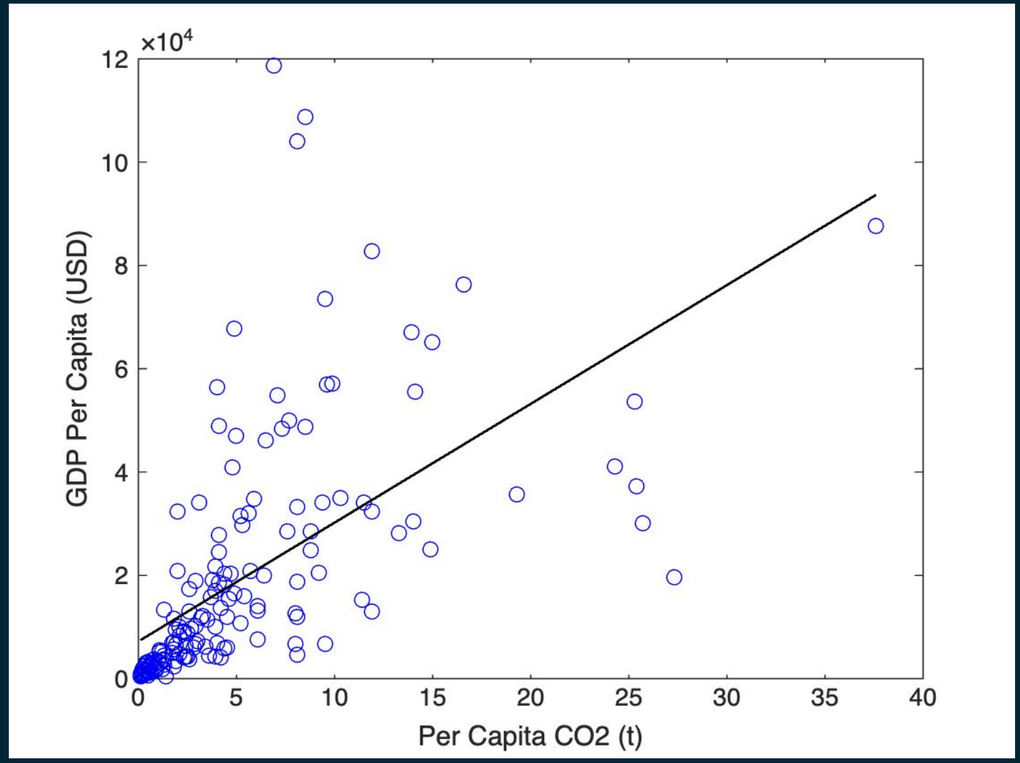
Introduction

- Only one-tenth of the world's greenhouse gases are emitted by the 74 lowest income countries, but they will be most affected by the effects of climate change (Bhargava, 2023)
- Vulnerable populations in these countries suffer damaging outcomes in terms of health, food, water, education and more (Bhargava, 2023)
- Excluded landlocked countries
- Assumed intermediate emissions (SSP2-4.5)
- SLR Projections for 2040-2059



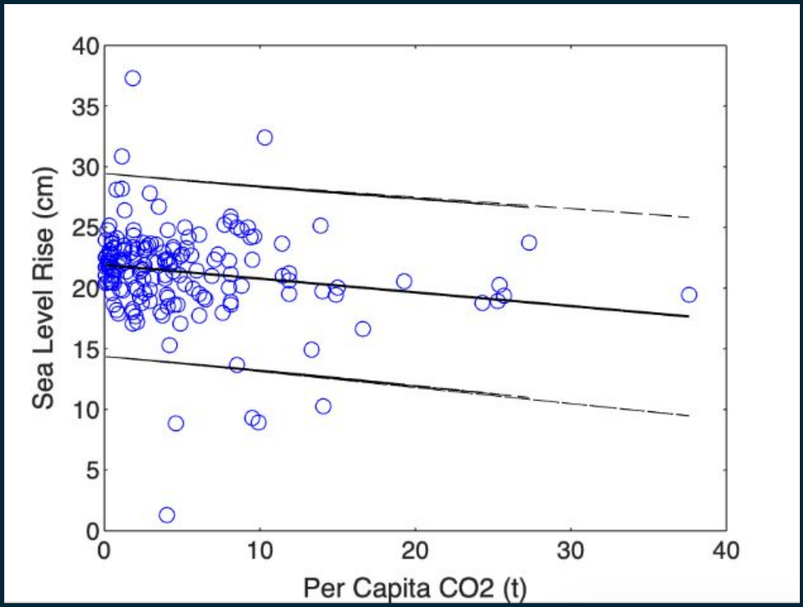
LSQR – SLR and CO2 per capita

Slope = −0.1130

Intercept = 21.9085

Error of Slope = [−0.2113, −0.0148]

Implication → SLR decreases as CO2 per capita increases



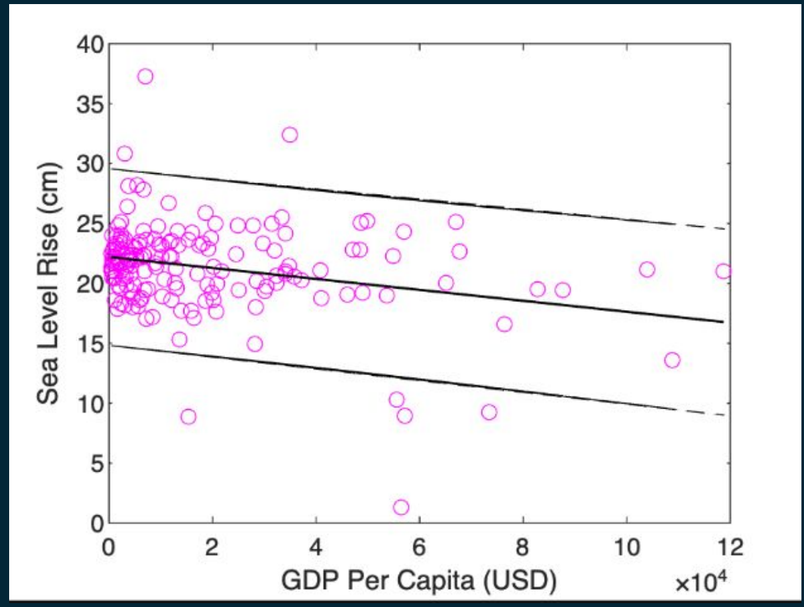
LSQR – SLR and GDP per capita

Slope = −4.5636e−05

Intercept = 22.1972

Error of Slope = [−7.0686e−05, −2.0585e−05]

Implication → SLR decreases as GDP per capita increases



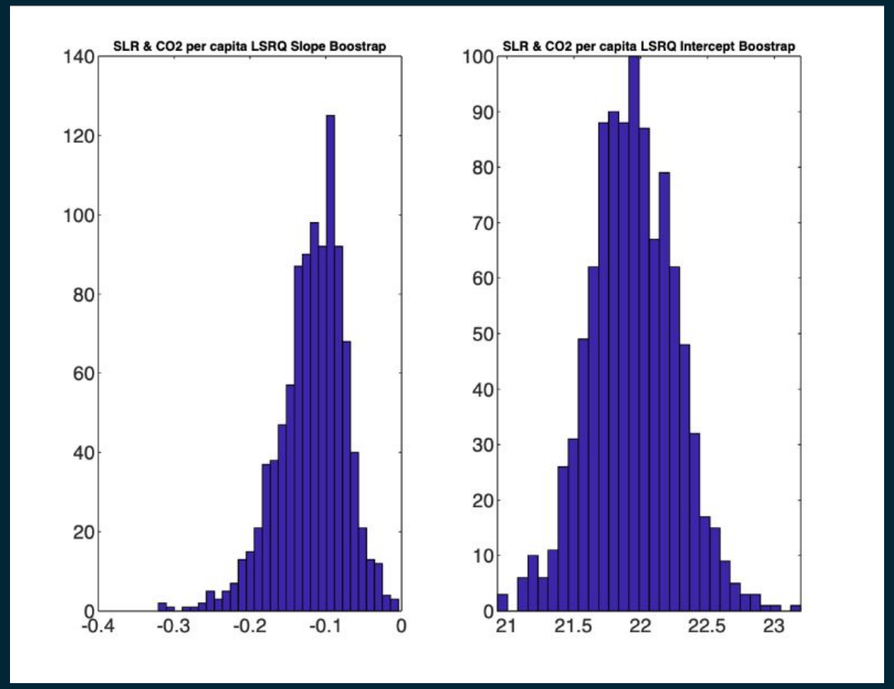
Bootstrap – SLR and CO2 per capita

Slope mean = −0.1160

Slope std = 0.0428

Intercept mean = 21.9197

Intercept std = 0.3311



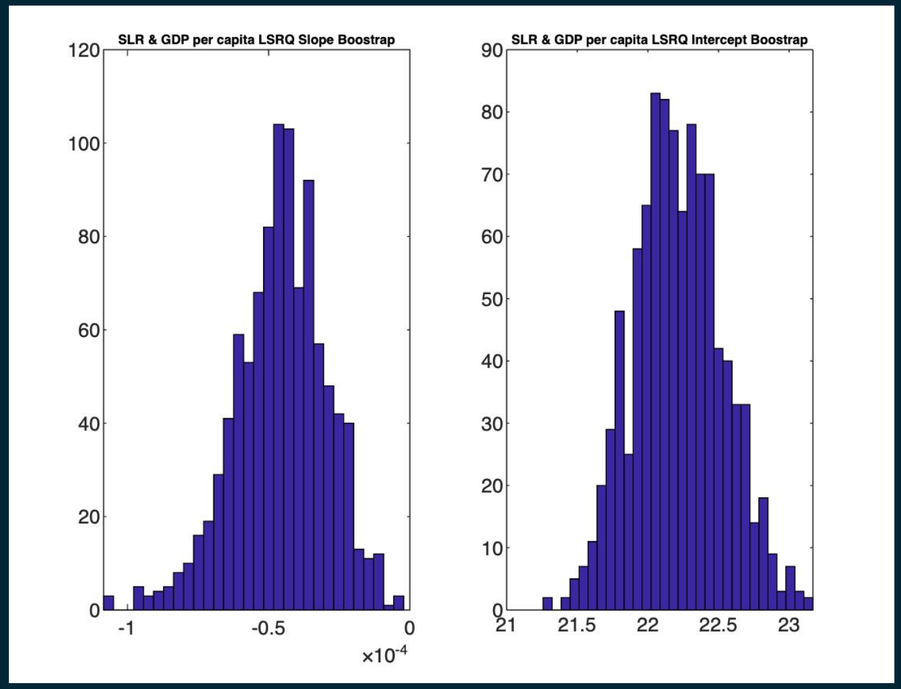
Bootstrap – SLR and GDP per capita

Slope mean = −4.5327e−05

Slope std = 1.6645e−05

Intercept mean = 22.1852

Intercept std = 0.3191



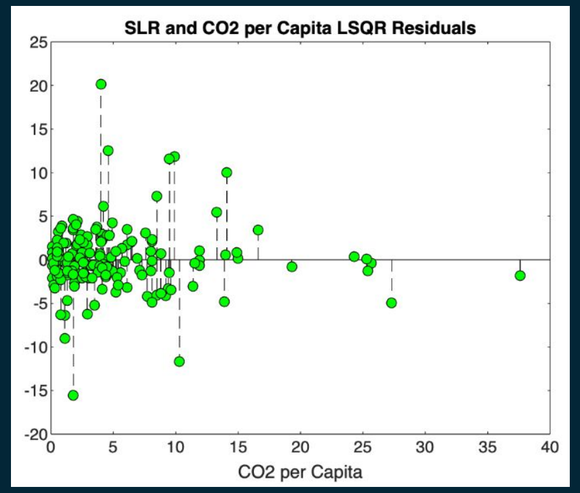
Residuals – SLR and CO2 per capita

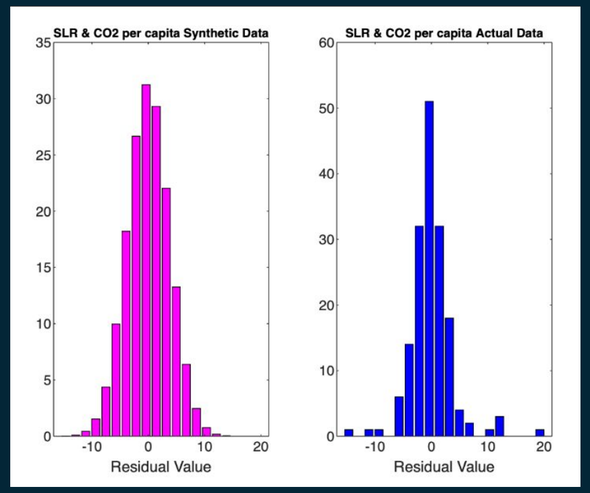
Chi-squared Value = 1.3129e+04

Critical Value = 27.5871

Implication → Reject the null hypothesis

→ LSQR not valid





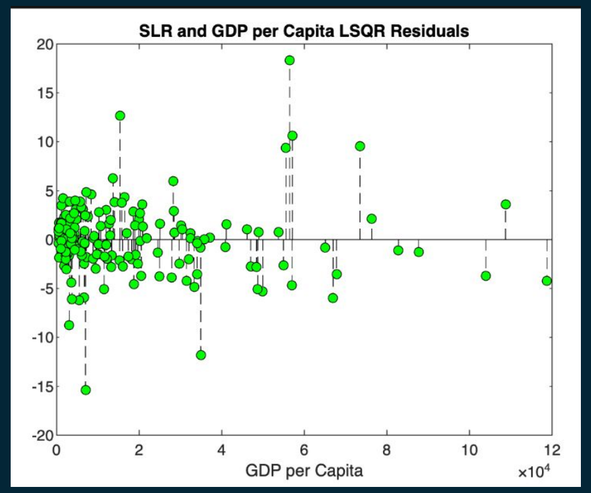
Residuals – SLR and GDP per capita

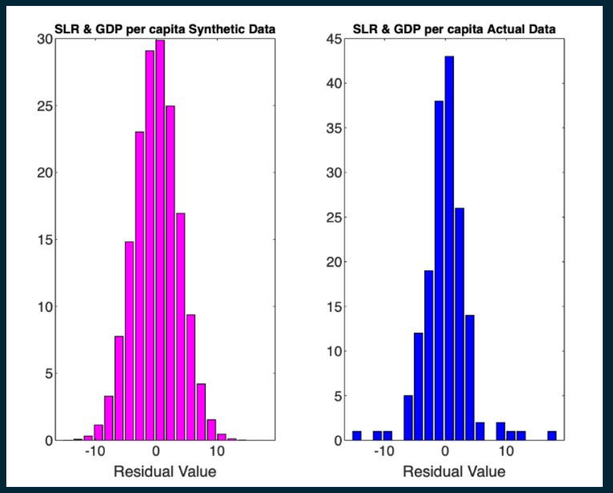
Chi-squared Value = 2.3367e+03

Critical Value = 27.5871

Implication → Reject the null hypothesis

→ LSQR not valid





Correlation – SLR and CO_2 per capita

r = −0.1741

p = 0.0244

p < 0.05

[rlow, rhigh] = [−0.3176, −0.0229]

Implications

- ➔ Correlation coefficient is small
- ➔ Negative indicates that as CO_2 per capita increases, mean SLR tends to decrease

Correlation – SLR and GDP per capita

r = −0.2697

p = 0.0004

p < 0.05

[rlow, rhigh] = [−0.4049, −0.1228]

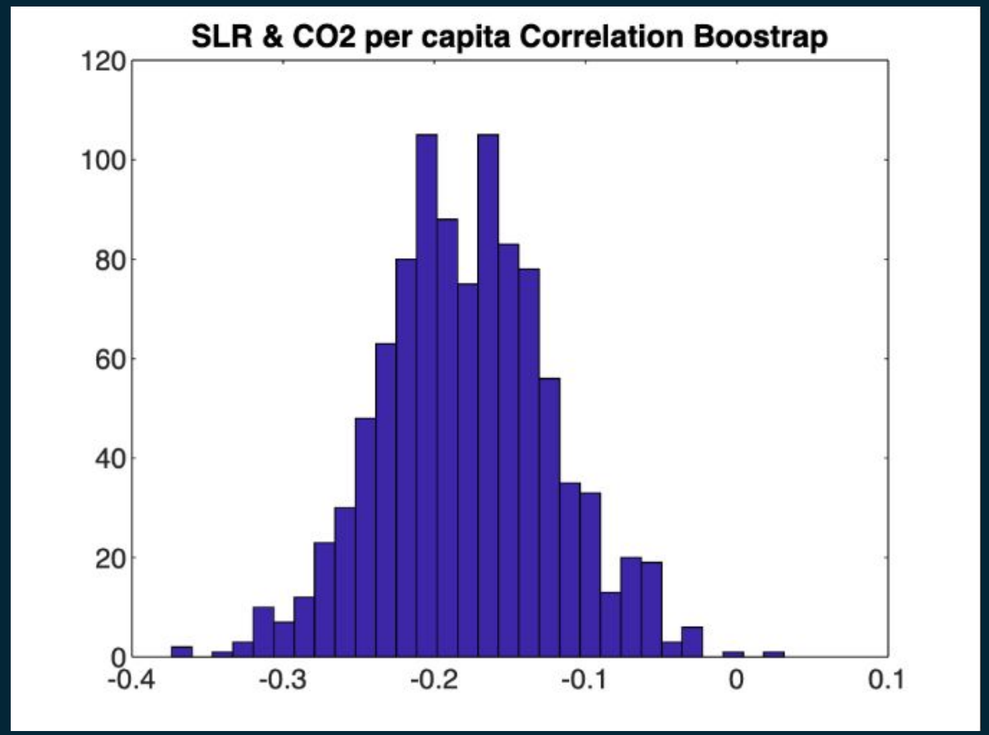
Implications

- ➔ Correlation coefficient is small
- ➔ Negative indicates that as GDP per capita increases, mean SLR tends to decrease

Bootstrap – SLR and CO2 per capita

Correlation mean = −0.1786

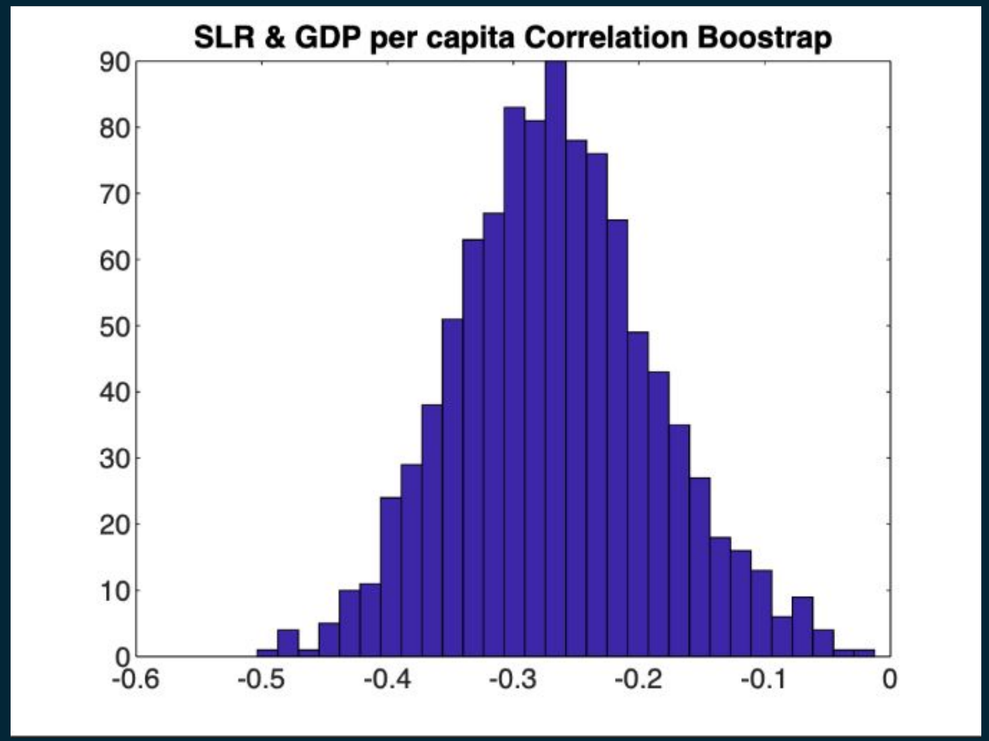
Correlation std = 0.0573



Bootstrap – SLR and GDP per capita

Correlation mean = −0.2665

Correlation std = 0.0793



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