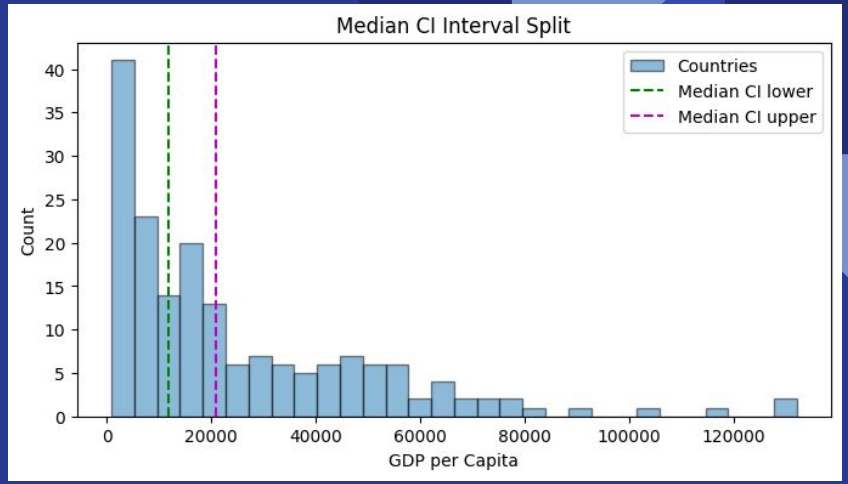
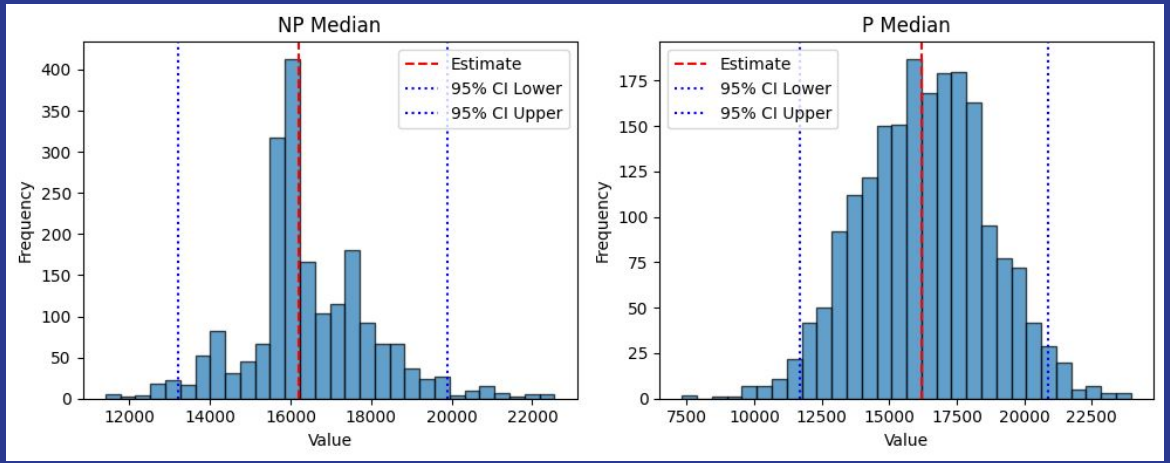
Bootstrapping Analysis:

CO2 emission efficiency High vs Low income countries

Income Group Definition

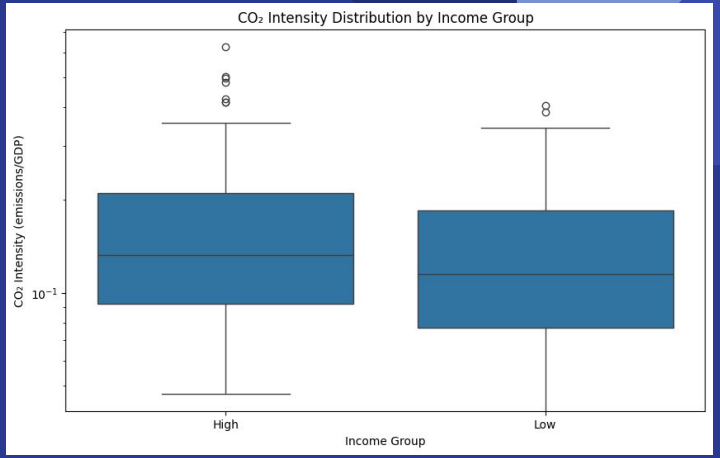
- Bootstrap-derived median GDP thresholds
- Low / Medium / High income splits
- GDP distribution (latest year) with median 95% CI bounds
- Data-driven group thresholds

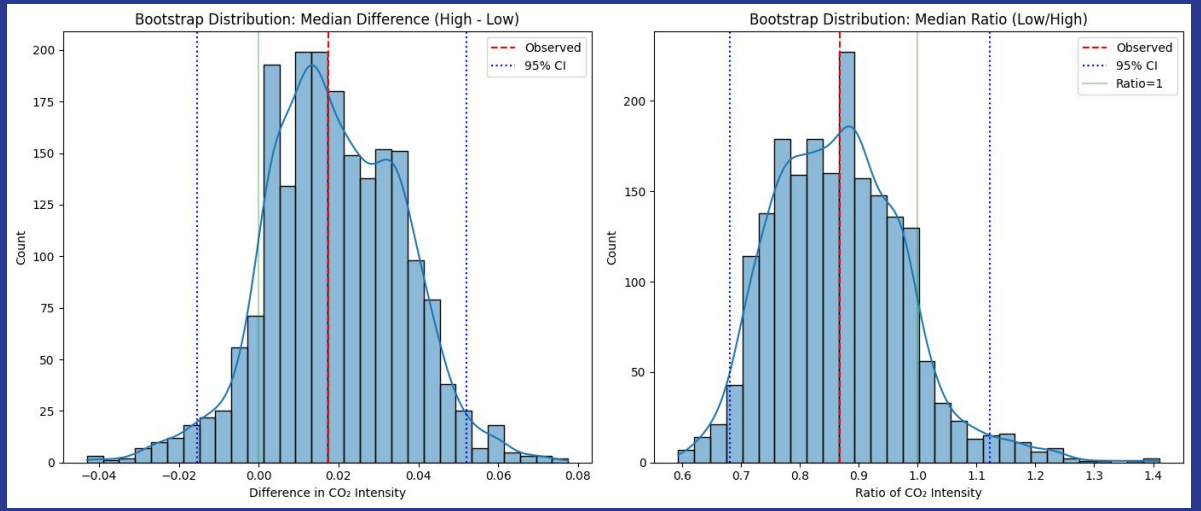




GDP per Capita Distribution

- Median CO_2 intensity: low vs. high income
- Bootstrap confidence intervals for medians
- Difference in medians not significant; ratio is
- Low-income countries slightly more CO_2-efficient





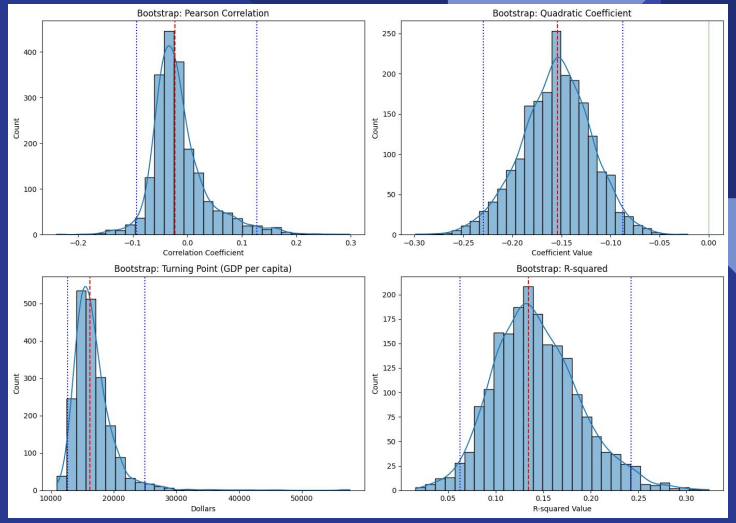
EKC Scatter & Fit

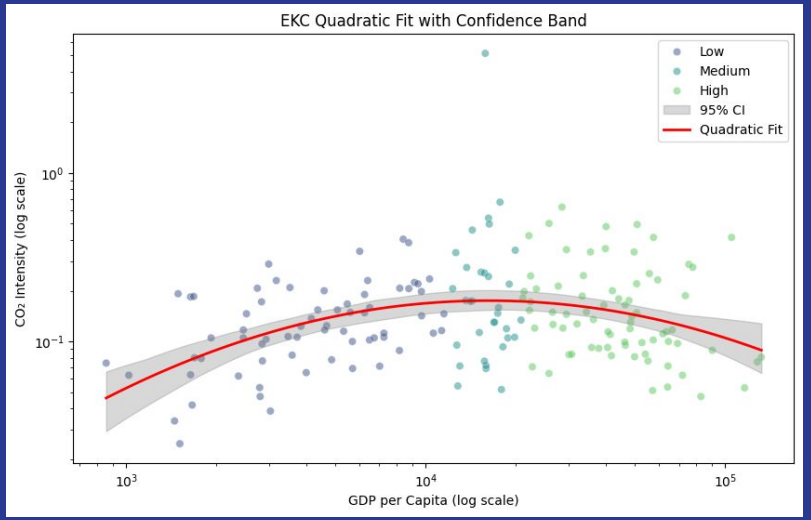
- Log–log scatter of GDP vs. CO_2 intensity
- Quadratic regression: inverted-U shape

- Pearson & Spearman ≈ zero (not significant)
- Weak global linear trend

- β_2 (quadratic term) significant, negative
- Confidence band confirms inverted-U”

- CO_2 intensity peaks at ≈$16 k GDP





Key Takeaways

- Bootstrap quantifies uncertainty at every step
- Robust group definitions and model inference
- Evidence for EKC: efficiency gains beyond mid-income