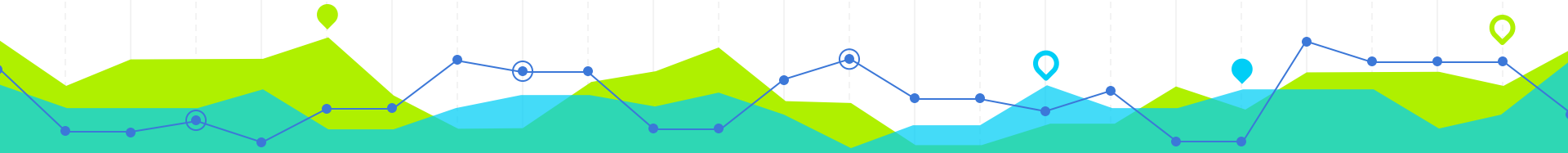
Emissions and



Quality of Life

Rich
Pihlstrom

Research Question

How Do Global Emission Indices Correlate With Quality of Life Measurements?

In my analysis, I will examine four categories of emission indices

- *Total greenhouse gas emissions (kt of CO2 equivalent)*
- *CO2 emissions (kt)*
- *Methane emissions (kt of CO2 equivalent)*
- *Nitrous oxide emissions (kt of CO2 equivalent)*

Alongside nine categories of quality of life (QOL) measurements (loosely correlated to emission—intentionally)

- *Access to electricity (% of population)*
- *Individuals using the Internet (% of population)*
- *Alternative and nuclear energy (% of total energy use)*
- *Adjusted net national income per capita (current US$)*
- *Birth rate, crude (per 1,000 people)*
- *Life expectancy at birth, total (years)*
- *Contraceptive prevalence, any modern method (% of married women ages 15-49)*
- *Automated teller machines (ATMs) (per 100,000 adults)*
- *Death rate, crude (per 1,000 people)*

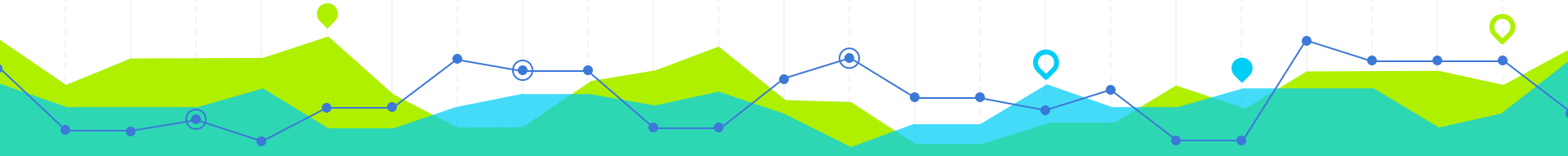
The Data

Source

- Title: “Environment from the World Development Indicators Database”
- From: World Bank
- Citation: World Bank (2022-09-22). World Development Indicators: Environment | Access to clean fuels and technologies for cooking (% of population), 2000 - 2020. Data Planet™ Statistical Datasets: A SAGE Publishing Resource. (Dataset). Dataset-ID: 051-001-037

Preprocessing

- Information from 1960 to 2021 for every country
- >1000 Categories — see https://datacatalog.worldbank.org/search/dataset/0037712/World-Development-Indicators
- >380,000 lines of data
- Preprocessed using Python
    - Formatting
    - Filterting
    - Saving Time (RShiny)

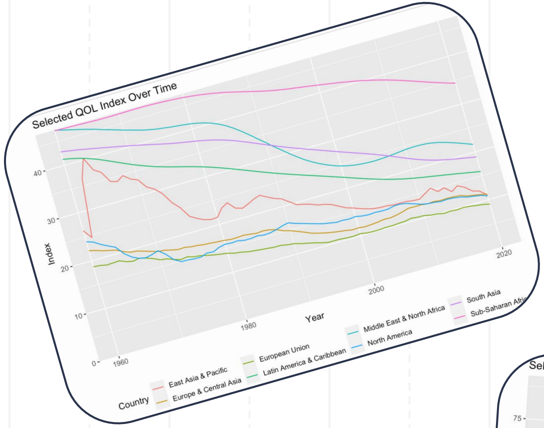


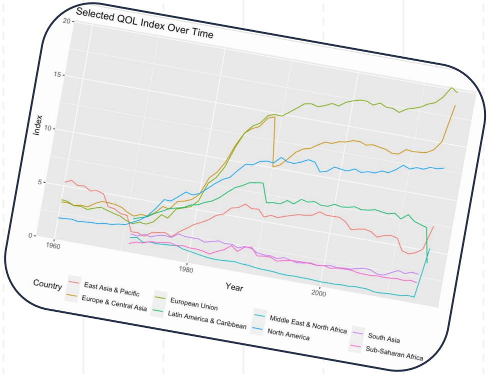
RShiny:

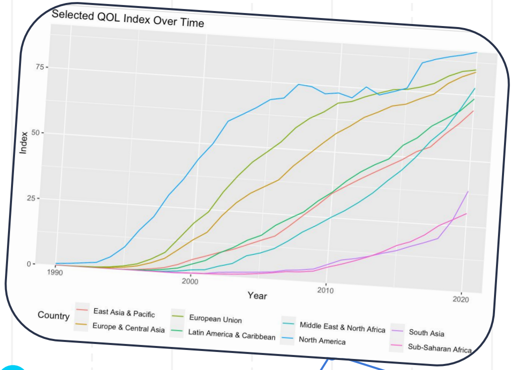
https://yluqa6-rpi11.shinyapps.io/proj1/

QOL Time Series

- Various QOL categories
  - Fun for exploratory data analysis
  - Less insightful for specific inquiry
- Some (many) holes with data depending on countries of interest
- Intention to have upward trend mean "good"—except birth/death rate

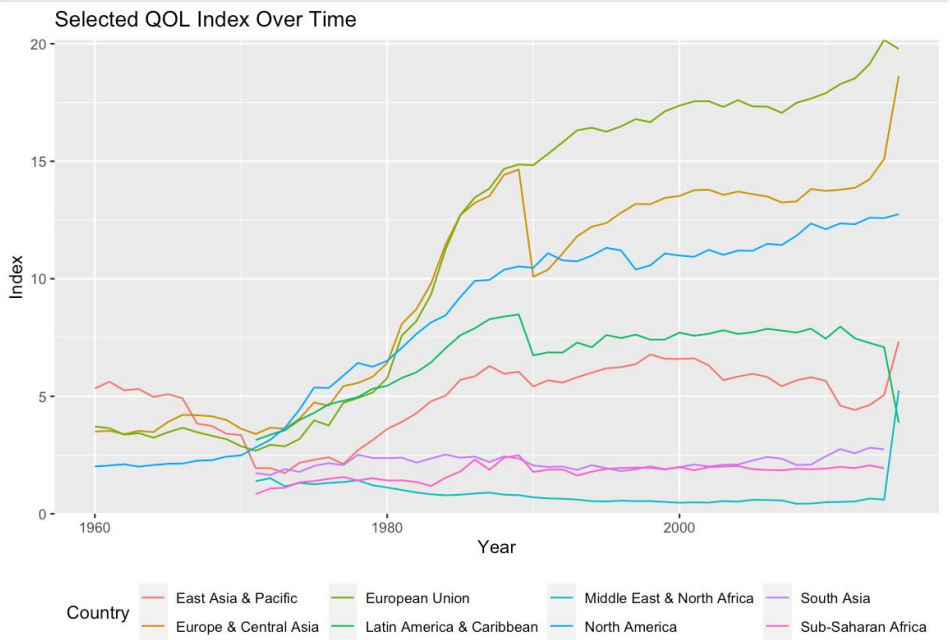






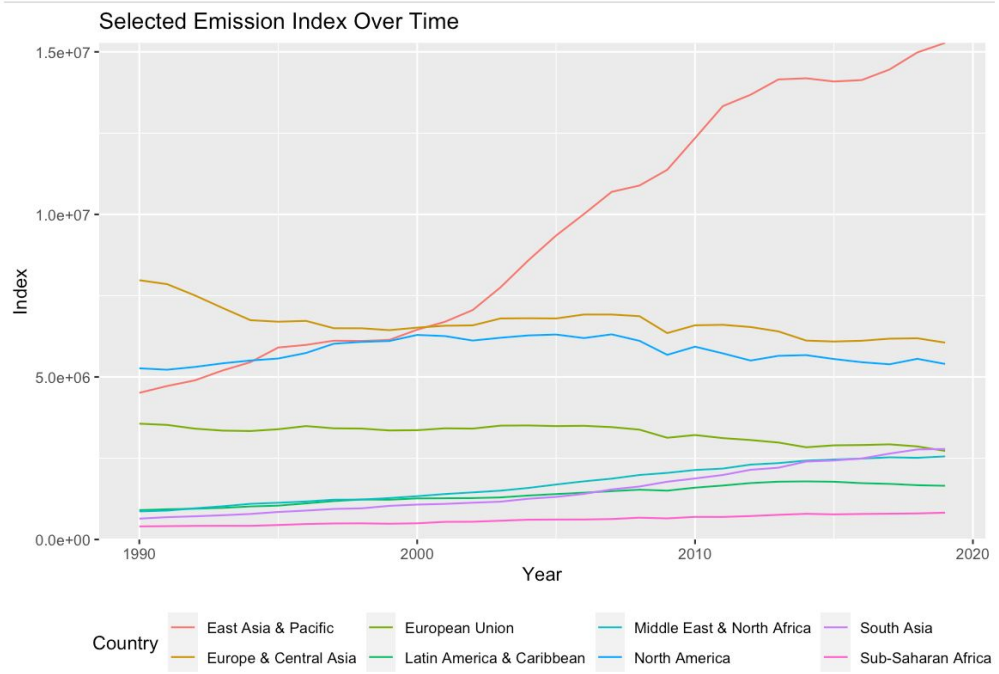
QOL Time Series

- **Alternative and nuclear energy (% of total energy use) over time for various regions**
  - Separation by region, not country
  - Illustrative of missing measurements (1972)
  - Shows general upward trend?
  - Lacking without other graphs



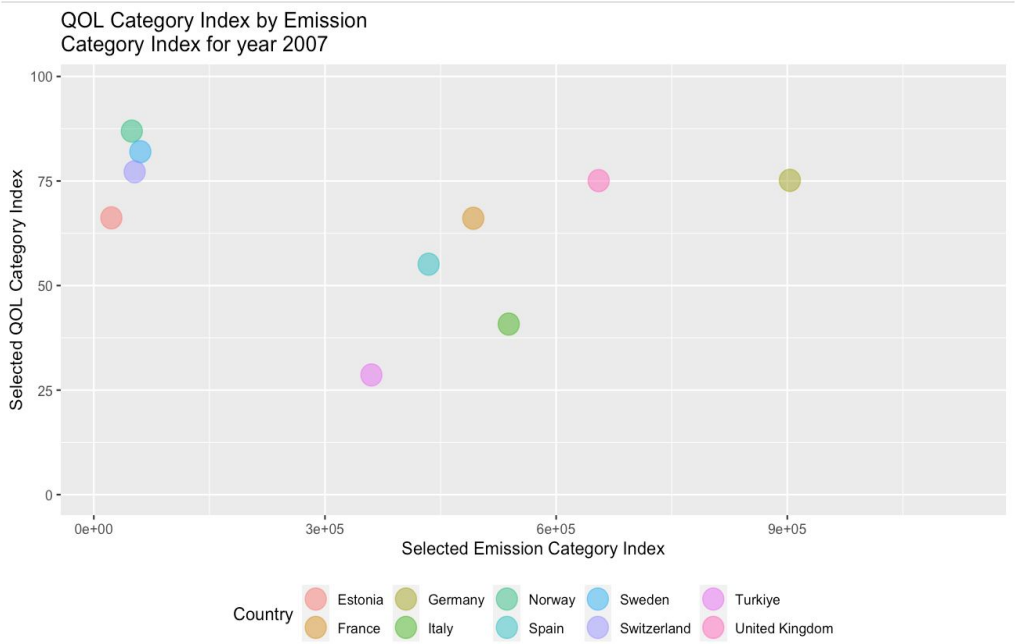
Emission Time Series

- **CO2 Emissions (kt) over time for various regions**
  - Useful to examine relativity
  - Kilotonne measurement also useful for scientific analysis
  - Requires context
    - Rise in EA from industry?
    - Or emission laws?
    - Or population?



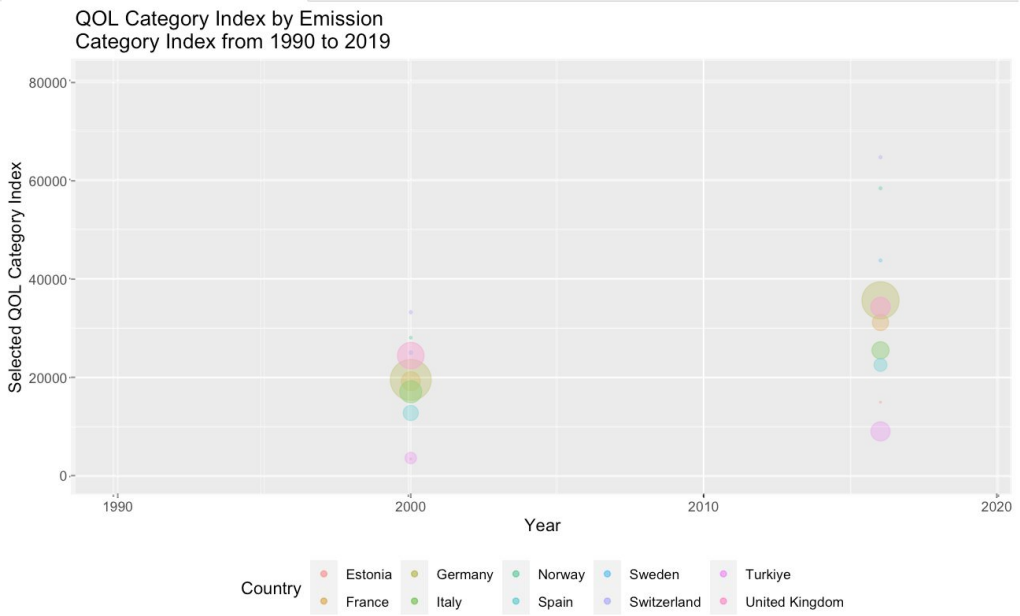
Bivariate Plot at Year

- **Individuals using the Internet (% of population) vs. Total greenhouse gas emissions (kt of CO2 equivalent) in 2007**
  - Allows for year selection
  - Seeking correlation to functions
    - One linear cluster?
    - Vaguely logarithmic group too?
  - Facilitates comparison of index pairs between countries
    - Do different continents have different trends?
    - Are there categories that have strong correlations?



Bivar. Size Plot by Year

- **Adjusted net national income per capita (current US$) vs. CO2 emissions in 2000 and 2016**
  - <u>NB: This is two (2) layered plots for different years</u>
  - Seek correlation by size-Y patterns
    - Are small/big circles high/low?
  - Facilitates examination of trends both between countries and across years
    - Does a lot of size change mean a lot of Y-change? (~no)



Final Thoughts

Conclusions?

- Given exploratory nature, hard to draw specific conclusions
- Broadly, increased emissions correlates to increased “up-is-good” QOL metrics
- However, observed variance suggests a lack of correlation
- Time series within each metric illustrates interesting changes, but depends on metric and if country has data