Electric Vehicles: Convenience or Cost?

A Statistic Analysis of Factors Leading to the Proliferation of Electric Vehicles

Domain

The trajectory of the proliferation of electric vehicles has obvious consequences for transportation, energy, consumer economics, the environment, logistics, infrastructure, and many others beyond that.

Specifically, we want to know whether this proliferation is driven by economic interest or social class issues, or ease of use.

Leverage

Conventional wisdom says that electric vehicles are the future of individual transportation infrastructure in the United States. However, this says nothing as to what precisely motivates the would-be purchaser, or, at what rate this supposed inevitability will occur.

Scope

- Granularity
- Distance

Oregon

- Zipcodes are small enough to hope that we can meaningfully differentiate between cost and convenience persausively enough to complete the project
- Oregon is demographically sparse enough for distance to be useful as a proxy for convenience throughout the state
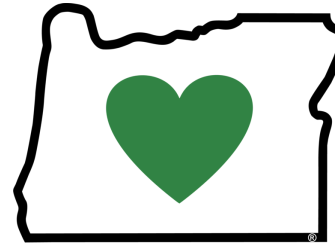
WHY?

HOW?

- Independent Variable

  Proliferation of Electric Vehicles:

  measured by count per Zip Code

- Dependent Variables

  Economic Affluence:

  measured by median income

  Accessibility to Recharge:

  measured by charging stations per Zip Code

- Index (dummy) Variable (Sort Of)

  Zip Code

  Creates geographic context in the fill plots

  Should be transparent in the scatterplots

  Complicated by the Post Office,ie

  they are routes, not a geographic area

NEAR   FAR

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DISTANCE

We want to aggregate the ZipCodes by nearness for the purpose of assessing the accessibility of EV supporting infrastructure

We Need An Experiment

SOURCES

- ## National Renewable Energy Laboratory

  developer.nrel.gov/api

  Federal laboratory with data for charging stations for the entire United States

- ## Atlas Public Policy / EV Hub

  atlasevhub.com/materials/

  state-ev-registration-data/

  Online consortium with data for electric car registrations for several states, including Oregon

- ## US Census Bureau

  api.census.gov

  Gold standard for social science research in America. Must use ACS data for median income and other economic data.

- ## R Packages (specific to this project)

  1. tidycensus - interface for Census Bureau APIs
  2. tigris - allows cartographic boundary shapefiles to be usable in R
  3. sf - low level library for geospatial vector data
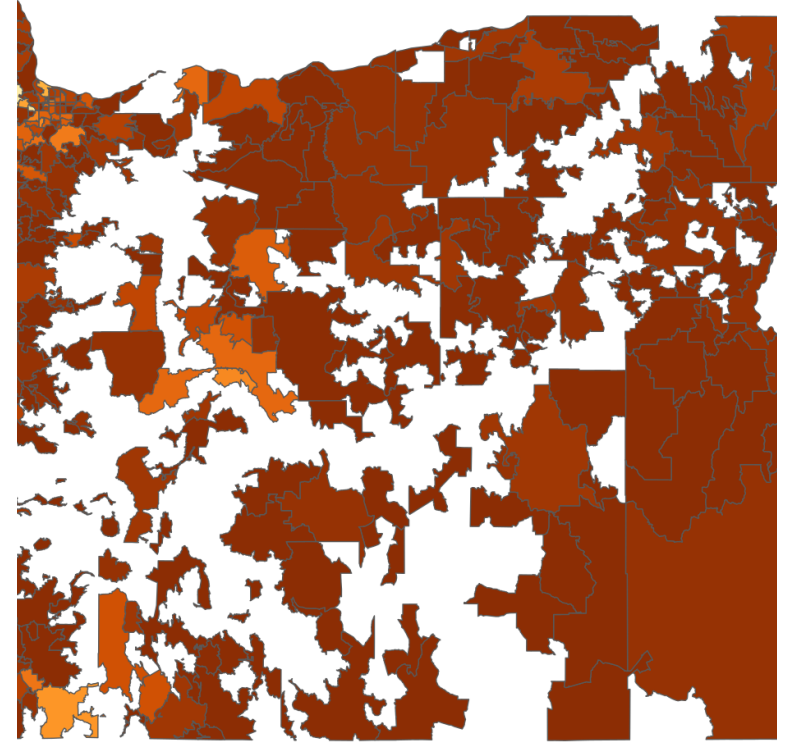 4. zipcodeR - provides Zip Code level functionality and calculations in R
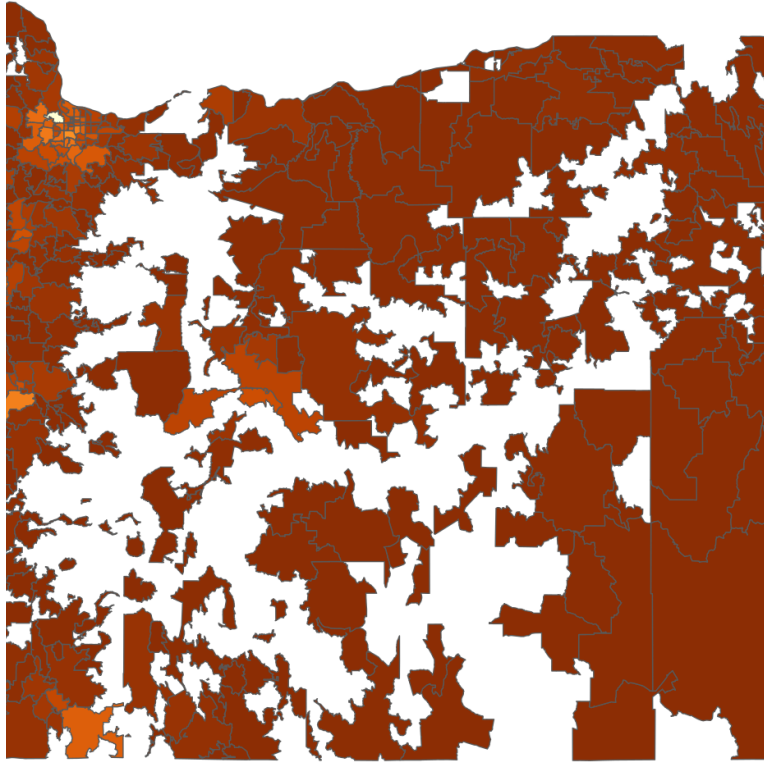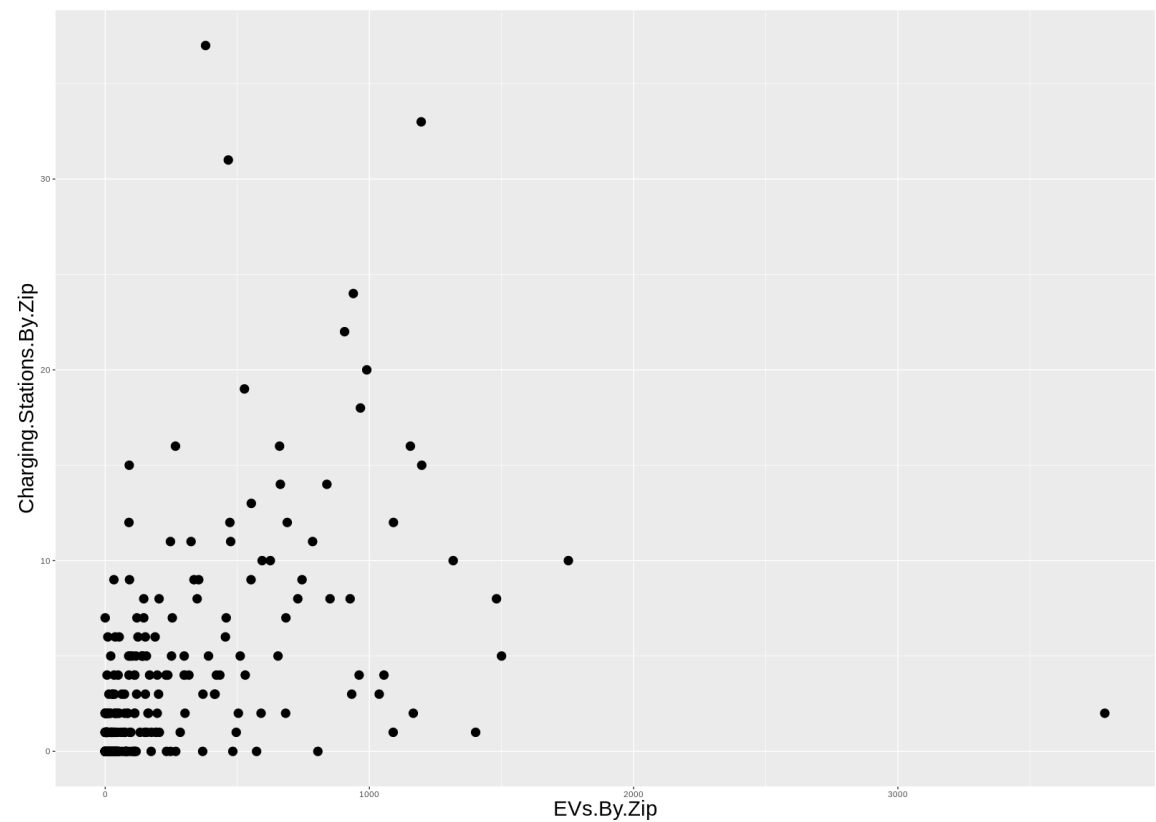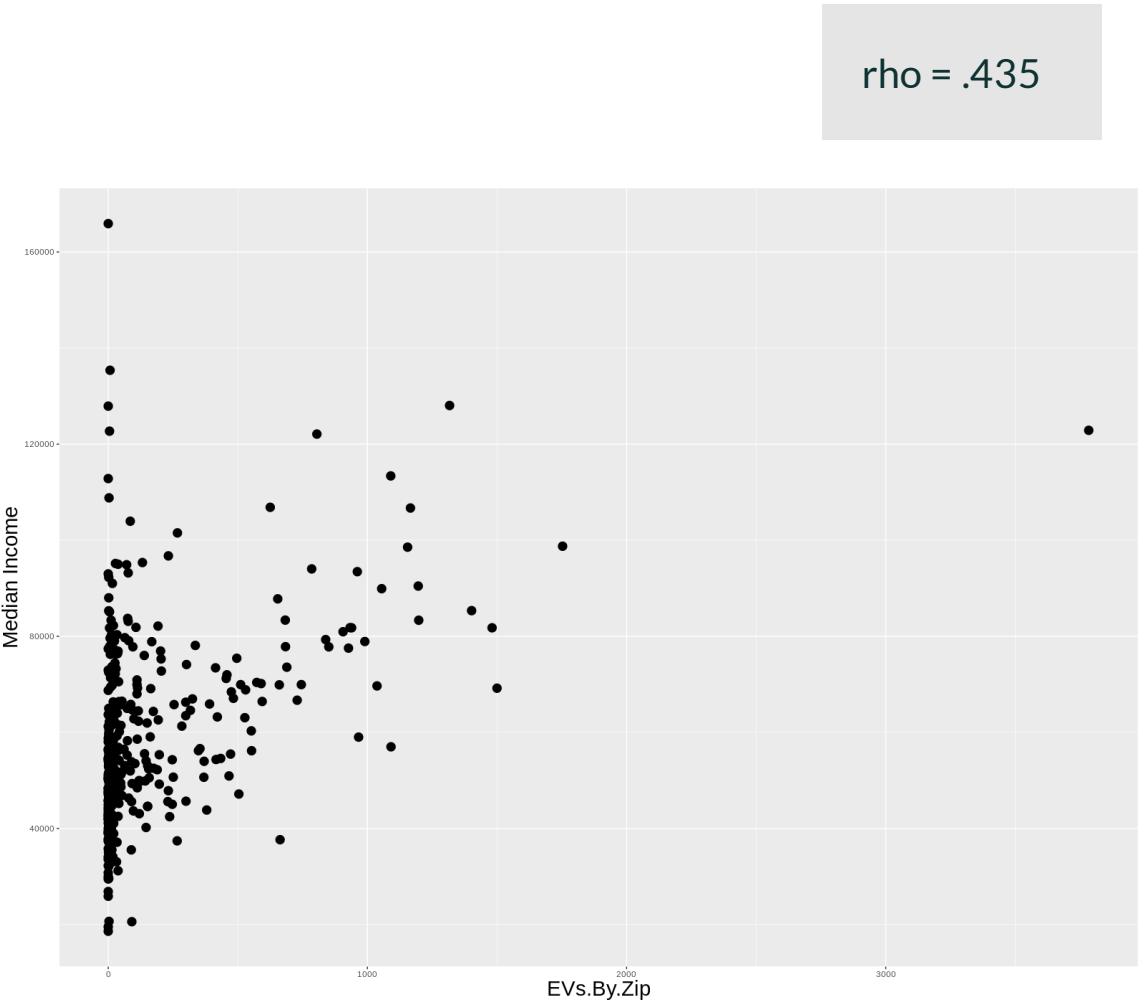
Electric Vehicles by Zip Code

Median Income by Zip Code

Charging Stations by Zip Code

(Not So) Pretty Pictures

What About Scatterplots? (And A Couple Numbers)

rho = .435

rho = .513

- ## Distance

  - zipcodeR is recent library that has some bugs or implementation issues. Though, I suspect the problem is resolvable through several different means.

- ## Comprensiveness (or Lack of It)

  - An issue with every dataset in the project

- ## Zip Codes Are a Bad Index

  - Country level analysis would solve this, but create bigger issues

- ## Census Methodology

  - ACS vs Decennial

  - "Data" are Estimates

  - Has Time Frame Slippage

IMPROVEMENTS