

AMERICAN UNIVERSITY DATA SCIENCE INSTITUTE WINTER '21

# INVESTIGATION INTO CARBON PRICE POLICY IMPACT ON GLOBAL WARMING LEGISLATION OPINIONS

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# Threats of Global Warming

## HABITAT/SPECIES LOSS

WWF study states that global warming puts 33% of global habitats at risk. Global Center for Biodiversity adds that 33% of species could be extinct by 2050.

## CLIMATE MIGRATION

29% of U.S. citizens live in coastal regions. By the end of the century, the anticipated 6 feet of ocean-level rise would redraw the coastline of southern Florida, parts of North Carolina and Virginia and most of Boston and New Orleans.

## PUBLIC HEALTH

Impacts on public health include increased respiratory and cardiovascular disease, injuries and premature deaths related to extreme weather events

**250,000**

ADDITIONAL DEATHS DUE  
TO GLOBAL WARMING IN  
2030-2050  
(WHO)

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**10.5%**

DECREASE IN GDP IN U.S.  
DUE TO GLOBAL WARMING  
BY 2100  
(NBER)

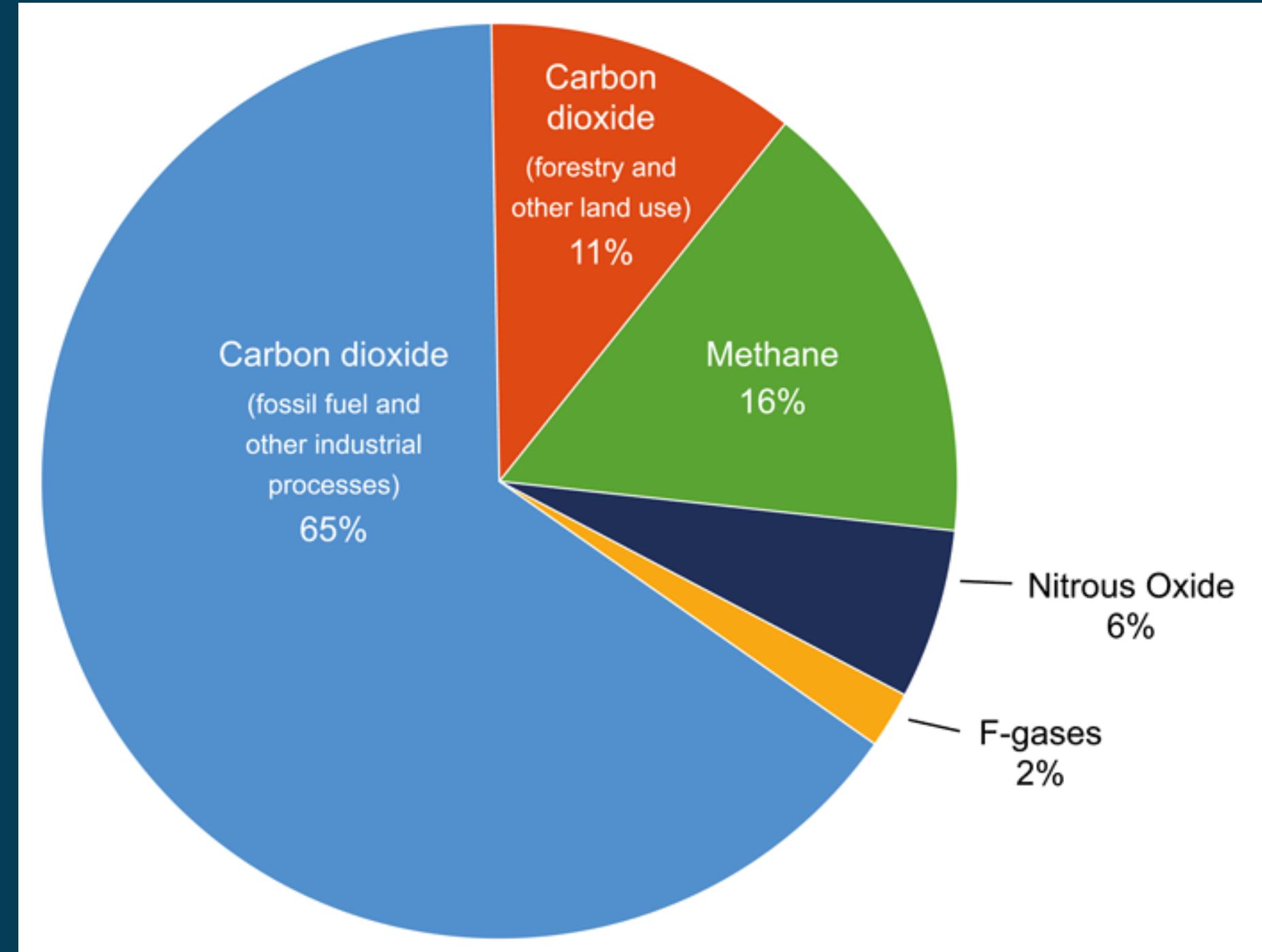
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# Emissions

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## Greenhouse Gas Emissions U.S. 2018

Carbon Dioxide emissions dominate  
U.S. Greenhouse Gas Emissions



# Carbon Price Policy Pathway



## CARBON POLICY IDEA INTRODUCED

First Carbon Policy idea introduced in 1990 after 1st IPCC Assessment shows potential impacts of global warming

## RGGI

Introduced Carbon Policy in 2008 for 10 Northeastern & Mid-Atlantic states (CT, DE, NH, NJ\*, NY, MA, MD, ME, RI, VT)

## CALIFORNIA CARBON PRICE

Introduced Carbon Policy with Cap-and-Trade format in 2013

\*NJ not in RGGI in 2019

# Does a Statewide Carbon Price Policy Impact % of State Populations that want Congress/President to Prioritize Global Warming?

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## HYPOTHESIS:

YES, A STATEWIDE CARBON PRICE POLICY WOULD HAVE A  
POSITIVE IMPACT ON % OF STATE POPULATIONS THAT  
WANT CONGRESS/PRESIDENT TO PRIORITIZE GLOBAL  
WARMING

# DATA DESCRIPTION

## CLIMATE CHANGE AND GLOBAL WARMING

Using climate change and global warming interchangeably

## POLITICS

Used 2016 election margin % for each state

Included Governor's party affiliation of each state

% that think GW is anthropogenic

**% wanting GW to be high priority in legislation**

## DEMOGRAPHICS

Used total population of each state

Used census data to determine % of demographics

## ECONOMICS & EMISSIONS

% total energy sourced by fossil fuels

% total energy sourced by renewables

State GDP totals

Total CO2 Emissions

# Multicollinearity

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## High Correlation Coefficients

*State Population & GDP*

**0.9774911**

*CO2 Emissions & GDP*

**0.730056**

*Population & CO2 Emissions*

**0.803038**

*% Believe Anthropogenic &  
2016 Election Margin*

**0.9138015**

# Models With and Without Carbon Price

WITH CARBON PRICE

Adjusted R2: **0.8423265**

AIC: **-381.1852**

BIC: **-359.9351**

WITHOUT CARBON PRICE

Adjusted R2: **0.8550544**

AIC: **-388.617**

BIC: **-375.0942**

# LINEAR REGRESSION MODEL WITH AND WITHOUT CARBON PRICE

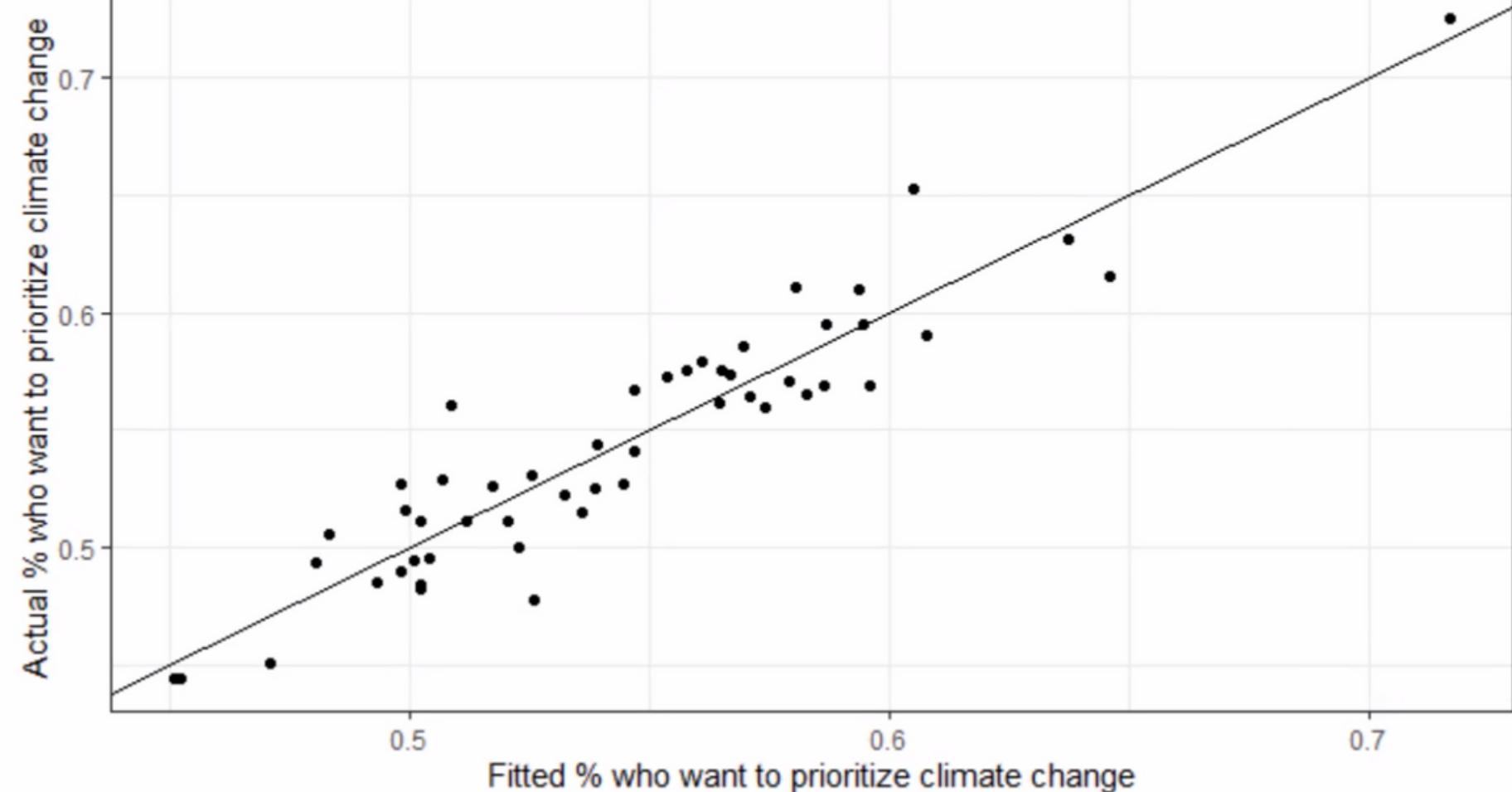
Proportion of State Population Who Want Congress/President to Prioritize Climate Change			
Predictors	Estimates	CI	p
Intercept	0.4892	0.4068 – 0.5715	<0.001
Carbon Price	0.0009	-0.0182 – 0.0200	0.924
Governor Party	-0.0005	-0.0153 – 0.0142	0.940
CO2 Emissions	-0.0000	-0.0001 – 0.0001	0.755
% Renewable Energy	0.0008	-0.0002 – 0.0018	0.114
% Fossil Fuels	0.0003	-0.0006 – 0.0011	0.532
% Black	0.0000	-0.0000 – 0.0000	0.688
% Latino	0.0009	0.0001 – 0.0017	0.035
% Asian	0.0011	0.0003 – 0.0019	0.006
Population	0.0013	-0.0001 – 0.0026	0.063
2016 Margin	0.0017	0.0012 – 0.0021	<0.001
Observations	51		
R <sup>2</sup> / R <sup>2</sup> adjusted	0.874 / 0.842		

Proportion of State Population Who Want Congress/President to Prioritize Climate Change			
Predictors	Estimates	CI	p
Intercept	0.5135	0.4919 – 0.5350	<0.001
% Renewable Energy	0.0006	-0.0001 – 0.0012	0.075
% Black	0.0008	0.0001 – 0.0015	0.029
% Latino	0.0000	-0.0000 – 0.0000	0.865
% Asian	0.0011	0.0004 – 0.0019	0.003
Population	0.0013	0.0001 – 0.0026	0.042
2016 Margin	0.0017	0.0014 – 0.0020	<0.001
Observations	51		
R <sup>2</sup> / R <sup>2</sup> adjusted	0.872 / 0.855		

# Linear vs Beta

Linear Model

Actual vs. Fitted Values

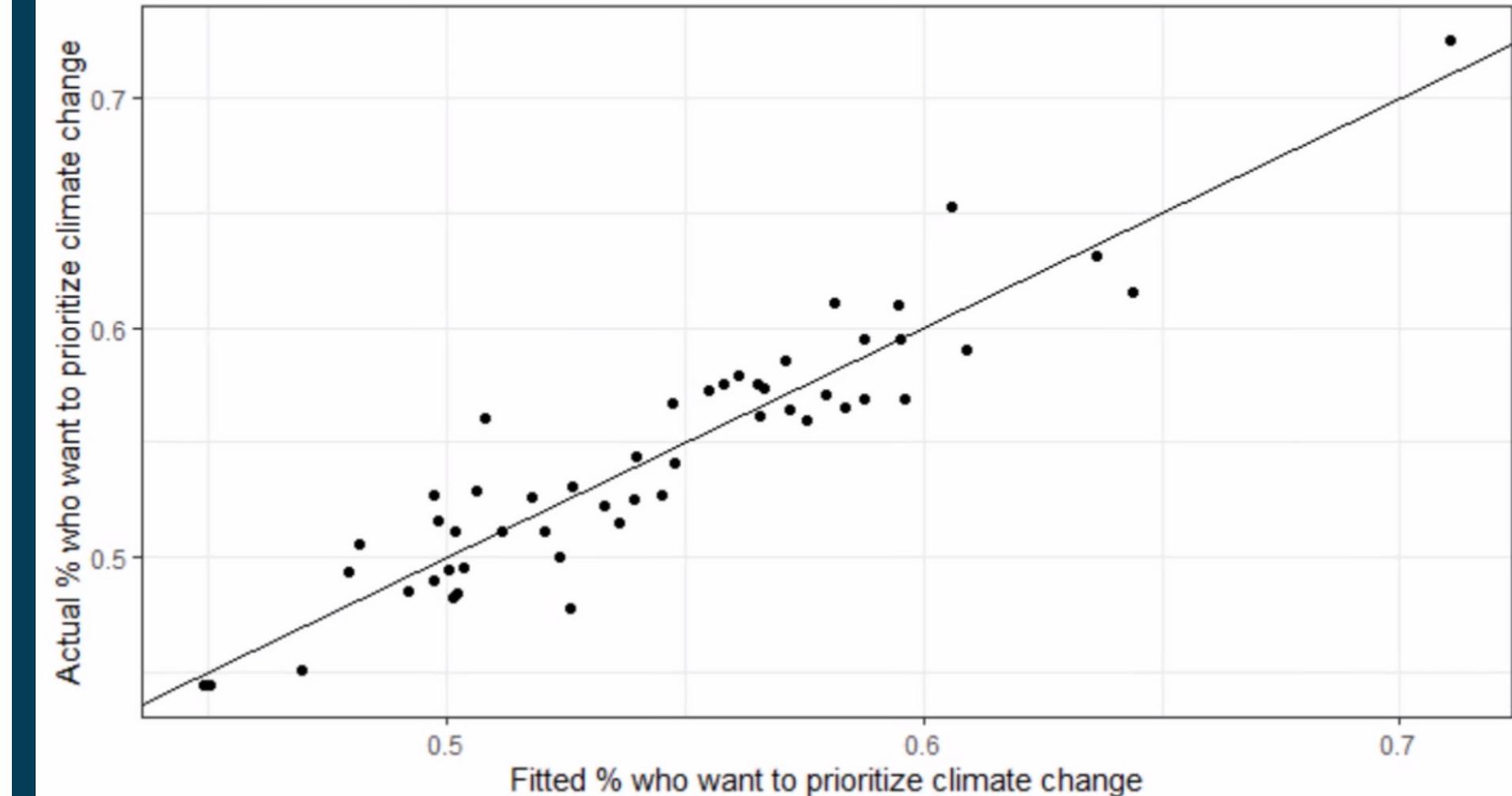


Linear RMSE: 0.01930821

R2 Value: 0.872

Beta Model

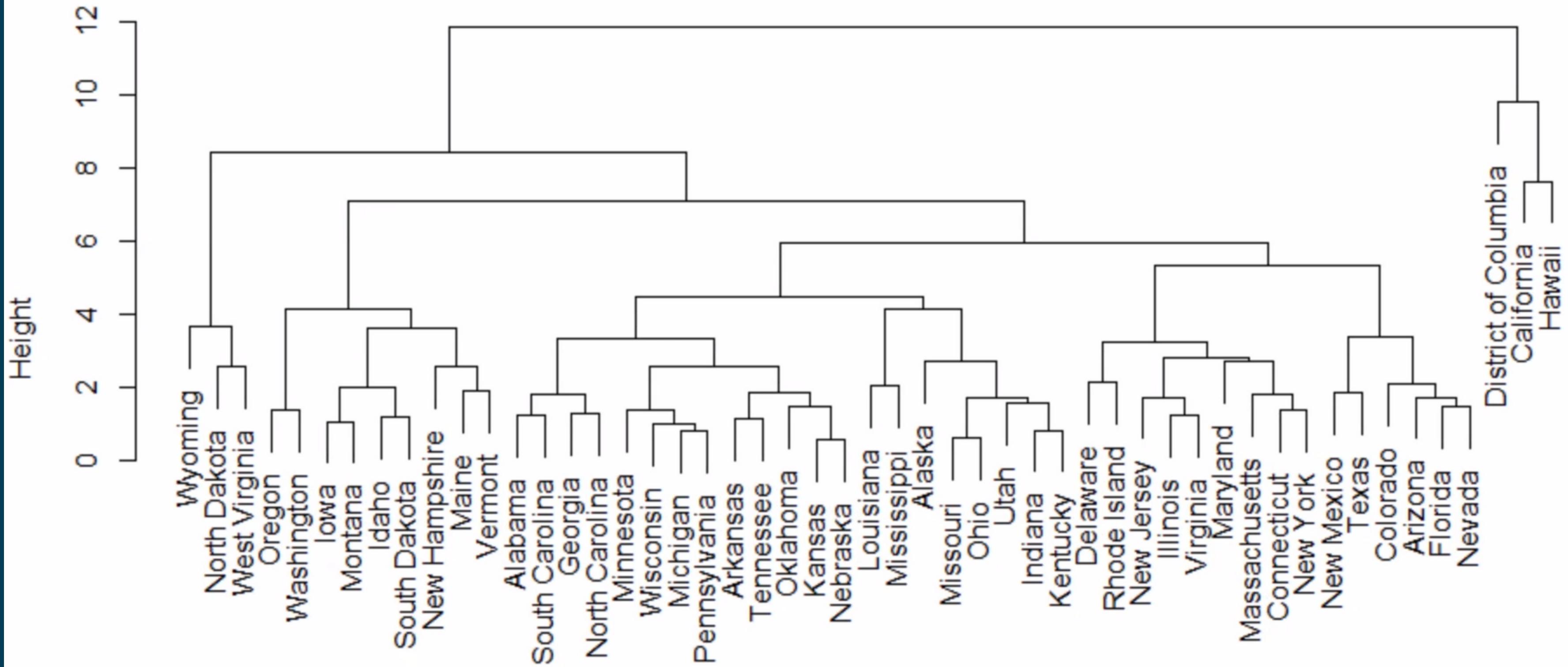
Actual vs. Fitted Values



Beta RMSE: 0.01937114

R2 Value: 0.874

## Cluster Dendrogram



# Final Analysis

## VARIABLES USED IN FINAL MODEL

- 1.2016 Election Margin
  - a. An increase of 1% in the margin of the 2016 election (1 % more of vote for Clinton) results in a mean increase of ~.2% in percentage of population that wants climate legislation to be high priority issue
- 2.Percent of State Population Asian
- 3.Percent of State Population Black
- 4.Percent of State Population Latinx
- 5.Percent of Energy Used Renewable
- 6.Population

## IMPACT OF CARBON PRICE

Carbon Price was not found to be significant meaning that we cannot reject the null hypothesis that the coefficient for Carbon Price is 0

## WHAT DOES THIS MEAN

We cannot claim that a Carbon Price policy has an impact on the percentage of state populations that believe that President & Congress should make legislation that combats global warming a high priority issue

# Limitations & Recommendations

## DATA COLLECTION

2016 Election Margin Variable

Impact of Demographics on percentage of population that wants climate legislation to be high priority issue

## MODELS

Time constraints limited ability to validate model with another set of survey data.

## ANALYSIS

Only focused on Carbon Price policies and not other potential environmental policies for global warming mitigation

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