The Impact of Adult Awareness of Climate Change on Renewable Energy Consumption in the United States

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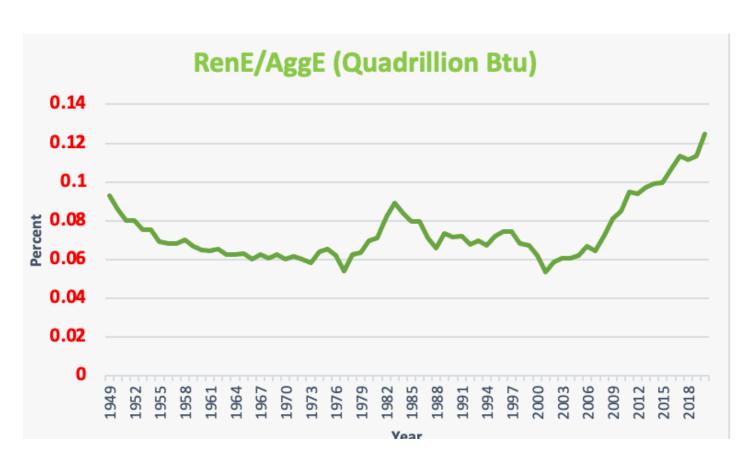
TEXAS TECH
U N I V E R S I T Y

Motivation

The demand for energy is increasing, and fossil fuels have emerged as the primary source to meet this demand. Nevertheless, the process of burning fossil fuels results in significant environmental pollution. The government should transition to Renewable Energy, which is comparatively more environmentally sustainable. In addition, citizens must support the government in implementing sustainable energy policies.

Objective

The goal of this study is to measure how environmental awareness among U.S. adults affects the Renewable energy Consumption in the United States.

Contributions

- First to investigate the causality between the awareness level and renewable energy consumption.
- Government Policy Analysis.
  - An insight into people's willingness to pay.

Limitations

- Sample Size.
- Panel Data Analysis.

Data

- Micro Analysis.
  - Surveyed 406 College Students in Texas
- Macro Analysis.
  - National-level Data.

Methodology

We estimate the following logit model

$$log(\frac{P_i}{1-P_i})= \beta_0 + \beta_1 VGAL_i + \beta_2 GAL_i$$
$$+\beta_3 BG_i + \beta_4 Female_i + \beta_5 PE_i + \beta_6 RS_i + \beta_7 AGE_i + \mu_i$$

Our Estimated ARDL model (long run)

$$log(REC)_t = \lambda_0 + \sum_{i=1}^{q} \lambda_1 log(REC)_{t-i} + \sum_{i=1}^{q} \lambda_2 log(AL)_{t-i} +$$
$$\sum_{i=1}^{q} \lambda_3 CE_{t-i} + \sum_{i=1}^{q} \lambda_4 EER_{t-i} + \sum_{i=1}^{q} \lambda_5 RI_{t-i} + \sum_{i=1}^{q} \lambda_6 log(NC)_{t-i} +$$
$$\sum_{i=1}^{q} \lambda_7 CP_{t-i} + \sum_{i=1}^{q} \lambda_8 CG_{t-i} + \sum_{i=1}^{q} \lambda_9 PDSI_{t-i} + \epsilon_t$$

Abstract

I conduct a survey among college students in Texas to assess their willingness to pay for renewable energy to tackle climate change. An individual with a good level of climate awareness is 9.38% more willing to pay extra for renewable energy. Comparably, people with an excellent level of awareness are 23% more likely to financially favor renewable energy than others, given the willingness to pay those with a good level of awareness. Utilizing the ARDL model, I analyze the national-level data to extrapolate the individual-level results on a macroeconomic level. I find that a 1% increase in awareness level would cause an increase in REC by 0.32%, but a $1 increase in the oil price would lead to a rise in REC only by 0.002%. The environmental stringency index (EER), newspaper coverage of climate change (NC), and education (CG) all have statistically significant effects on REC. However, the renewable energy investment (RI), and climate extreme index (CE) have no substantial impact on REC.
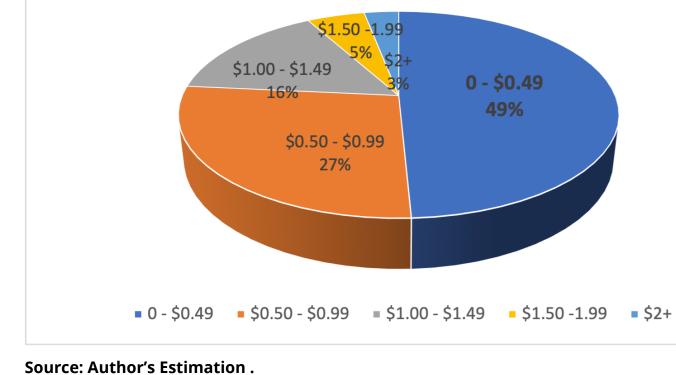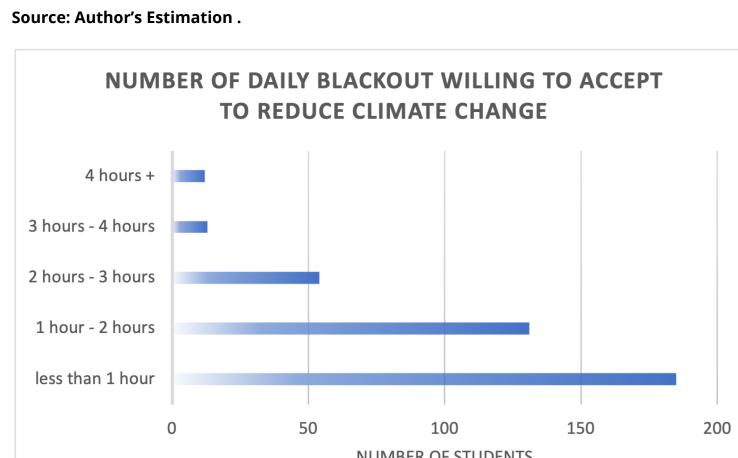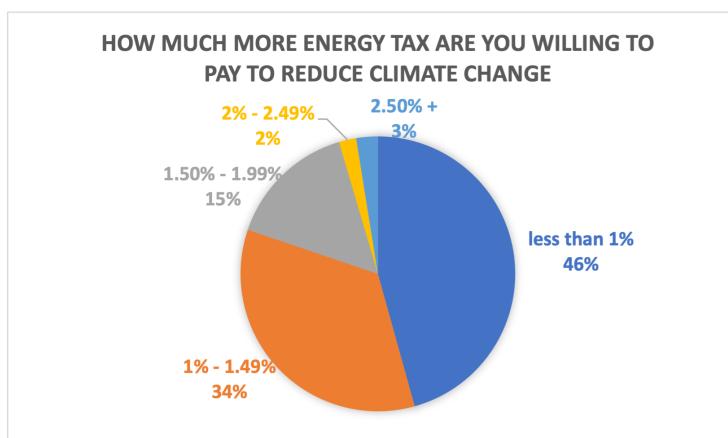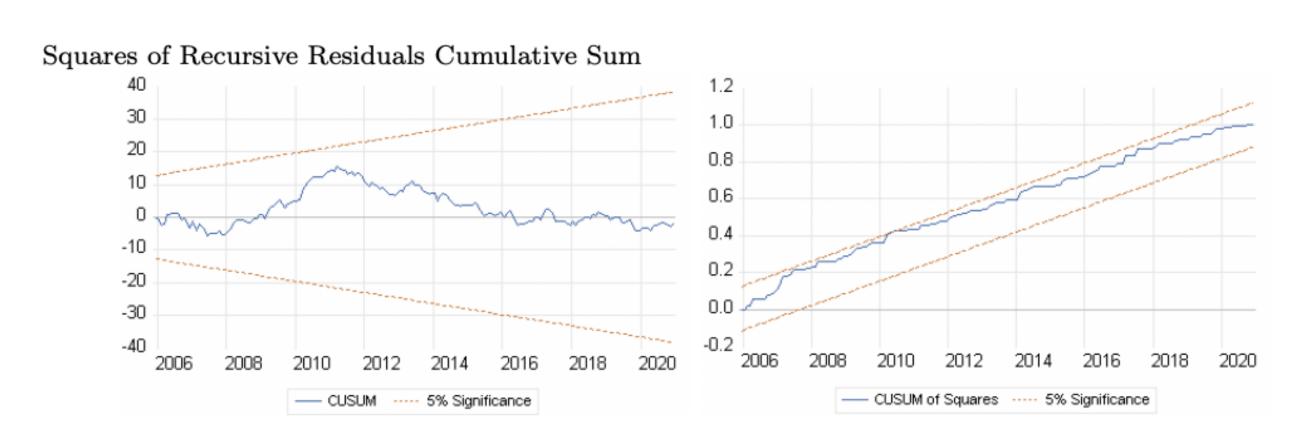
Willingness to pay more in gasoline (per gallon) to reduce climate change

Source: Author's Estimation.

NUMBER OF DAILY BLACKOUT WILLING TO ACCEPT TO REDUCE CLIMATE CHANGE

Source: Author's Estimation.

HOW MUCH MORE ENERGY TAX ARE YOU WILLING TO PAY TO REDUCE CLIMATE CHANGE

Source: Author's Estimation.

RenE/AggE (Quadrillion Btu)

Source: U.S. Energy Information Administration.

How Much Additional Income Tax Willing to Accept for a Cleaner Environment?

less than 1%	162
1% - 1.49%	153
1.50% - 1.99%	59
2% - 2.49%	9
2.50% +	12

Source: Author's Estimation.

Results & Conclusions

Avg. Marginal Effects of Climate Awareness on Renewable Energy Consumption

Variables	(1)	(2)	(3)
Very Good AL	.2298** (.1041)	.2529** (.1086)	.2937*** (.1065)
Good AL	.0959* (.0531)	.0563 (.0543)	.0766 (.0522)
Rural	.0942 (.0841)	.0924 (.0844)	-.0032 (.0810)
Female	-.0703 (.0504)	-.0139 (.0515)	-.1101** (.0488)
Parent's Education	-.1372*** (.0499)	-.0821 (.0515)	-.1768*** (.0479)
Marital Status	.0205 (.1059)	.0449 (.1076)	.0273 (.1040)
Age	.0001 (.0113)	-.0138 (.0115)	-.0145 (.0110)

Squares of Recursive Residuals Cumulative Sum

Logit and ARDL Analysis

- Coefficients are consistent to assert a positive impact of AL on REC.
- People with higher climate awareness tend pay more for REC.
- However, the there is very low transition.
- Newspaper coverage on climate change has a negative impact on REC.
- The impact to the education and EER is very low.
- Investment in renewable energy has no statistically significant impact.

Long-run ARDL Estimation

Variables	(1) ARDL	(2) DOLS	(3) FMOLS
Log (Awareness Level)	.3156*** (.0746)	.1985*** (.0424)	.0917*** (.0316)
Climate Extreme	-.0001 (.0020)	.0001 (.0014)	-.0001 (.0001)
Renewable Energy Investment	-.0009 (.0053)	.0036 (.0036)	.0057* (.0030)
Crude Oil Price	.0011** (.0005)	.0013** (.0004)	.0015*** (.0003)
Log(Newspaper Coverage)	-.7028*** (.1710)	-.5349*** (.1116)	-.3030*** (.0719)
Palmer Drought Severity Index	-.0051 (.0047)	-.0023 (.0037)	.0010 (.0036)
Log (College Graduates)	.0001*** (.0000)	.0001*** (.0001)	.0001*** (.001)
Energy And Environmental Regulation Index)	.0017* (.0010)	.0005 (.0006)	.0001 (.0003)
Constant		4.1646*** (0.3127)	4.5856*** (0.2374)

Diagnostic test	p-value	Result
Breusch-Godfrey LM	0.5183	No serial correlations
White test	0.4667	No heteroskedasticity
Ramsey RESET test	0.9	Model is specified correctly
Normality test	0.1938	Estimated residual are normal

Granger Causality Test

Null Hypothesis	chi^2	P-value
Log(Awareness Level) does not granger cause Log(REC)	33.996	0.000
Log(Renewable Energy Consumption) does not granger cause Log(AL)	8.0506	0.1115