Climate Policy Uncertaity & Renewable Energy Consumption

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Paper Brief

In this paper I employ a time series methodology to explore the long and short run effects of climate policy ambiguity on renewable energy consumption in the United States.

Data processing

```
library(tidyverse)
library(dplyr)
library(stargazer)
library(gtsummary)
library(timetk)
```

```
Research_Data<-read.csv(file = file.choose(), header = T, sep=",")

#   str(Research_Data)
#   Research_Data %>%
#   select(everything()) %>%
#   summarise_all(funs(Missing_Values=sum(is.na(.)))) %>%
#   glimpse()

Research_Data<-Research_Data %>% select(-c(1:3))

Research_Data %>% as.data.frame() %>%
    stargazer(type = 'text')
```

```
================================================================================
Statistic                              N    Mean    St. Dev.    Min       Max
--------------------------------------------------------------------------------
Total_Renewable_Energy_Consumption   263 704.410 187.320  395.833 1,088.369
Hydro_Consumption                    263 216.992  38.369  145.715  316.615
Biofuelss_consumption                263 123.016  66.558  16.306   209.235
Geothermal_consumption               263 16.292   1.547   11.971   18.801
Solar_Energy_consumption             263 30.015   37.536   2.925   158.560
Biomas_consumption                   263 340.092  75.653  199.370  458.954
Waste_energy_consumption             263 37.472   4.239   25.688   50.694
Wind_Energy_consumption              263 101.019  87.723   3.367   350.361
Wood_energy_consumption              263 179.604  12.055  148.458  208.323
Total_Renewable_Energy_Production    263 708.253 191.990  396.469 1,096.106
Biofuel_production                   263 124.728  68.458  17.661   214.619
Biomass_production                   263 343.935  79.580  198.932  467.556
Wood_Energy_production               263 181.735  12.843  148.458  215.800
CPU_INDEX                            263 102.365  84.023   1.230   629.020
```

```
Industrial_production              263 96.637   4.843   84.202   104.166
WTI_Crud_OIL_Price                 263 60.977   25.599  16.550   133.880
Producer_price_Index               263 178.384  27.369  128.100  243.272
-------------------------------------------------------------------------
```

```
library(lubridate)

Research_Data<-Research_Data %>%
  mutate(date_seq =seq(ymd('2000-01-01'), ymd('2021-11-21'), by = 'months'))
```

```
# Log transformation of all variables

Research_data_ln<-Research_Data %>%
    mutate_at(1:17, list(ln = ~ log(.))) %>% select(18:35) %>% glimpse()
```

```
Rows: 263
Columns: 18
$ date_seq                                <date> 2000-01-01, 2000-02-01, 2000-03-01, 2000-04-01, 200~
$ Total_Renewable_Energy_Consumption_ln <dbl> 6.225597, 6.212596, 6.325213, 6.340626, 6.325842, 6.~
$ Hydro_Consumption_ln                    <dbl> 5.554965, 5.435267, 5.607261, 5.672027, 5.633786, 5.~
$ Biofuelss_consumption_ln                <dbl> 2.981278, 2.850360, 2.994381, 2.923753, 2.999575, 2.~
$ Geothermal_consumption_ln               <dbl> 2.689479, 2.610511, 2.628141, 2.664934, 2.630809, 2.~
$ Solar_Energy_consumption_ln             <dbl> 1.181420, 1.288682, 1.605631, 1.715238, 1.837211, 1.~
$ Biomas_consumption_ln                   <dbl> 5.404666, 5.502095, 5.574740, 5.534318, 5.540408, 5.~
$ Waste_energy_consumption_ln             <dbl> 3.738169, 3.753074, 3.871076, 3.861887, 3.925808, 3.~
$ Wind_Energy_consumption_ln              <dbl> 1.884491, 1.974220, 1.272846, 1.214022, 1.426236, 1.~
$ Wood_energy_consumption_ln              <dbl> 5.079589, 5.221755, 5.276654, 5.231483, 5.214996, 5.~
$ Total_Renewable_Energy_Production_ln    <dbl> 6.224855, 6.214526, 6.324368, 6.343044, 6.325656, 6.~
$ Biofuel_production_ln                   <dbl> 2.962124, 2.904603, 2.970517, 2.994982, 2.994381, 2.~
$ Biomass_production_ln                   <dbl> 5.402979, 5.506018, 5.572948, 5.539729, 5.540000, 5.~
$ Wood_Energy_production_ln               <dbl> 5.079589, 5.221755, 5.276654, 5.231483, 5.214996, 5.~
$ CPU_INDEX_ln                            <dbl> 3.3666059, 3.0407056, 2.7887081, 0.2070142, 2.165619~
$ Industrial_production_ln                <dbl> 4.519549, 4.523170, 4.526920, 4.533265, 4.536278, 4.~
$ WTI_Crud_OIL_Price_ln                   <dbl> 3.305420, 3.379974, 3.395850, 3.247269, 3.360028, 3.~
$ Producer_price_Index_ln                 <dbl> 4.854371, 4.865995, 4.873669, 4.872905, 4.879767, 4.~
```

```
# summary statistics of log transformed data

Research_data_ln %>% as.data.frame() %>%
    stargazer(type = 'text')
```

```
=========================================================================
Statistic                                 N  Mean  St. Dev.  Min   Max
-------------------------------------------------------------------------
Total_Renewable_Energy_Consumption_ln 263 6.521  0.273   5.981 6.992
Hydro_Consumption_ln                  263 5.364  0.177   4.982 5.758
Biofuelss_consumption_ln              263 4.569  0.800   2.792 5.343
Geothermal_consumption_ln             263 2.786  0.098   2.482 2.934
Solar_Energy_consumption_ln           263 2.671  1.195   1.073 5.066
Biomas_consumption_ln                 263 5.802  0.238   5.295 6.129
Waste_energy_consumption_ln           263 3.617  0.114   3.246 3.926
Wind_Energy_consumption_ln            263 3.980  1.330   1.214 5.859
Wood_energy_consumption_ln            263 5.189  0.067   5.000 5.339
Total_Renewable_Energy_Production_ln  263 6.525  0.278   5.983 7.000
Biofuel_production_ln                 263 4.576  0.810   2.871 5.369
Biomass_production_ln                 263 5.811  0.247   5.293 6.148
```

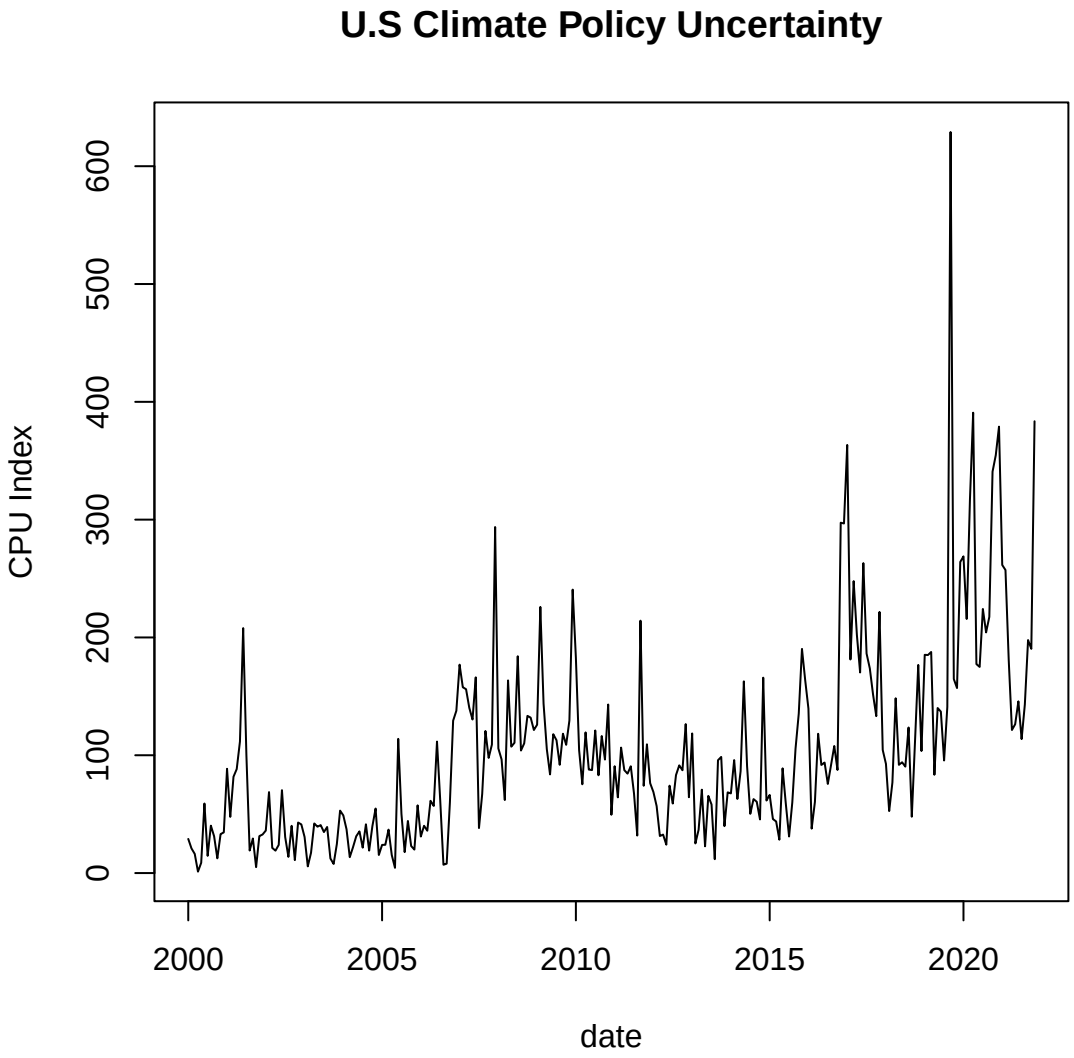
```
Wood_Energy_production_ln             263 5.200  0.071   5.000 5.374
CPU_INDEX_ln                          263 4.282  0.923   0.207 6.444
Industrial_production_ln              263 4.570  0.051   4.433 4.646
WTI_Crud_OIL_Price_ln                 263 4.015  0.450   2.806 4.897
Producer_price_Index_ln               263 5.171  0.162   4.853 5.494
------------------------------------------------------------------------
```

PLoting time series

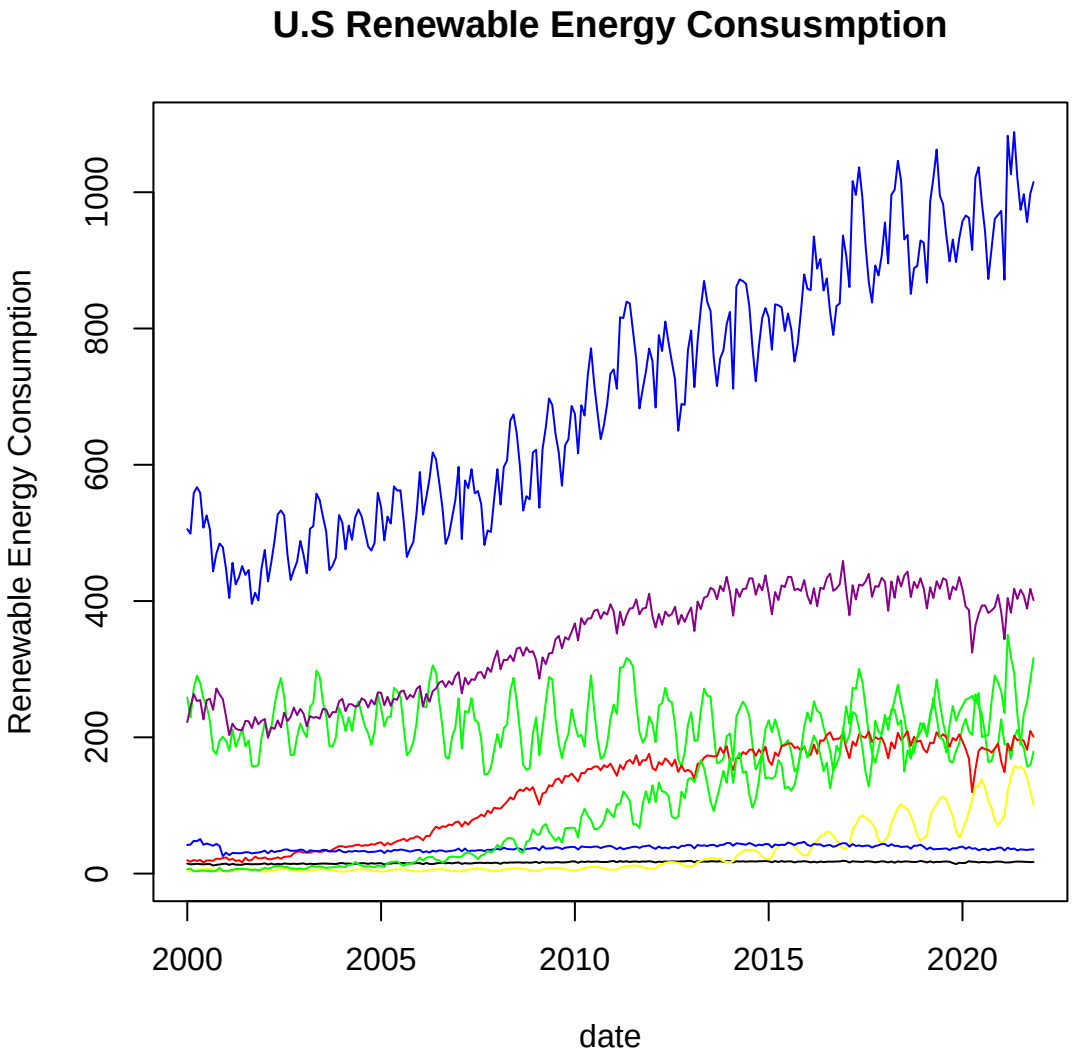
```
# sub-setting the time series for plots

Total_Ren_Cons<-ts(Research_Data$Total_Renewable_Energy_Consumption, start = c(2000, 1), frequency = 12)
Hydro_Ren_Cons<-ts(Research_Data$Hydro_Consumption , start = c(2000, 1), frequency = 12)
Biofuel_Ren_Cons<-ts(Research_Data$Biofuelss_consumption , start = c(2000, 1), frequency = 12)
Geothermal_Ren_Cons<-ts(Research_Data$Geothermal_consumption , start = c(2000, 1), frequency = 12)
Solar_Ren_Cons<-ts(Research_Data$Solar_Energy_consumption , start = c(2000, 1), frequency = 12)
Biomas_Ren_Cons<-ts(Research_Data$Biomas_consumption , start = c(2000, 1), frequency = 12)
Waste_Ren_Cons<-ts(Research_Data$Waste_energy_consumption , start = c(2000, 1), frequency = 12)
Wind_Ren_Cons<-ts(Research_Data$Wind_Energy_consumption , start = c(2000, 1), frequency = 12)
cpu_time_Ren_Cons<-ts(Research_Data$CPU_INDEX , start = c(2000, 1), frequency = 12)

plot(cpu_time_Ren_Cons, main="U.S Climate Policy Uncertainty", plot.type = "single", xlab="date", ylab=
```




```
plot(cbind( Total_Ren_Cons, Hydro_Ren_Cons, Biofuel_Ren_Cons, Geothermal_Ren_Cons, Solar_Ren_Cons, Bioma
```


U.S Renewable Energy Consusmption
Renewable Energy Consumption
0
200
400
600
800
1000
2000
2005
2010
2015
2020
date