Earthquakes, Volcanic Eruptions, and Country Voting within the United Nations General Assembly

Mariya Siliankina

EPPS 6356

Introduction

- What influences voting behavior?
  - Diplomatic relations
  - External factors
- United Nations General Assembly utilizes country voting extensively
- What factors cause more solidarity among U.N. member states?

Literature Review

- Natural disasters
  - Socio-economic disturbance
- Manage macroeconomic consequences
  - Mobilization of resources
  - Favorable financial conditions
- Foreign aid → soft power
- U.S. provides aid based on voting behavior
  - Apply this relationship

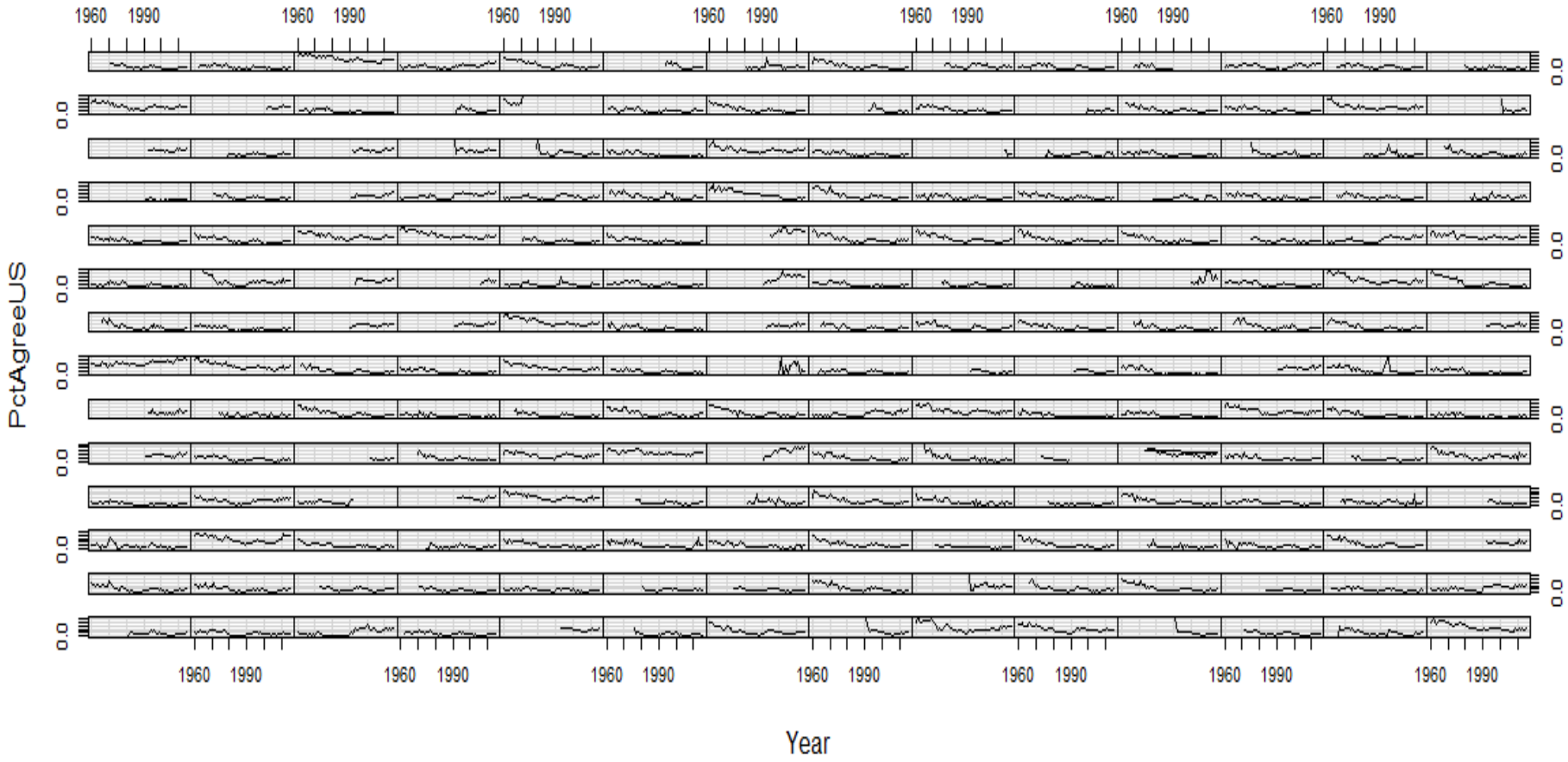
Research Statement

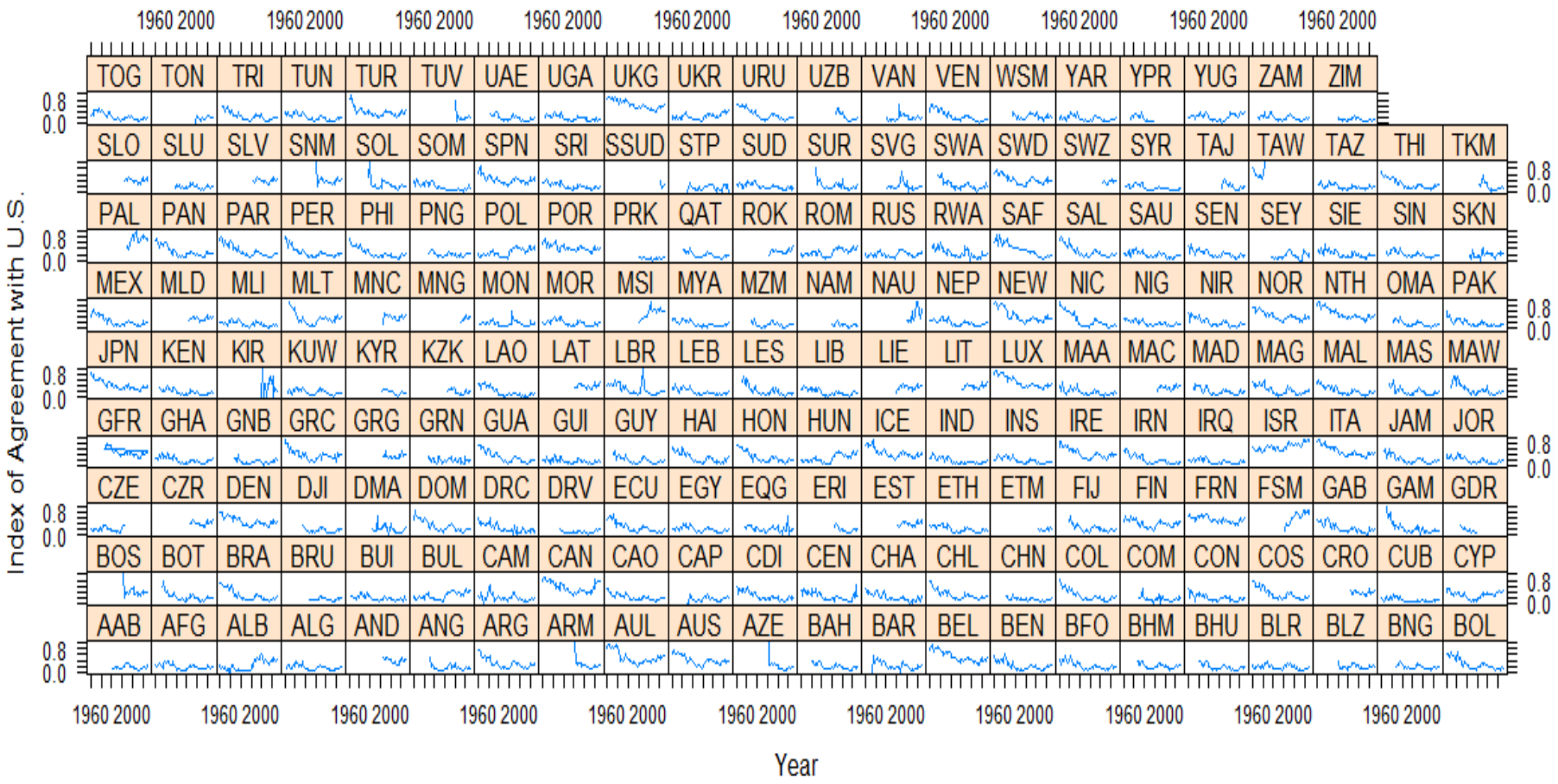
- Hypothesis 1:
  - U.N. member states that experience significant earthquakes and/or volcanic eruptions will be more likely to vote with the United States in the U.N. General Assembly during the same year.
    - Based on assumption that they need foreign aid

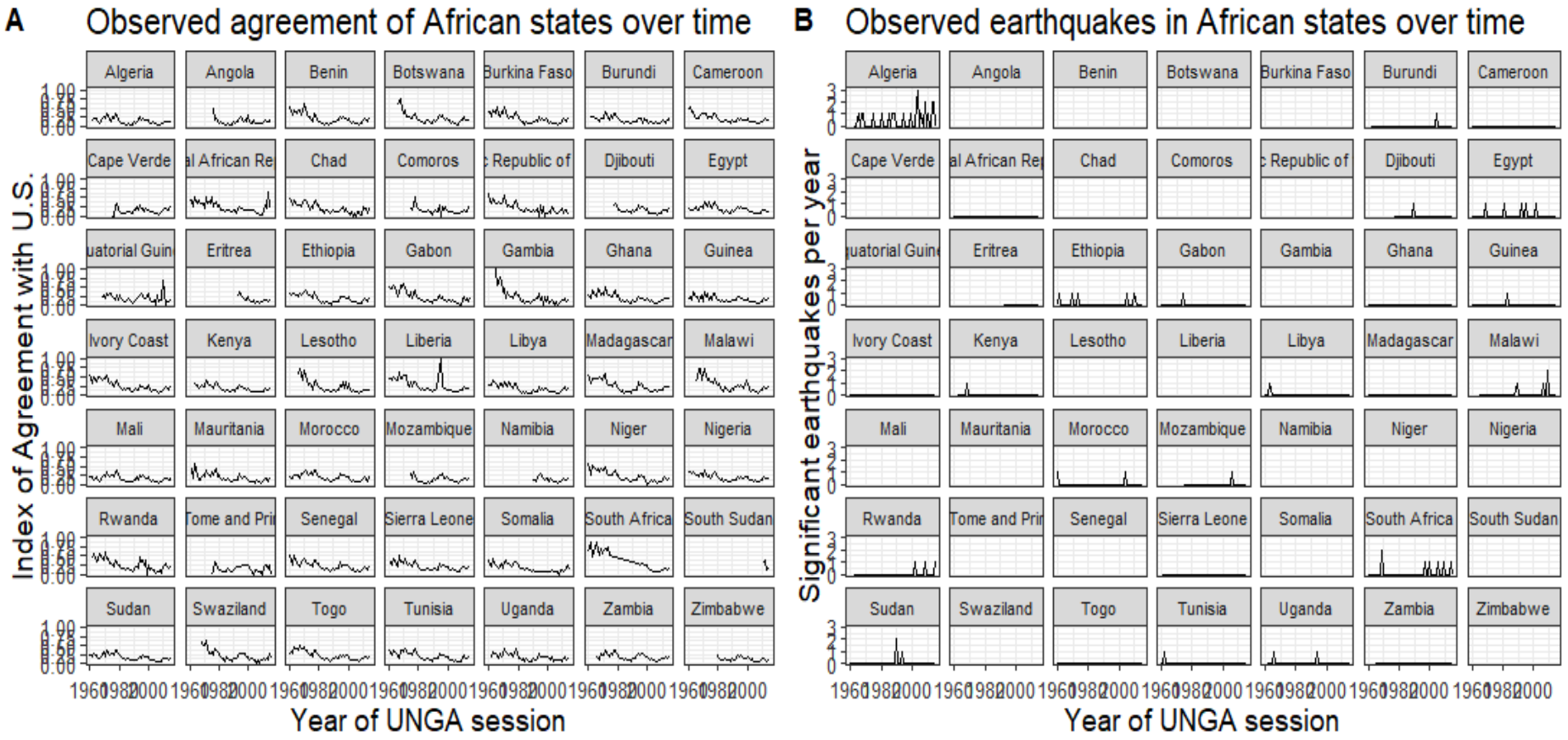
Panel Data

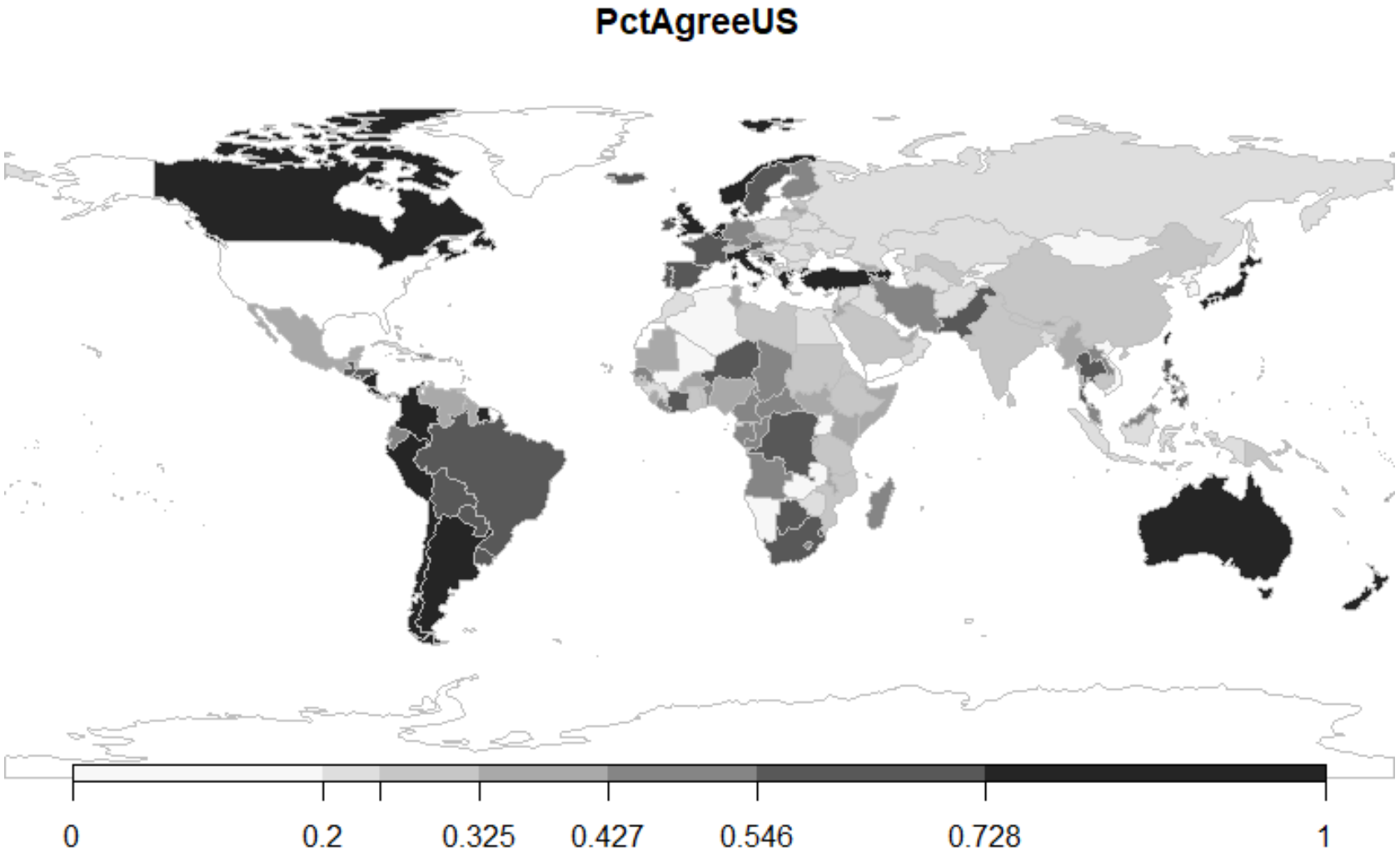
- Time: 1960-2015
- 196 U.N. member states
- Dependent variable:
  - Lijphart's index of agreement between a state & U.S.
- Independent variables:
  - Occurrence of a natural disaster(s) per year
    - Significant earthquakes and volcanic eruptions
- Control variables:
  - Polity score
  - GDP per capita
  - ODA donated by the U.S.

Testing Data Visualization Methods



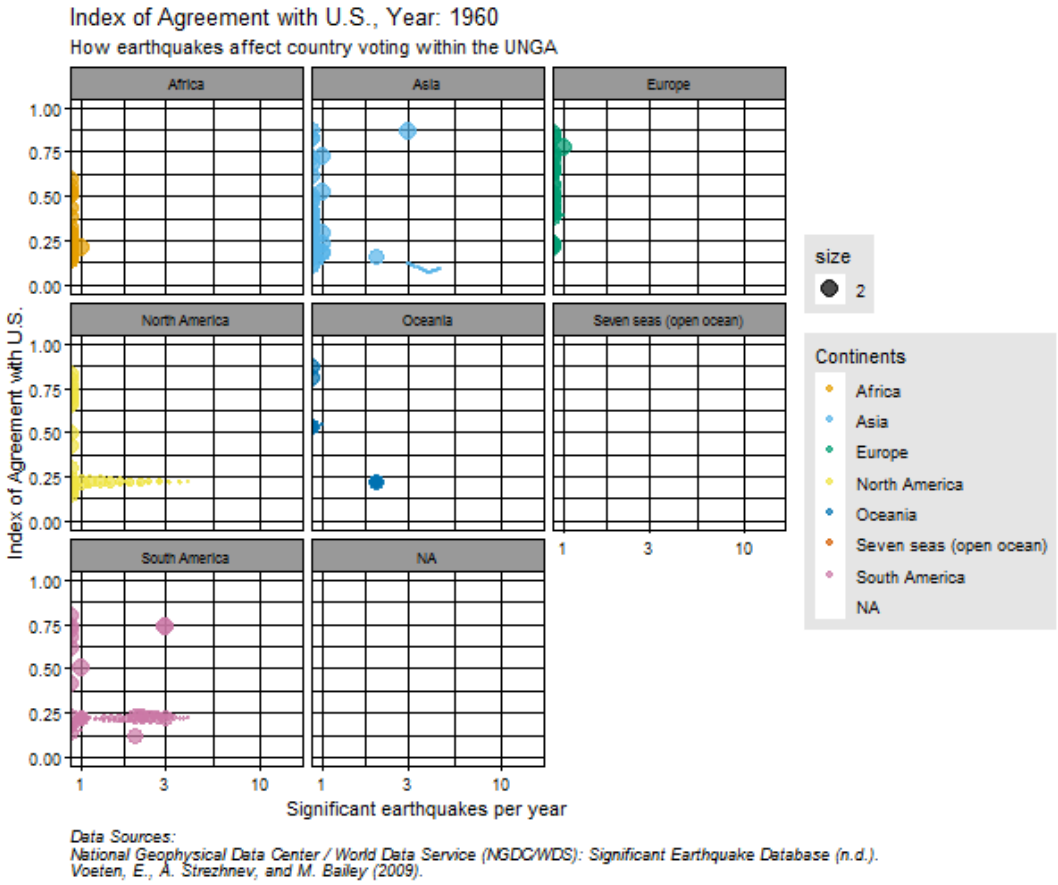

TOG TON TRI TUN TUR TUV UAE UGA UKG UKR URU UZB VAN VEN WSM YAR YPR YUG ZAM ZIM
SLO SLU SLV SNM SOL SOM SPN SRI SSUD STP SUD SUR SVG SWA SWD SWZ SYR TAJ TAW TAZ THI TKM
PAL PAN PAR PER PHI PNG POL POR PRK QAT ROK ROM RUS RWA SAF SAL SAU SEN SEY SIE SIN SKN
MEX MLD MLI MLT MNC MNG MON MOR MSI MYA MZM NAM NAU NEP NEW NIC NIG NIR NOR NTH OMA PAK
JPN KEN KIR KUW KYR KZK LAO LAT LBR LEB LES LIB LIE LIT LUX MAA MAC MAD MAG MAL MAS MAW
GFR GHA GNB GRC GRG GRN GUA GUI GUY HAI HON HUN ICE IND INS IRE IRN IRQ ISR ITA JAM JOR
CZE CZR DEN DJI DMA DOM DRC DRV ECU EGY EQG ERI EST ETH ETM FIJ FIN FRN FSM GAB GAM GDR
BOS BOT BRA BRU BUI BUL CAM CAN CAO CAP CDI CEN CHA CHL CHN COL COM CON COS CRO CUB CYP
AAB AFG ALB ALG AND ANG ARG ARM AUL AUS AZE BAH BAR BEL BEN BFO BHM BHU BLR BLZ BNG BOL
1960 2000
0.8
0.0
Index of Agreement with U.S.
Year


A
Observed agreement of African states over time
Index of Agreement with U.S.
Year of UNGA session
B
Observed earthquakes in African states over time
Significant earthquakes per year
Year of UNGA session
Algeria
Angola
Benin
Botswana
Burkina Faso
Burundi
Cameroon
Cape Verde
Chad
Comoros
Djibouti
Egypt
Eritrea
Ethiopia
Gabon
Gambia
Ghana
Guinea
Ivory Coast
Kenya
Lesotho
Liberia
Libya
Madagascar
Malawi
Mali
Mauritania
Morocco
Mozambique
Namibia
Niger
Nigeria
Rwanda
Senegal
Sierra Leone
Somalia
South Africa
South Sudan
Sudan
Swaziland
Togo
Tunisia
Uganda
Zambia
Zimbabwe

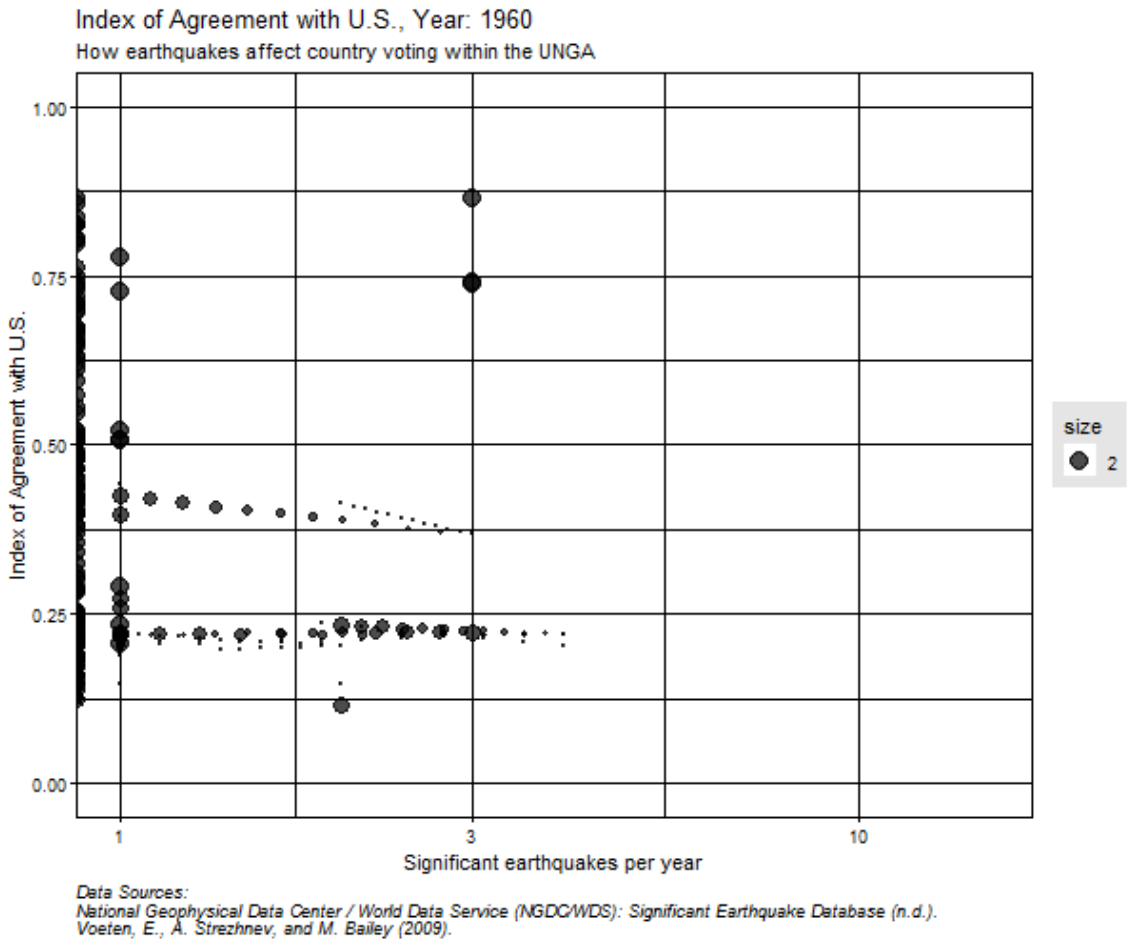

PctAgreeUS
0
0.2
0.325
0.427
0.546
0.728
1

Data Visualization Method

- Animate graphics

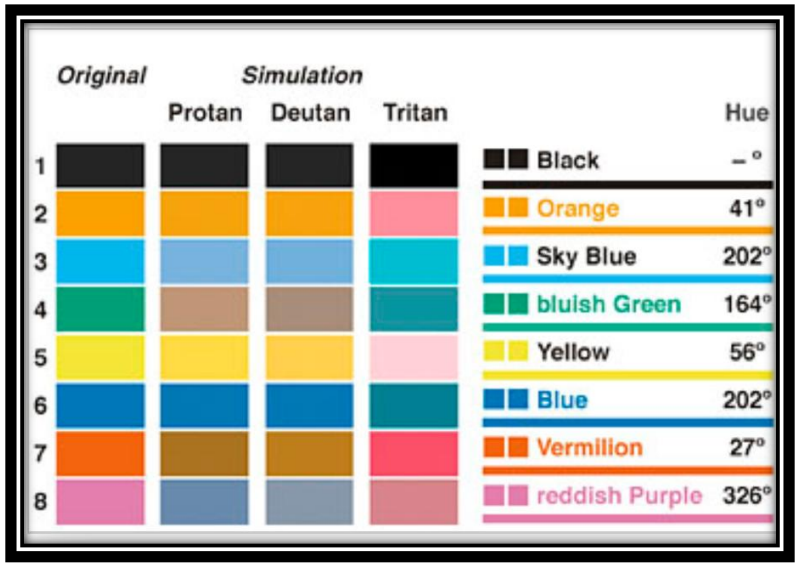


Data Visualization Method



Why this method?

- Customizable
  - Exclude continents to see overall relationship
  - Color-blind-friendly palette
    - Unordered hues
      - Source: http://www.cookbook-r.com/Graphs/Colors_(ggplot2)/



Why this method?

- Animation creates a compelling visualization
- Eye movement
  - Smooth-pursuit movements
  - Include preceding frames with gradual falloff
  - Easy to follow
    - Determine relationship between variables
- Visibility with size of shapes
- Include caption and sources

Data Visualization Method

- Example of old version split by continents:

https://raw.githubusercontent.com/svmariya/svmariya.github.io/master/dv_presentations/gganim_weq.gif

- Final Versions per variable:

https://raw.githubusercontent.com/svmariya/svmariya.github.io/master/dv_presentations/gganim_eq.gif

https://raw.githubusercontent.com/svmariya/svmariya.github.io/master/dv_presentations/gganim_ve.gif

Results

- Utilized fixed effects model which corrected for heteroskedacity and serial correlation
- Data visualization effectively portrays results

	Estimate	Std. Error	Pr(>|t|)
Earthquakes (eq)	-0.0048	0.0035	0.1719
Volcanic Eruptions (ve)	-0.0078	0.0086	0.3658
Polity score (pol)	-0.0006	0.0004	0.1795
GDP per capita (gdp)	-0.0000	0.0000	0.0000
ODA (oda)	-0.0002	0.0001	0.0588

Table 1: Heteroskedasticity consistent coefficients (Arellano)

Conclusion

- Compelling animated ggplot
- Room for improvement
  - More user-friendly
  - Animated map with gradient scale
  - Animated circular visual where states move closer to center when their voting behavior supports the U.S.

References

Becerra, O., E. Cavallo, and I. Noy (2014). "Foreign aid in the aftermath of large natural disasters". In: Review of Development Economics 18.3, pp. 445–460.

Caruso, German Daniel (2017). "The legacy of natural disasters: The intergenerational impact of 100 years of disasters in Latin America". In: Journal of Development Economics 127, pp. 209–233.

GDP per capita (current US$) (2019). Last accessed 20 March 2019. url: https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?view=chart.

Healy, K., 2018. *Data visualization: a practical introduction*. Princeton University Press.

Kadri, F., B. Birregah, and E. Chatelet (2014). "The impact of natural disasters on critical infrastructures: A domino effect-based study". In: Journal of Homeland Security and Emergency Management 11.2, pp. 217–241.

National Geophysical Data Center / World Data Service (NGDC/WDS): Significant Earthquake Database (n.d.). Last accessed 23 February 2019. url: https://doi:10.7289/V5TD9V7K.

National Geophysical Data Center / World Data Service (NGDC/WDS): Significant Volcanic Eruptions Database (n.d.). Last accessed 23 February 2019. url: https://doi:10.7289/V5JW8BSH.

Net ODA by region from all donors combined database (2019). Last accessed 21 March 2019. url: http://www.oecd.org/dac/stats/idsonline.htm.

Noy, I. (2009). "The macroeconomic consequences of disasters". In: Journal of Development economics 88.2, pp. 221–231.

Polity IV Annual Time-Series, 1800-2017 (2018). Last accessed 20 March 2019. url: http://www.systemicpeace.org/inscrdata.html.

Ritchie, H. and M. Roser (2019). "Natural Disasters". In: Our World in Data. https://ourworldindata.org/natural-disasters. Stromberg, D. (2007). "Natural disasters, economic development, and humanitarian aid". In: Journal of Economic perspectives 21.3, pp. 199–222.

Voeten, E., A. Strezhnev, and M. Bailey (2009). United Nations General Assembly Voting Data. Version V18. doi: 10.7910/DVN/LEJUQZ. url: https: //doi.org/10.7910/DVN/LEJUQZ.

Wittkopf, E. R. (1973). "Foreign aid and United Nations votes: a comparative study". In: American Political Science Review 67.3, pp. 868–888.

Yau, N., 2011. *Visualize this: the FlowingData guide to design, visualization, and statistics*. John Wiley & Sons.

Code

```
mapping0 <- aes(x =EQ, y = PctAgreeUS, size = 2, frame = Year)
cbPalette <- c("#E69F00", "#56B4E9", "#009E73", "#F0E442", "#0072B2", "#D55E00", "#CC79A7")
anim0 <-  ggplot(data1, mapping = mapping0) +
        geom_point(alpha = 0.7) +
  theme_linedraw() +
  scale_x_log10()+
  scale_color_manual(values=cbPalette)+
  theme(strip.text.x = element_text(size=8, colour="black"),
        strip.background = element_rect(fill="#999999"),
        plot.caption = element_text(face = "italic", hjust = 0))+
  labs(title = 'Index of Agreement with U.S., Year: {as.integer(frame_time)}',
       subtitle  =  "How earthquakes affect country voting within the UNGA",
       x = 'Significant earthquakes per year',
       y = 'Index of Agreement with U.S.',
       caption  = "Data Sources:
       National Geophysical Data Center / World Data Service (NGDC/WDS): Sig-nificant Earthquake Database (n.d.).
       Voeten, E., A. Strezhnev, and M. Bailey (2009).") +
  transition_time(Year) +
  ease_aes('linear') +
  shadow_wake(wake_length = 0.05, alpha = FALSE)+
  theme(legend.background = element_rect(fill="gray90", size=.5, linetype="dotted"))
animate(anim0, fps = 30,  width = 600, height = 500, duration=20,
        renderer = gifski_renderer("gganim_0.gif"))
```