

Food Security and Political Stability

In Song Kids - Jen, AJ, Talia, Milo

Background

- A major factor in Iranian protests in 2017 was the rising price of eggs - resulting in 21 deaths and 450+ arrests.
- Hans Rosling's theory:
 - As countries get healthier, they are more likely to be economically productive and politically stable
- How do we represent political stability?
 - Politically motivated violence
 - Mass civil protest
 - Instability within a regime
- How do we represent food (and water) security?
 - We use % undernourished and % access to water as proxies for food stability

Dataset

- World Development Indicators from the World Bank
 - Access to basic drinking water services (rural, urban, overall)
 - Prevalence of undernourishment
 - Kilocalorie deficit
 - Population
 - Access to electricity, access to clean food
- World Governance Indicators from the World Bank
 - **Political Stability** and Absence of Violence/Terrorism index
- All variables by country-year from ~1998 to 2015



THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

Political Stability Index

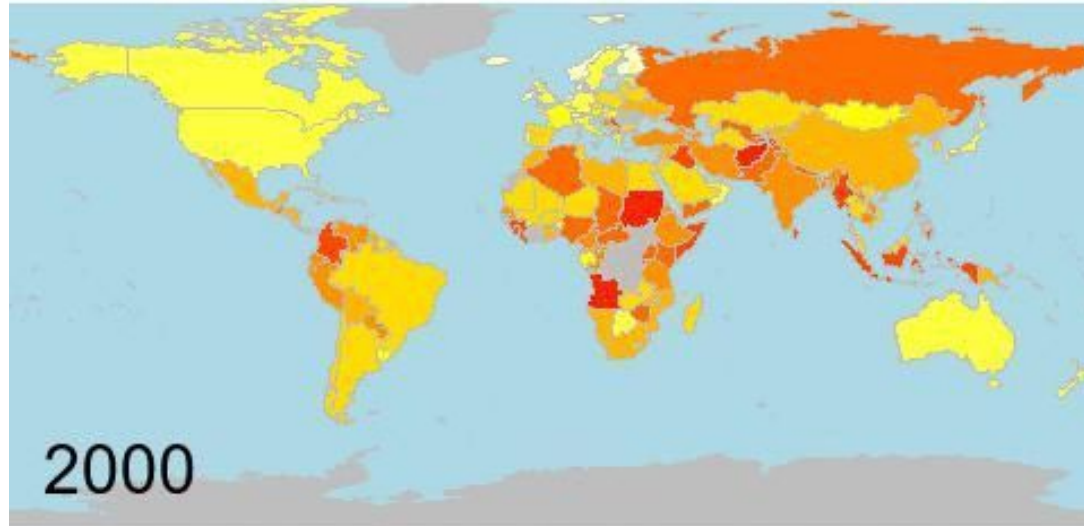
Political Stability and Absence of Violence/Terrorism **measures perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism.**

-3 → extremely unstable

+3 → extremely stable

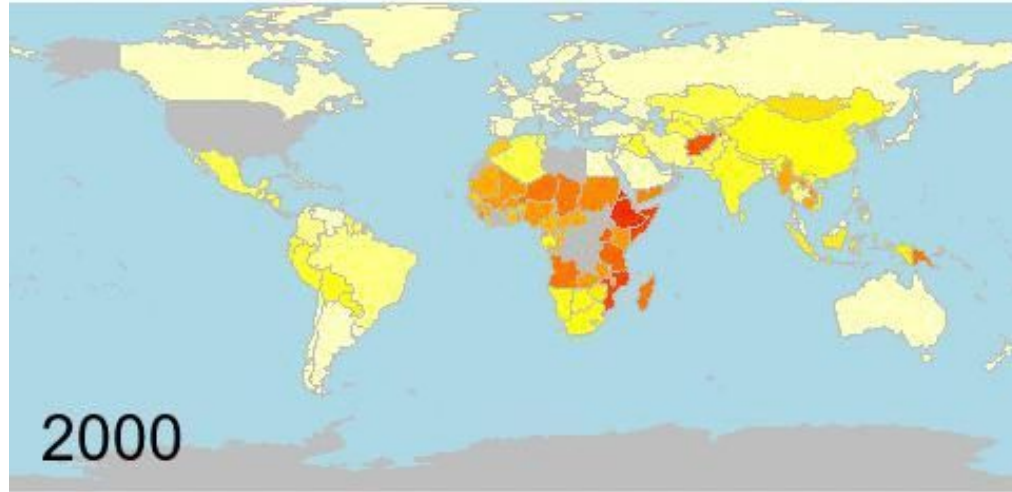
EIU	Orderly transfers, Armed conflict, Violent demonstrations, Social Unrest, International tensions / terrorist threat
GCS	Cost of Terrorism
HUM	Political terror scale
IJT	Security Risk Rating
IPD	Intensity of internal conflicts: ethnic, religious or regional, Intensity of violent activities of underground political organizations, Intensity of social conflicts (excluding conflicts relating to land)
PRS	Government stability, Internal conflict, External conflict, Ethnic tensions
WMO	Protests and riots, Terrorism, Interstate war, Civil war
WCY	The risk of political instability is very high
WJP	Factor 3.2: Civil conflict is effectively limited (Order and Security)

Political Stability



Access to Water

- Percent access to basic drinking water services by country, 2000-2015

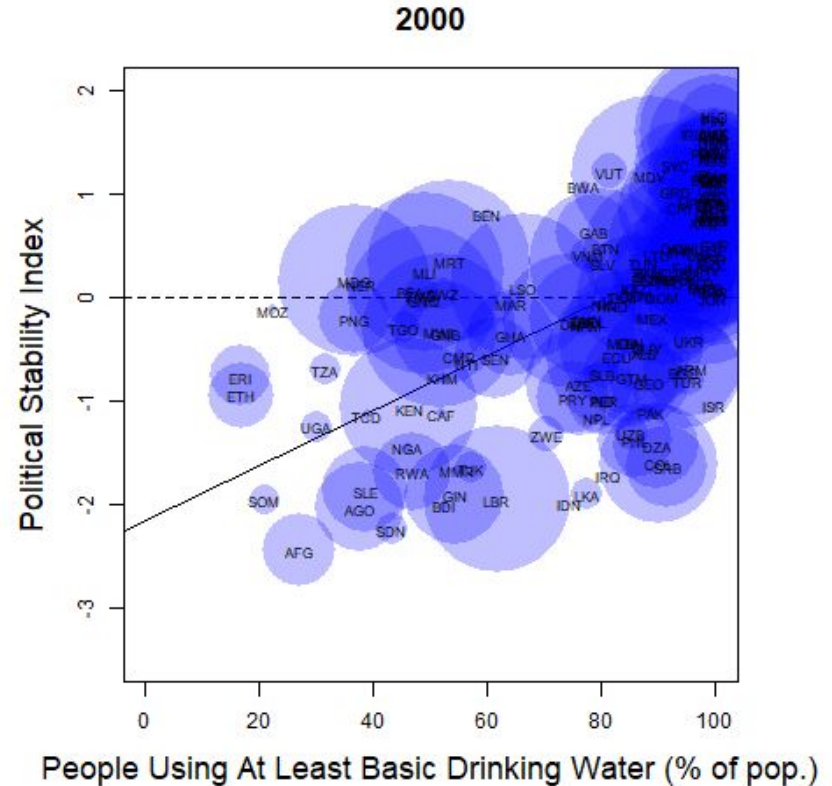


Access to Water

Percent access to basic drinking
water services by country

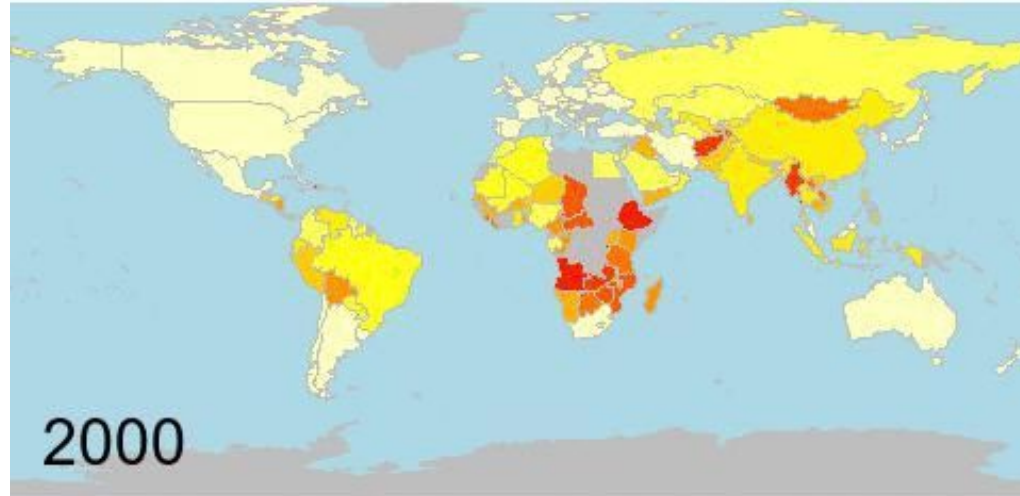
vs

Political stability index, 2000-2015



Food Security

- (Negative) percent undernourished by country, 2000-2015

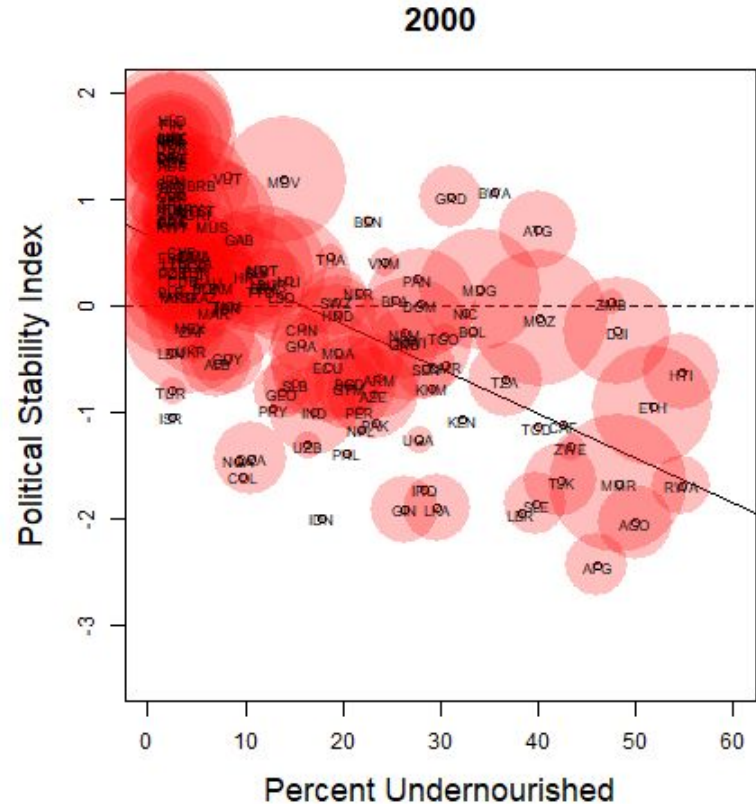


Percent Undernourished

Negative percent undernourished
by country

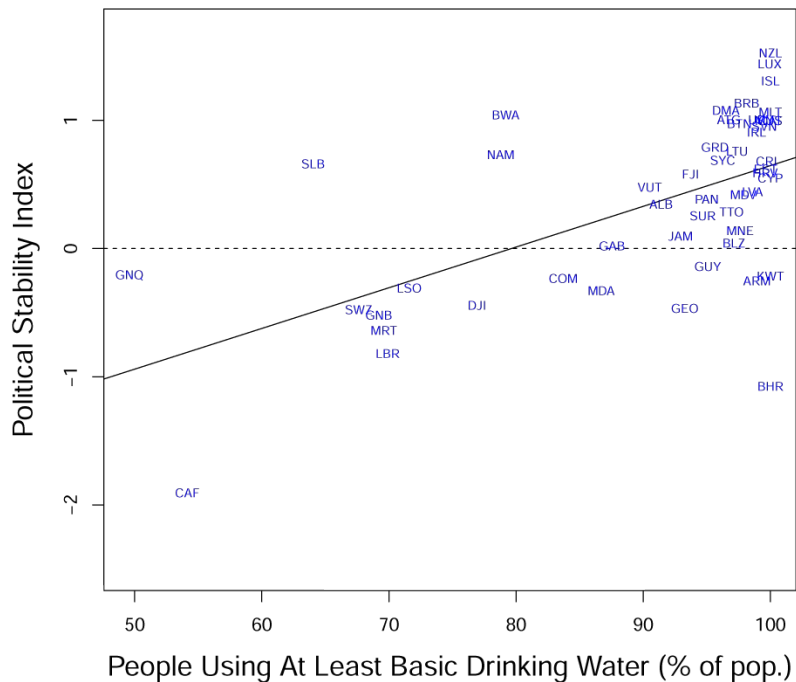
vs

Political stability index, 2000-2015

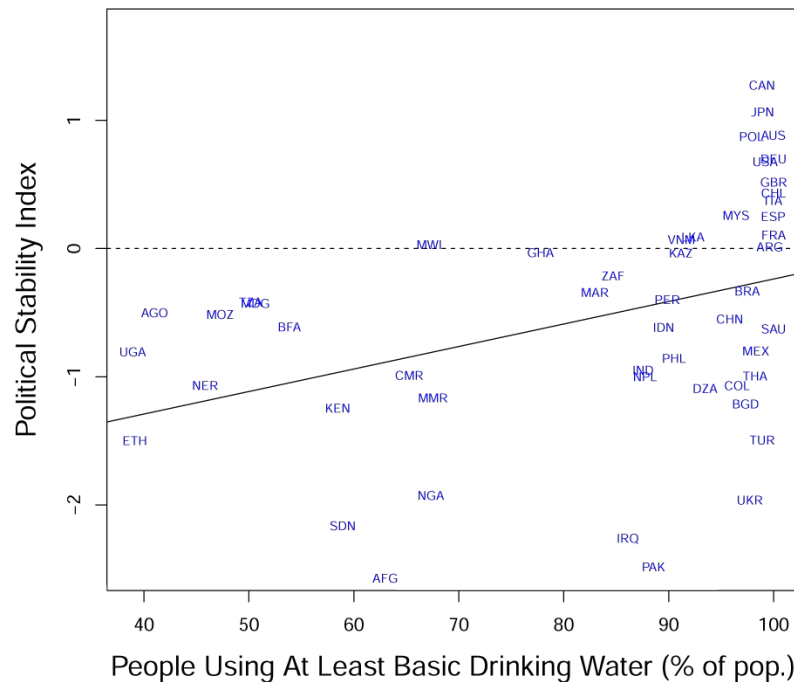


Access to water, segmented by population

Bottom 50, 2015

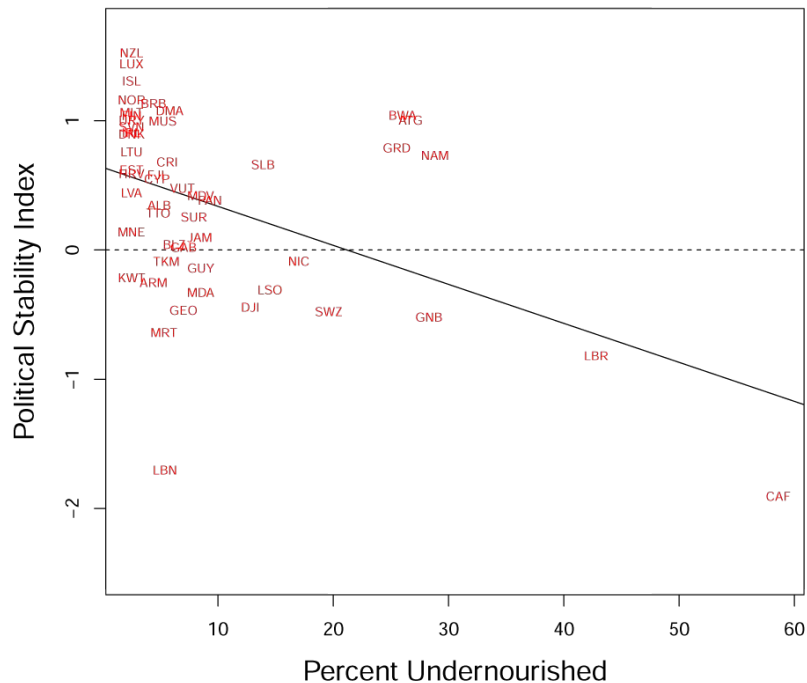


Top 50, 2015

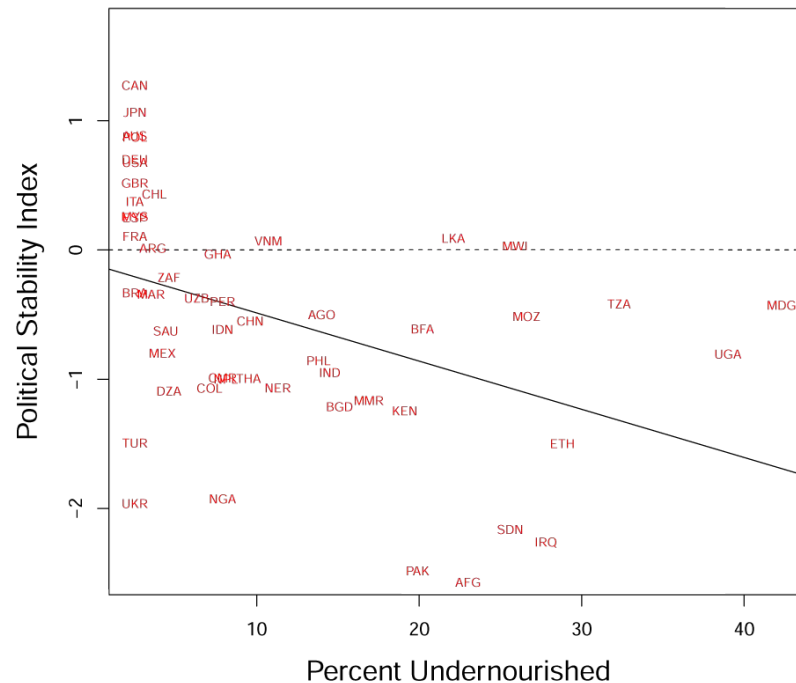


Percent undernourished, segmented by population

Bottom 50, 2015



Top 50, 2015



Determining causal relationship between food security and political stability

Regression Methods

1. Distributed Lag Model

- Regression of a dependent variable against current and “lagged” independent variables.

$$y_t = \beta_0 + \beta_1 y_{t-1} + \beta_2 x_t + \beta_3 x_{t-1} + \dots + \epsilon$$

2. Two-way Fixed Effect

- Control for country-specific and year-specific effects by including country and year factors

Distributed Lag Model Results

$$\Delta_{t-1,t}^y = \beta_0 + \beta_1 \Delta_{t-2,t-1}^y + \beta_2 \Delta_{t-1,t}^{x_1} + \beta_3 \Delta_{t-2,t-1}^{x_1} + \dots + \epsilon$$

- As we'd expect, stability index is *autocorrelated*
- Only **water access** shows statistical significance

Indicator	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-0.0053	0.0063	-0.84	0.4025
$\Delta_{t-2,t-1}$ Stability Index Estimate	-0.0587	0.0219	-2.69	0.0073**
$\Delta_{t-1,t}$ % Undernourished	0.0005	0.0092	0.05	0.9577
$\Delta_{t-2,t-1}$ % Undernourished	-0.0095	0.0079	-1.20	0.2309
$\Delta_{t-1,t}$ % Basic Water Access	0.0739	0.0280	2.64	0.0083**
$\Delta_{t-2,t-1}$ % Basic Water Access	-0.0797	0.0254	-3.14	0.0017**
$\Delta_{t-1,t}$ Food Production Index	0.0003	0.0006	0.52	0.6052
$\Delta_{t-2,t-1}$ Food Production Index	0.0004	0.0005	0.82	0.4131

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Two-Way Fixed Effect Results

Indicator		Estimate	Std. Error	t value	Pr(> t)	
Prevalence of undernourishment (% of population)	SN.ITK.DEFC.ZS	-0.0107765	0.0027	-3.930	8.81e-05	***
Food production index	AG.PRD.FOOD.XD	0.0031020	0.0006	5.315	1.20e-07	***
People using at least basic drinking water services (% of population)	SH.H2O.BASW.ZS	-0.0144071	0.0036	-4.073	4.84e-05	***
Access to clean fuels and technologies for cooking (% of population)	EG.CFT.ACCS.ZS	0.0079380	0.0023	3.501	0.000475	***

Two-Way Fixed Effect Results

These variables have a **potential causal relationship** with political stability

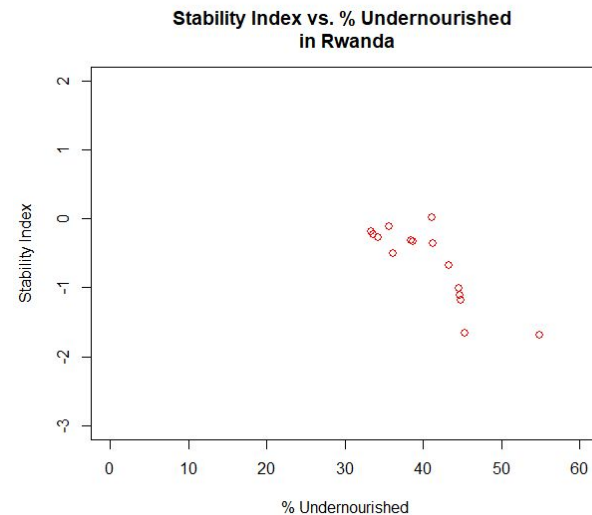
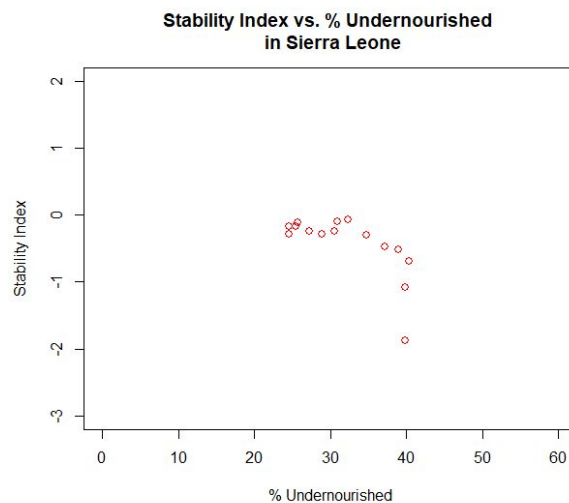
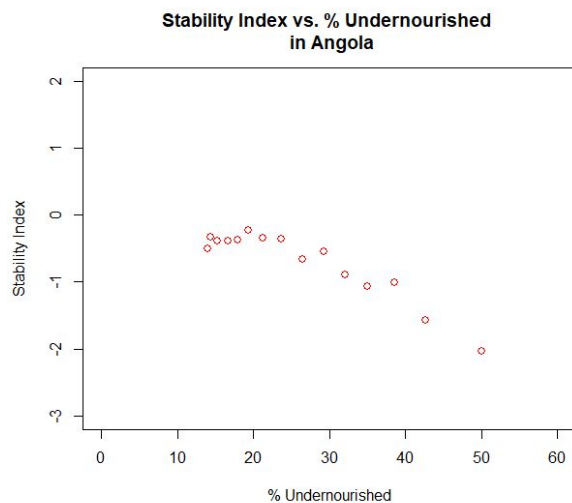
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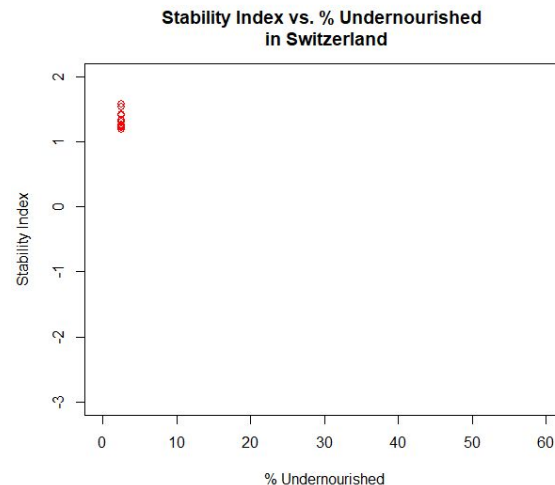
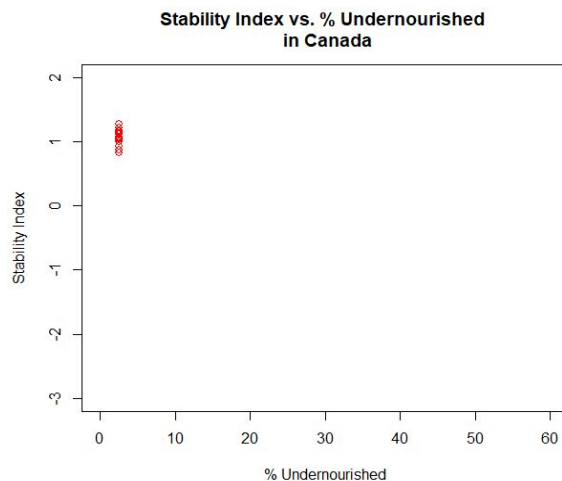
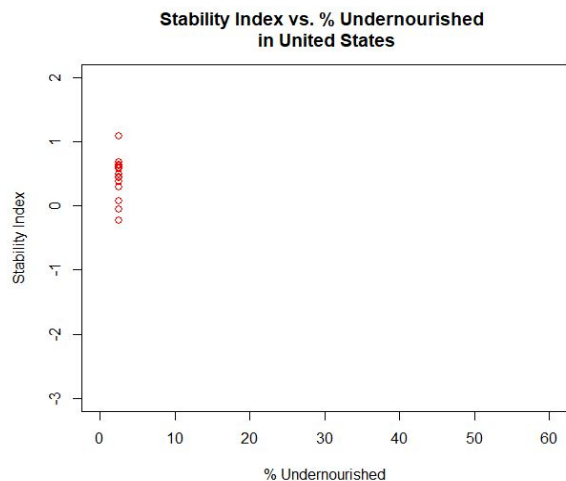
A 10 percentage point increase in **prevalence of undernourishment** decreases the political stability score by 0.11

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Some countries exhibited negative slopes, as we expected

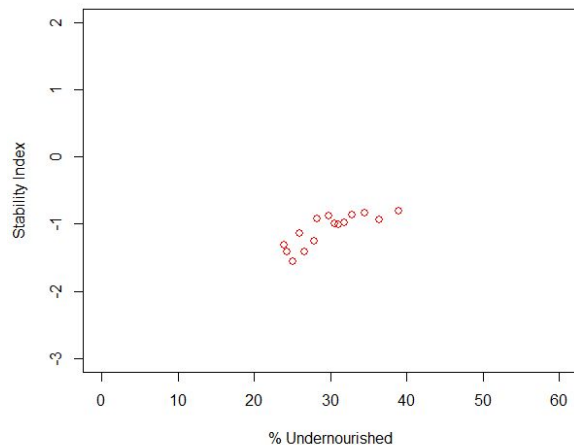


Some countries displayed a nearly vertical line

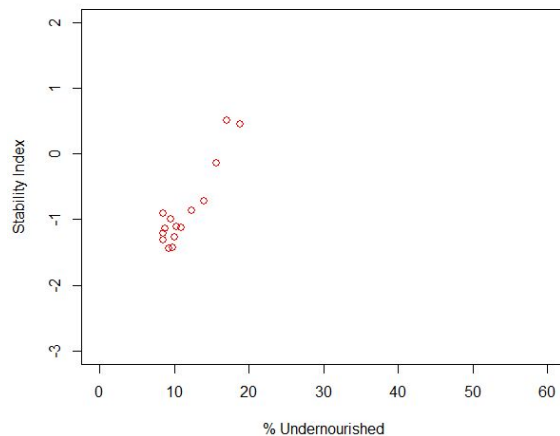


Some countries exhibited positive slopes, which is unexpected

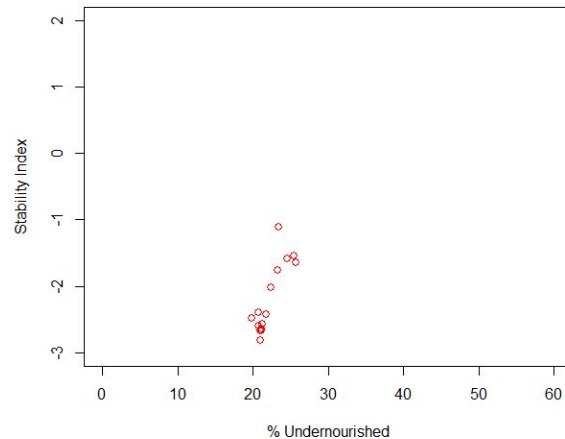
Stability Index vs. % Undernourished
in Uganda



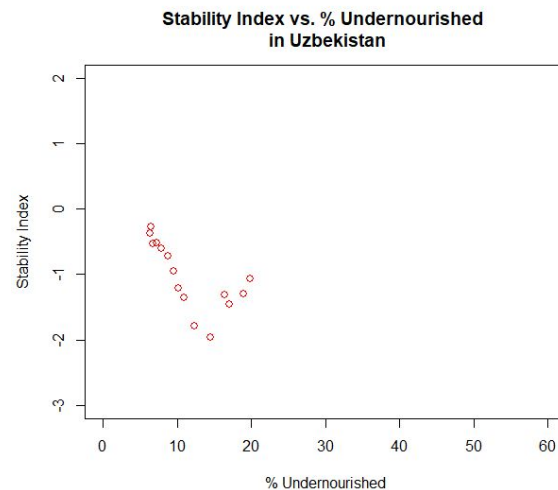
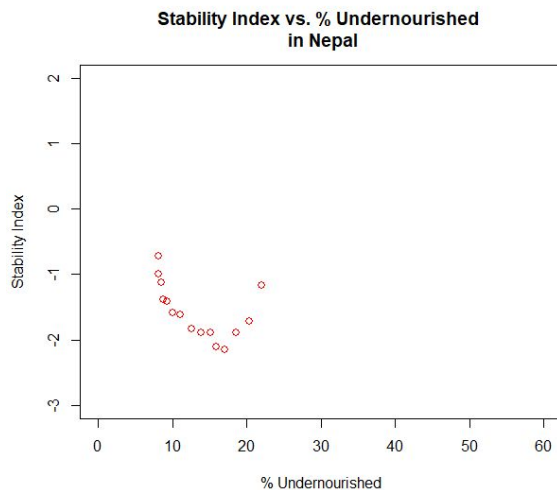
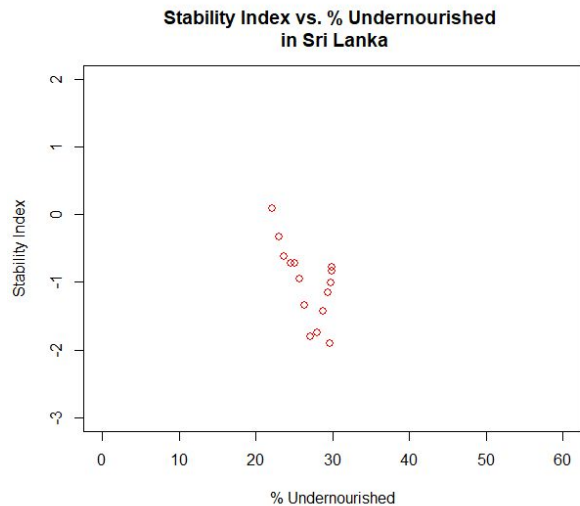
Stability Index vs. % Undernourished
in Thailand



Stability Index vs. % Undernourished
in Pakistan



Some exhibited a surprising V-shape



Conclusion and Future Work

- There is a clear correlation between food security, water security and political stability
- Causal effects are possible, but our results are inconclusive
- Some counterintuitive trends in our data could be further investigated

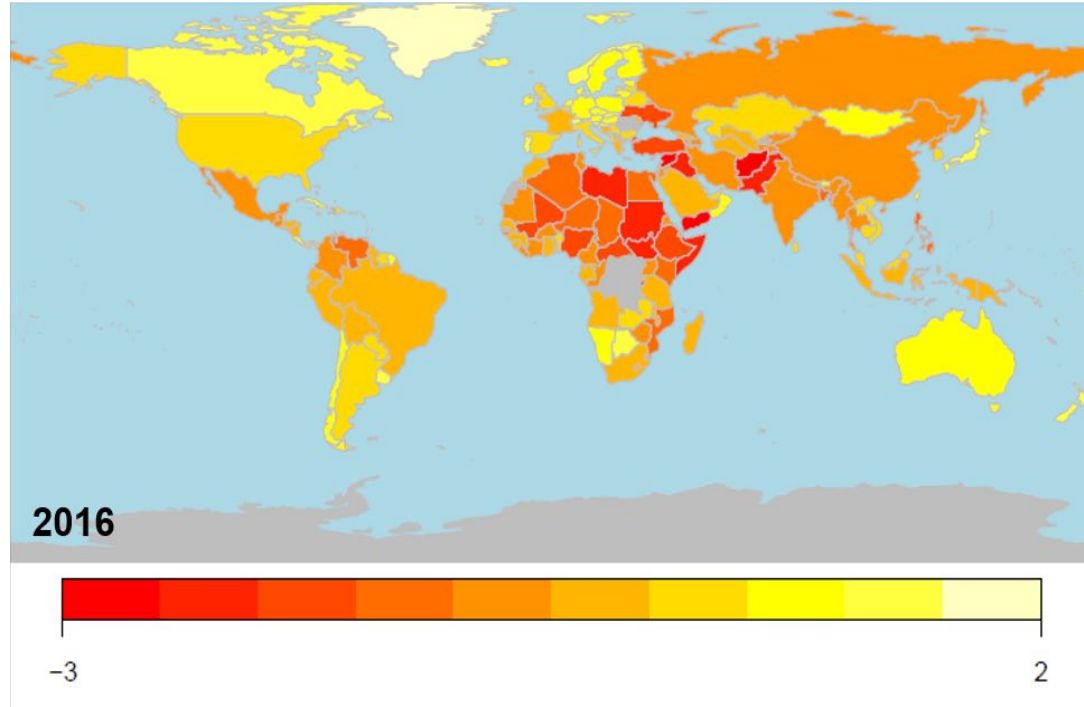
Questions?

Thank you!

-The In Song Kids

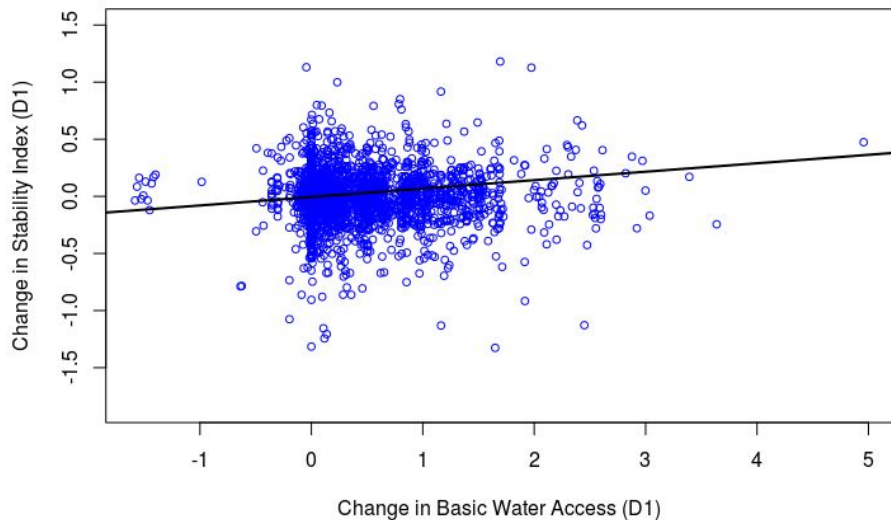
Appendix

Most Current Mapping of Political Stability



Results are different depending on lag

Change in Stability Index vs. Basic Water Access (1 Year Lag)



Change in Stability Index vs. Basic Water Access (2 Year Lag)

