Corruption and Terror in Nigeria

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Introduction

The purpose of this document is to provide replicable statistical processes for the Muftah article, "Corruption and Terror in Nigeria".

Statistical Analysis

All statistical analyses were conducted using **R** version 3.2.5.

Author Contact

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Dataset

The dataset was compiled by the author from a multitude of sources:

Variable	Source	Note
year		Year of data observation
region		Sub-national region
corruption	Afrobarometer	Sub-national aggregate of police corruption
terror	GTD	Number of total terror attacks
boko	GTD	Number of terror attacks by Boko Haram
other	GTD	Number of terror attacks by other groups
lgdp	CIESIN	Logged GDP taken from downsample raster
lnight	NOAA	Logged level of nighttime lights
dterror		Binary indicator: at least one terror attack
dboko		Binary indicator: at least one BH attack
dother		Binary indicator: at least one non BH attack
irrelevant	EPR	Irrelevant ethnic group size
jrpartner	EPR	Junior Partner ethnic group size
srpartner	EPR	Senior Partner ethnic group size

Data Citations

Ethnic Power Relations Andreas Wimmer, Lars-Erik Cederman and Brian Min. "Ethnic politics and armed conflict. A configurational analysis of a new global dataset", in American Sociological Review 74(2):316-337, 2009.

CIESIN GDP Data Yetman, G., S.R. Gaffin, and X. Xing. 2004. Global 15 x 15 Minute Grids of the Downscaled GDP Based on the SRES B2 Scenario, 1990 and 2025. Palisades, NY: NASA Socioeconomic Data and Applications Center (SEDAC). http://dx.doi.org/10.7927/H4NC5Z4X.

CIESIN GDP Data Gaffin, S.R., C. Rosenzweig, X. Xing, and G. Yetman. 2004. Downscaling and Geo-spatial Gridding of Socio-economic Projections from the IPCC Special Report on Emissions Scenarios (SRES). Global Environmental Change 14 (2): 105-123. http://dx.doi.org/10.1016/j.gloenvcha.2004.02.004.

Afrobarometer Afrobarometer Data, All countries, Rounds 4 & 5, 2009 - 2014, available at http://www.afrobarometer.org

Global Terrorism Data National Consortium for the Study of Terrorism and Responses to Terrorism (START). (2013). Global Terrorism Database. Retrieved from http://www.start.umd.edu/gtd

Nighttime Lights National Centers for Environmental Information. Version 4 DMSP-OLS Nighttime Lights Time Series. 2009 - 2014. Available online at: http://ngdc.noaa.gov/eog/dmsp/downloadV4composites.html

Initial Data Exploration

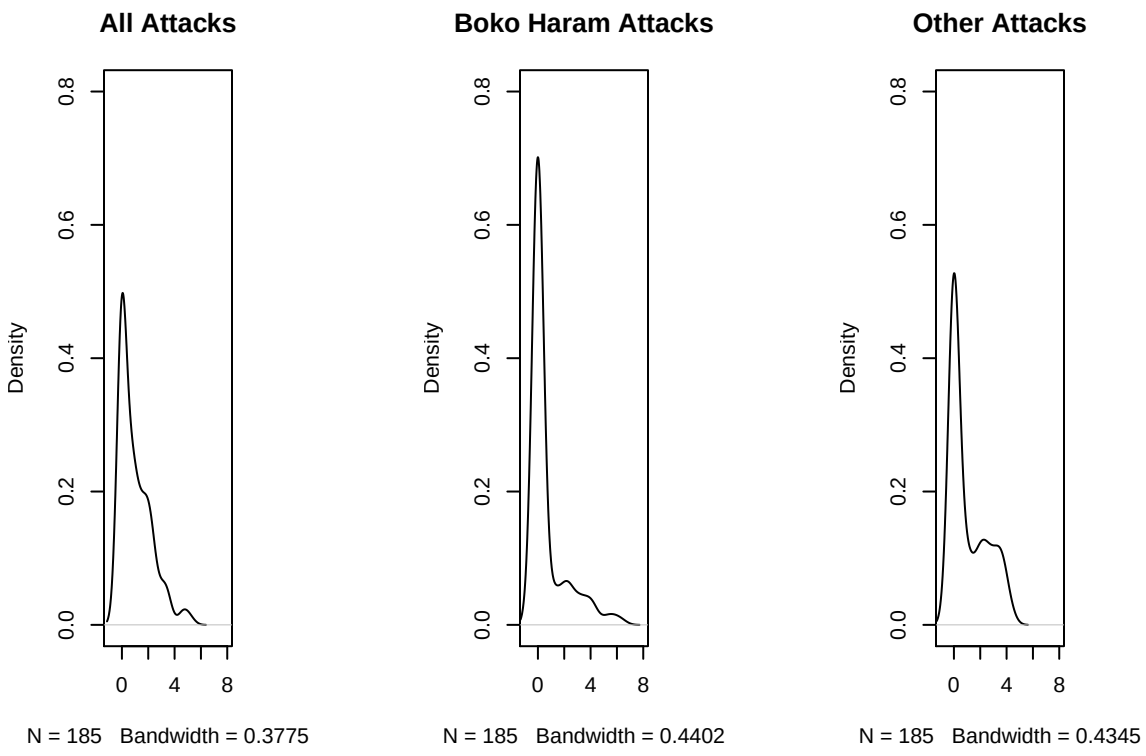
```
# Preamble
library(arm)
library(lme4)
library(MASS)
library(stargazer)
```

Bring the data in:

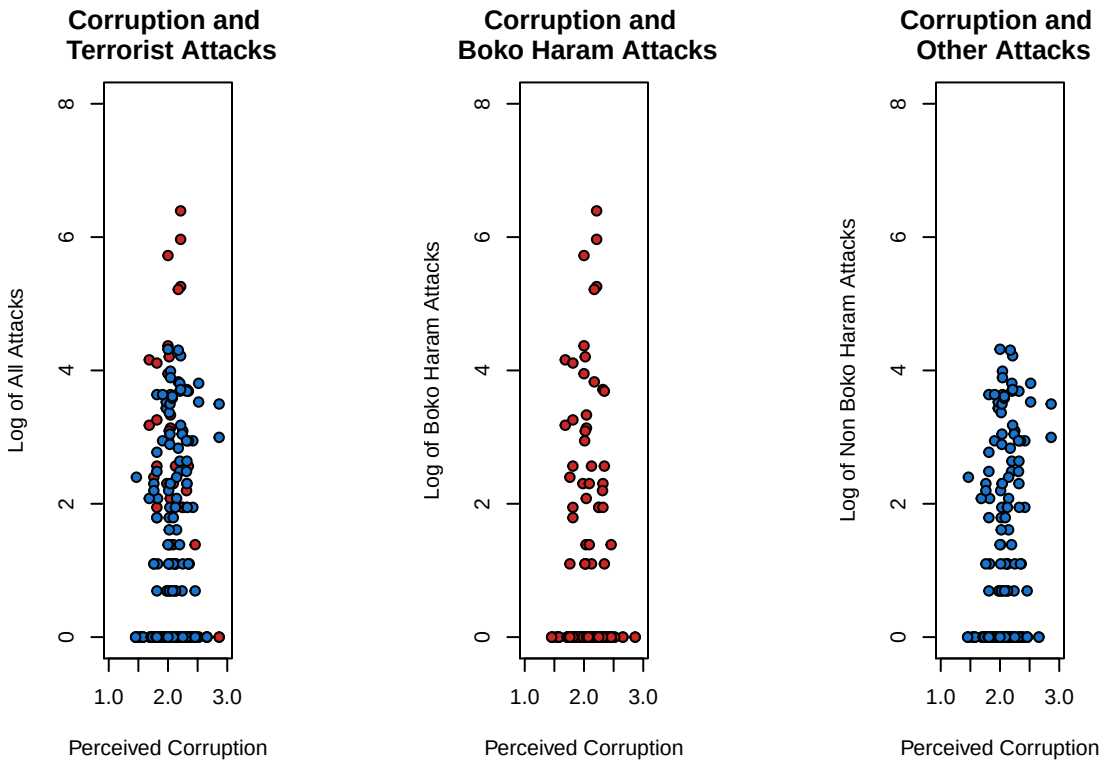
```
nigeria <- read.csv("nigeria-terror-replication.csv")
```

Visualize the data:

```
# Plot the densities
par(mfrow = c(1, 3), mai = c(1, 0.5, 0.5, 1))
plot(density(log(terror + 1)), main = "All Attacks", xlim = c(-1, 8), ylim = c(0,
    0.8))
plot(density(log(boko + 1)), main = "Boko Haram Attacks", xlim = c(-1, 8), ylim = c(0,
    0.8))
plot(density(log(other + 1)), main = "Other Attacks", xlim = c(-1, 8), ylim = c(0,
    0.8))
```

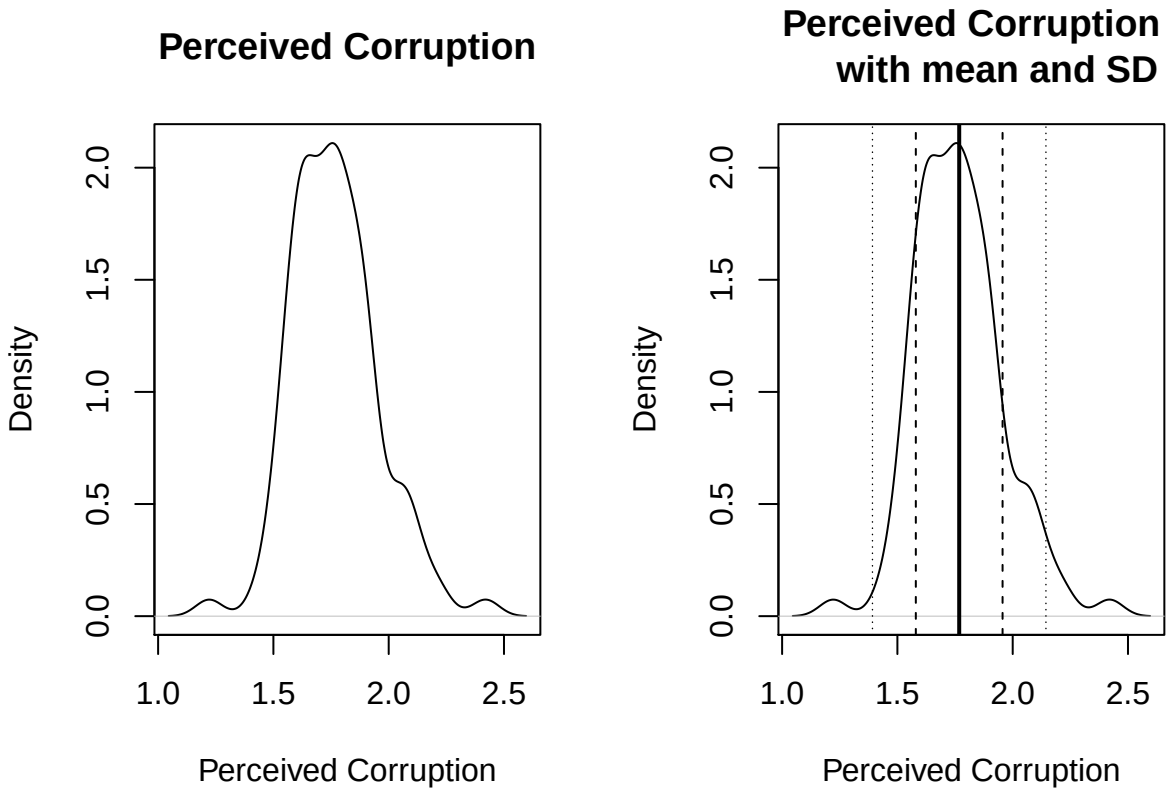


```r
# Scatterplots All terror
par(mfrow = c(1, 3), mai = c(1, 0.5, 0.5, 1))
plot(-10, 10, xlim = c(1, 3), ylim = c(0, 8), main = "Corruption and \n Terrorist Attacks",
    xlab = "Perceived Corruption", ylab = "Log of All Attacks")
points(policecorruption, log(boko + 1), pch = 21, bg = "firebrick3")
points(policecorruption, log(other + 1), pch = 21, bg = "dodgerblue3")

# Boko Haram
plot(policecorruption, log(boko + 1), pch = 21, bg = "firebrick3", ylim = c(0,
    8), xlim = c(1, 3), xlab = "Perceived Corruption", ylab = "Log of Boko Haram Attacks",
    main = "Corruption and \n Boko Haram Attacks")

# Other
plot(policecorruption, log(other + 1), pch = 21, bg = "dodgerblue3", ylim = c(0,
    8), xlim = c(1, 3), xlab = "Perceived Corruption", ylab = "Log of Non Boko Haram Attacks",
    main = "Corruption and \n Other Attacks")
```



Plotting Corruption Density

```
sumcorr <- summary(nigeria$corruption)
mucorr <- sumcorr[4]
sdcorr <- sd(nigeria$corruption)

par(mfrow = c(1, 2))
plot(density(corruption), main = "Perceived Corruption", xlab = "Perceived Corruption")
plot(density(corruption), main = "Perceived Corruption\n     with mean and SD",
    xlab = "Perceived Corruption")
abline(v = mucorr, lty = 1, lwd = 2)
abline(v = (mucorr + sdcorr), lty = 2, lwd = 1)
abline(v = (mucorr - sdcorr), lty = 2, lwd = 1)
abline(v = (mucorr + (2 * sdcorr)), lty = 3, lwd = 0.75)
abline(v = (mucorr - (2 * sdcorr)), lty = 3, lwd = 0.75)
```



Regressions

I will conduct three regressions:

1. Regression of **all** terrorist attacks on corruption
2. Regression of **Boko Haram's** attacks on corruption
3. Regression of **Non Boko Haram's** attacks on corruption

First-Stage Logistic Regression

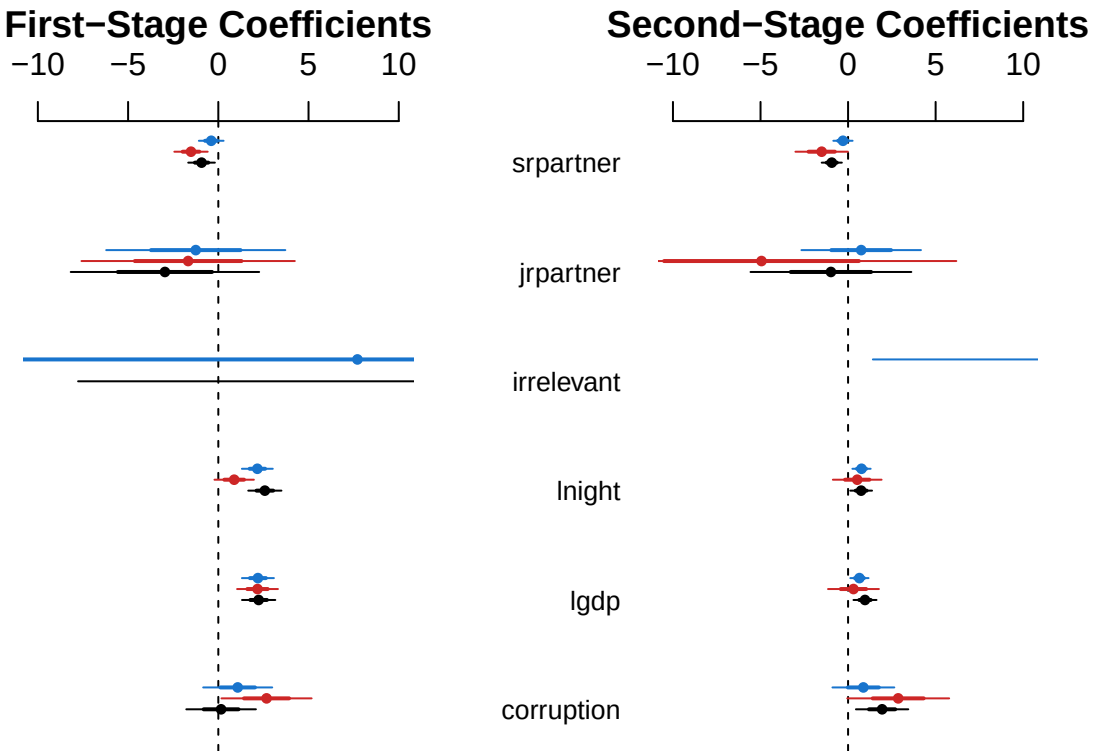
```
# First-Stage Logit Regressions
all.bn <- glm(data = nigeria, dterror ~ corruption + lgdp + lnight + irrelevant +
    jrpartner + srpartner, family = binomial(link = "logit"))

boko.bn <- glm(data = nigeria, dboko ~ corruption + lgdp + lnight + irrelevant +
    jrpartner + srpartner, family = binomial(link = "logit"))

other.bn <- glm(data = nigeria, dother ~ corruption + lgdp + lnight + irrelevant +
    jrpartner + srpartner, family = binomial(link = "logit"))

stargazer(all.bn, boko.bn, other.bn, out = "Tables/logit.html", dep.var.labels = c("All Terror",
    "Boko Haram", "Non-Boko Haram"), covariate.labels = c("Corruption", "GDP",
    "Development"), title = "First-Stage Results")
```

Second-Stage Negative Binomial Regressions

```
all.nb <- glm(data = nigeria, terror ~ corruption + lgdp + lnight + irrelevant +
    jrpartner + srpartner, family = quasi(variance = "mu", link = "log"), subset = terror >=
    1)

boko.nb <- glm(data = nigeria, boko ~ corruption + lgdp + lnight + irrelevant +
    jrpartner + srpartner, family = quasi(variance = "mu", link = "log"), subset = boko >=
    1)

other.nb <- glm(data = nigeria, other ~ corruption + lgdp + lnight + irrelevant +
    jrpartner + srpartner, family = quasi(variance = "mu", link = "log"), subset = other >=
    1)

stargazer(all.nb, boko.nb, other.nb, out = "Tables/nbin.html", dep.var.labels = c("All Terror",
    "Boko Haram", "Non-Boko Haram"), covariate.labels = c("Corruption", "GDP",
    "Development"), title = "Second-Stage Results")
```

Coefficient Visualization

```
# Set the Grid
par(mfrow = c(1, 2), mai = c(0.5, 0.5, 0.5, 0.5))

# Plot the Logit Coefficients
coefplot(all.bn, xlim = c(-10, 10), main = "First-Stage Coefficients", vertical = TRUE,
    v.axis = FALSE)
coefplot(boko.bn, xlim = c(-10, 10), col.pts = "firebrick3", add = TRUE, vertical = TRUE)
coefplot(other.bn, xlim = c(-10, 10), col.pts = "dodgerblue3", add = TRUE, offset = 0.2,
    vertical = TRUE)

# Plot the Negative Binomial Coefficients
coefplot(all.nb, xlim = c(-10, 10), main = "Second-Stage Coefficients", vertical = TRUE)
coefplot(boko.nb, xlim = c(-10, 10), col.pts = "firebrick3", add = TRUE, vertical = TRUE)
coefplot(other.nb, xlim = c(-10, 10), col.pts = "dodgerblue3", add = TRUE, offset = 0.2,
    vertical = TRUE)
```



Predicted Probabilities and Counts

```
# ALL ATTACKS
all.synth = data.frame(corruption = seq(1.0, 3.0, 0.1), lgdp = rep(4.279, 21),
                       lnight = rep(0.9368, 21), irrelevant = rep(0.0022, 21),
                       jrpartner = rep(0.0944, 21), srpartner = rep(0.7481, 21))
all.synth$bn.pred <- predict(all.bn, all.synth, type = "response")
all.synth$nb.pred <- predict(all.nb, all.synth, type = "response")

# BOKO ATTACKS
boko.synth = data.frame(corruption = seq(1.0, 3.0, 0.1), lgdp = rep(4.279, 21),
                        lnight = rep(0.9368, 21), irrelevant = rep(0.0022, 21),
                        jrpartner = rep(0.0944, 21), srpartner = rep(0.7481, 21))
boko.synth$bn.pred <- predict(boko.bn, boko.synth, type = "response")
boko.synth$nb.pred <- predict(boko.nb, boko.synth, type = "response")

# OTHER ATTACKS
other.synth = data.frame(corruption = seq(1.0, 3.0, 0.1), lgdp = rep(4.279, 21),
                         lnight = rep(0.9368, 21), irrelevant = rep(0.0022, 21),
                         jrpartner = rep(0.0944, 21), srpartner = rep(0.7481, 21))
other.synth$bn.pred <- predict(other.bn, other.synth, type = "response")
other.synth$nb.pred <- predict(other.nb, other.synth, type = "response")
```

```r
# Plot the Variables
par(mfrow = c(1,2), mai = c(1.5, 1.5, 1, 1))

plot(-10, -10, xlab = "Perceived Corruption", ylab = "Probability of Attack",
     xlim = c(1, 3), ylim = c(0,1), main = "First-Stage \nPredicted Probabilities")
lines(all.synth$corruption, all.synth$bn.pred, col = "black", lwd = 2)
lines(boko.synth$corruption, boko.synth$bn.pred, col = "firebrick3", lwd = 2)
lines(other.synth$corruption, other.synth$bn.pred, col = "dodgerblue3", lwd = 2)

plot(-10, -10, xlab = "Perceived Corruption", ylab = "Predicted Number \nof Attacks",
     xlim = c(1, 3), ylim = c(0,250), main = "Second-Stage \nPredicted Counts")
lines(all.synth$corruption, all.synth$nb.pred, col = "black", lwd = 2)
lines(boko.synth$corruption, boko.synth$nb.pred, col = "firebrick3", lwd = 2)
lines(other.synth$corruption, other.synth$nb.pred, col = "dodgerblue3", lwd = 2)
```