

MSD 2019 Final Project

A replication of Greed and Grievance in Civil War by Paul Collier and Anke Hoeffler, 2000

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Reading Data

```
setwd(".")
options(scipen = 100, digits = 4)

data <- read.dta("data/G&G.dta")
# data_war_period <- data %>% filter(warsa == 1)
# subdata<- data %>% select(warsa, sxp, sxp2,
# coldwar, secm, lngdp_, gy1, peace, mount, geogia,
# lnpop, frac, elfo, rf, pol16, etdo4590, dem,
# ygini, grievxb, greedxb, oilsxp, oilsxp2)
```

Helper Functions

```
summarize_into_table <- function(summary_obj) {
  # takes summary object as input, and returns a DF
  # res. to print res, use print(summ(obj), quote =
  # FALSE) is you don't want quotes

  options(digits = 4)
  res <- t(round(summary_obj$coefficients, digits = 4))
  z.values <- res[4, ]
  Signif <- symnum(z.values, corr = FALSE, na = FALSE,
    cutpoints = c(0, 0.01, 0.05, 0.1, 1), symbols = c("***",
      "**", "*", ""))
  res <- rbind(res, Signif)
  res <- t(res)
```

```

    res <- res[-1, ]
    res
  }

comma_sep = function(x) {
  x = strsplit(x, "")
}

```

Opportunity Models

Generating the various opportunity models

```
# Opportunity Models
```

```

filtering_columns_list <- list("warsa,sxp,sxp2,coldwar,secm,gy1,peace,prevwara,mount,geogia,frac,lnpop",
  "warsa,sxp,sxp2,coldwar,secm,gy1,peace,mount,geogia,frac,lnpop",
  "warsa,sxp,sxp2,coldwar,lngdp_,gy1,peace,mount,geogia,frac,lnpop",
  "warsa,sxp,sxp2,lngdp_,peace,lnpop,diaspeaa", "warsa,sxp,sxp2,lngdp_,peace,lnpop,difdpeaa,diahpeaa")

regression_formula_list <- list("warsa ~  sxp + sxp2 + coldwar + secm + gy1 + peace + prevwara + mount +
  "warsa ~  sxp + sxp2 + coldwar + secm + gy1 + peace + mount + geogia + frac + lnpop",
  "warsa ~  sxp + sxp2 + coldwar + lngdp_ + gy1 + peace + mount + geogia + frac + lnpop",
  "warsa ~  sxp + sxp2 + lngdp_ + peace + lnpop + diaspeaa",
  "warsa ~  sxp + sxp2 + lngdp_ + peace + lnpop + difdpeaa + diahpeaa")

for (i in c(1:5)) {
  print(paste0("Opportunity Model ", i))

  filtering_columns <- strsplit(filtering_columns_list[[i]],
    ",")[[1]]
  print(filtering_columns)
  opportunity.data <- data[, filtering_columns]

  opportunity.data <- na.omit(opportunity.data)
  print(paste0("N : ", nrow(opportunity.data)))
  print(paste0("No of wars : ", nrow(opportunity.data[opportunity.data$warsa ==
    1, ])))

  opportunity_fit <- glm(as.formula(regression_formula_list[[i]]),
    family = binomial(link = "logit"), data = opportunity.data)

  print(paste0("Pseudo R2 : ", round(PseudoR2(opportunity_fit),
    digits = 2)))
  print(paste0("Log likelihood : ", round(logLik(opportunity_fit),
    digits = 2)))

  print(summarize_into_table(summary(opportunity_fit)),
    quote = FALSE)
}

```

```
## [1] "Opportunity Model 1"
```

```
## [1] "warsa"      "sxp"        "sxp2"       "coldwar"    "secm"       "gy1"
```

```

## [7] "peace"      "prevwara" "mount"      "geogia"      "frac"      "lnpop"
## [1] "N : 688"
## [1] "No of wars : 46"
## [1] "Pseudo R2 : 0.24"
## [1] "Log likelihood : -128.49"
##           Estimate Std. Error z value Pr(>|z|) Signif
## sxp      18.1486   6.0065     3.0215 0.0025 ***
## sxp2     -27.4453  11.9963    -2.2878 0.0221 **
## coldwar  -0.3257   0.4695    -0.6937 0.4879
## secm     -0.0248   0.0103    -2.4028 0.0163 **
## gy1      -0.117    0.0437    -2.6782 0.0074 ***
## peace    -0.0025   0.0017    -1.5234 0.1277
## prevwara 0.4639    0.5467     0.8487 0.3961
## mount     0.0129   0.0093     1.3929 0.1636
## geogia   -2.2115   1.0377    -2.1311 0.0331 **
## frac     -0.0002   0.0001    -1.6019 0.1092
## lnpop     0.6688   0.1631     4.1016 0 ***
## [1] "Opportunity Model 2"
## [1] "warsa"      "sxp"      "sxp2"      "coldwar" "secm"      "gy1"      "peace"
## [8] "mount"      "geogia"    "frac"      "lnpop"
## [1] "N : 688"
## [1] "No of wars : 46"
## [1] "Pseudo R2 : 0.24"
## [1] "Log likelihood : -128.85"
##           Estimate Std. Error z value Pr(>|z|) Signif
## sxp      18.8998   5.9478     3.1776 0.0015 ***
## sxp2     -29.1226  11.9047    -2.4463 0.0144 **
## coldwar  -0.207    0.4496    -0.4605 0.6451
## secm     -0.0239   0.0101    -2.3565 0.0184 **
## gy1      -0.1182   0.0438    -2.6967 0.007 ***
## peace    -0.0036   0.0011    -3.1021 0.0019 ***
## mount     0.0137   0.0091     1.5097 0.1311
## geogia   -2.1291   1.0324    -2.0622 0.0392 **
## frac     -0.0002   0.0001    -1.5449 0.1224
## lnpop     0.6855   0.1617     4.2396 0 ***
## [1] "Opportunity Model 3"
## [1] "warsa"      "sxp"      "sxp2"      "coldwar" "lngdp_"    "gy1"      "peace"
## [8] "mount"      "geogia"    "frac"      "lnpop"
## [1] "N : 750"
## [1] "No of wars : 52"
## [1] "Pseudo R2 : 0.22"
## [1] "Log likelihood : -146.86"
##           Estimate Std. Error z value Pr(>|z|) Signif
## sxp      16.4757   5.2071     3.1641 0.0016 ***
## sxp2     -23.0168  9.9722    -2.3081 0.021 **
## coldwar  -0.4543   0.4162    -1.0916 0.275
## lngdp_   -0.837    0.2532    -3.3055 0.0009 ***
## gy1      -0.1051   0.0421    -2.4933 0.0127 **
## peace    -0.0035   0.0011    -3.3355 0.0009 ***
## mount     0.0084   0.0085     0.9966 0.3189
## geogia   -0.8655   0.9482    -0.9127 0.3614
## frac     -0.0002   0.0001    -1.9716 0.0487 **
## lnpop     0.4927   0.1286     3.8308 0.0001 ***
## [1] "Opportunity Model 4"

```

```
## [1] "warsa"      "sxp"        "sxp2"       "lngdp_"    "peace"     "lnpop"
## [7] "diaspeaa"
## [1] "N : 595"
## [1] "No of wars : 32"
## [1] "Pseudo R2 : 0.25"
## [1] "Log likelihood : -93.27"
##      Estimate Std. Error z value Pr(>|z|) Signif
## sxp      17.5671  6.7436    2.605  0.0092 ***
## sxp2     -28.8151 15.35    -1.8772 0.0605 *
## lngdp_   -1.2366  0.2826   -4.3756 0      ***
## peace    -0.002   0.0014   -1.4716 0.1411
## lnpop     0.2949  0.1414    2.0859 0.037 **
## diaspeaa 700.9343 363.2903  1.9294 0.0537 *
## [1] "Opportunity Model 5"
## [1] "warsa"      "sxp"        "sxp2"       "lngdp_"    "peace"     "lnpop"
## [7] "difdpeaa" "diahpeaa"
## [1] "N : 595"
## [1] "No of wars : 32"
## [1] "Pseudo R2 : 0.25"
## [1] "Log likelihood : -93.23"
##      Estimate Std. Error z value Pr(>|z|) Signif
## sxp      17.4034  6.7493    2.5785 0.0099 ***
## sxp2     -28.4562 15.3642   -1.8521 0.064 *
## lngdp_   -1.2426  0.2837   -4.3794 0      ***
## peace    -0.002   0.0014   -1.4816 0.1385
## lnpop     0.2962  0.1413    2.0959 0.0361 **
## difdpeaa 823.9412 556.0224  1.4818 0.1384
## diahpeaa 741.1547 387.6344  1.912  0.0559 *
```

Grievance Models

Generating the various grievance models

```
# Grievance Models

filtering_columns_list <- list("warsa,elfo,rf,pol16,etdo4590,dem,peace,mount,georgia,lnpop",
  "warsa,elfo,rf,pol16,etdo4590,dem,peace,mount,georgia,lnpop,ygini",
  "warsa,elfo,rf,pol16,etdo4590,dem,peace,mount,georgia,lnpop,lgini")

regression_formula_list <- list("warsa ~ elfo + rf + pol16 + etdo4590 + dem + peace + mount + georgia +
  "warsa ~ elfo + rf + pol16 + etdo4590 + dem + peace + mount + georgia + lnpop + ygini",
  "warsa ~ elfo + rf + pol16 + etdo4590 + dem + peace + mount + georgia + lnpop + lgini")

for (i in c(1:3)) {
  print(paste0("Grievance Model ", i))

  filtering_columns <- strsplit(filtering_columns_list[[i]],
    ",")[1]
  print(filtering_columns)
  grievance.data <- data[, filtering_columns]

  grievance.data <- na.omit(grievance.data)
```

```

print(paste0("N : ", nrow(grievance.data)))
print(paste0("No of wars : ", nrow(grievance.data[grievance.data$warsa ==
1, ])))

grievance_fit <- glm(as.formula(regression_formula_list[[i]]),
  family = binomial(link = "logit"), data = grievance.data)

print(paste0("Pseudo R2 : ", round(PseudoR2(grievance_fit),
  digits = 2)))
print(paste0("Log likelihood : ", round(logLik(grievance_fit),
  digits = 2)))

print(summarize_into_table(summary(grievance_fit)),
  quote = FALSE)
}

```

```

## [1] "Grievance Model 1"
## [1] "warsa"      "elfo"      "rf"        "pol16"     "etdo4590" "dem"
## [7] "peace"      "mount"     "georgia"   "lnpop"
## [1] "N : 850"
## [1] "No of wars : 59"
## [1] "Pseudo R2 : 0.13"
## [1] "Log likelihood : -185.57"
##      Estimate Std. Error z value Pr(>|z|) Signif
## elfo      0.0104   0.0057    1.8068 0.0708    *
## rf        -0.0032   0.0067   -0.4723 0.6367
## pol16     -3.0675   7.0207   -0.4369 0.6622
## etdo4590  0.4136   0.4958    0.8342 0.4042
## dem       -0.1091   0.0445   -2.4552 0.0141    **
## peace     -0.0037   0.001    -3.78   0.0002   ***
## mount      0.0109   0.0068    1.6033 0.1089
## georgia   -0.5092   0.8564   -0.5946 0.5521
## lnpop      0.2215   0.0959    2.3102 0.0209    **
## [1] "Grievance Model 2"
## [1] "warsa"      "elfo"      "rf"        "pol16"     "etdo4590" "dem"
## [7] "peace"      "mount"     "georgia"   "lnpop"     "ygini"
## [1] "N : 604"
## [1] "No of wars : 41"
## [1] "Pseudo R2 : 0.11"
## [1] "Log likelihood : -133.46"
##      Estimate Std. Error z value Pr(>|z|) Signif
## elfo      0.0108   0.0067    1.6199 0.1053
## rf        -0.0064   0.0082   -0.7851 0.4324
## pol16     -4.6818   8.2671   -0.5663 0.5712
## etdo4590  0.5747   0.5863    0.9802 0.327
## dem       -0.0834   0.0508   -1.6398 0.1011
## peace     -0.0031   0.0012   -2.6649 0.0077   ***
## mount      0.007    0.0089    0.7911 0.4289
## georgia   -0.7632   1.0531   -0.7247 0.4686
## lnpop      0.2461   0.1188    2.071  0.0384    **
## ygini      0.0153   0.0179    0.8543 0.393
## [1] "Grievance Model 3"
## [1] "warsa"      "elfo"      "rf"        "pol16"     "etdo4590" "dem"
## [7] "peace"      "mount"     "georgia"   "lnpop"     "lgini"

```

```
## [1] "N : 603"
## [1] "No of wars : 38"
## [1] "Pseudo R2 : 0.17"
## [1] "Log likelihood : -117.12"
##           Estimate Std. Error z value Pr(>|z|) Signif
## elfo      0.0117   0.0084    1.3867 0.1655
## rf        -0.0037   0.0094   -0.3992 0.6897
## pol16     -6.536    8.5782   -0.7619 0.4461
## etdo4590  1.0841    0.6285    1.7249 0.0846 *
## dem       -0.1211   0.0533   -2.2728 0.023 **
## peace     -0.0044   0.0013   -3.4254 0.0006 ***
## mount     -0.0001   0.0093   -0.0083 0.9934
## geogia    -1.2926   1.1016   -1.1734 0.2406
## lnpop      0.2991   0.1331    2.2465 0.0247 **
## lgini      0.4607   1.3052    0.353  0.7241
```

Combined Model

Generating the combined opportunity and grievance models

```
# Combined Models
```

```
filtering_columns_list <- list("warsa,sxp,sxp2,coldwar,secm,gy1,peace,mount,geogia,lnpop,frac,grievxb",
  "warsa,peace,mount,geogia,lnpop,elfo,rf,pol16,etdo4590,dem,greedxb",
  "warsa,sxp,sxp2,coldwar,secm,gy1,peace,mount,geogia,lnpop,frac,elfo,rf,pol16,etdo4590,dem,ygini",
  "warsa,sxp,sxp2,coldwar,secm,gy1,peace,mount,geogia,lnpop,frac,elfo,rf,pol16,etdo4590,dem",
  "warsa,sxp,sxp2,secm,gy1,peace,geogia,lnpop,frac,etdo4590",
  "warsa,sxp,sxp2,lngdp_,gy1,peace,geogia,lnpop,frac,etdo4590",
  "warsa,sxp,sxp2,secm,gy1,peace,geogia,lnpop,frac,etdo4590,oilsp,oilsp2")

regression_formula_list <- list("warsa ~ sxp + sxp2 + coldwar + secm + gy1 + peace + mount + geogia + lnpop + frac + elfo + rf + pol16 + etdo4590 + dem + greedxb",
  "warsa ~ peace + mount + geogia + lnpop + elfo + rf + pol16 + etdo4590 + dem + greedxb",
  "warsa ~ sxp + sxp2 + coldwar + secm + gy1 + peace + mount + geogia + lnpop + frac + elfo + rf + pol16 + etdo4590 + dem + ygin",
  "warsa ~ sxp + sxp2 + coldwar + secm + gy1 + peace + mount + geogia + lnpop + frac + elfo + rf + pol16 + etdo4590 + dem",
  "warsa ~ sxp + sxp2 + secm + gy1 + peace + geogia + lnpop + frac + etdo4590",
  "warsa ~ sxp + sxp2 + lngdp_ + gy1 + peace + geogia + lnpop + frac + etdo4590",
  "warsa ~ sxp + sxp2 + secm + gy1 + peace + geogia + lnpop + frac + etdo4590 + oilsp + oilsp2")

for (i in c(1:7)) {
  print(paste0("Combined Model ", i))

  filtering_columns <- strsplit(filtering_columns_list[[i]],
    ",")[1]
  print(filtering_columns)
  combined.data <- data[, filtering_columns]

  combined.data <- na.omit(combined.data)
  print(paste0("N : ", nrow(combined.data)))
  print(paste0("No of wars : ", nrow(combined.data[combined.data$warsa ==
    1, ])))

  combined_fit <- glm(as.formula(regression_formula_list[[i]]),
```

```

    family = binomial(link = "logit"), data = combined.data)

print(paste0("Pseudo R2 : ", round(PseudoR2(combined_fit),
  digits = 2)))
print(paste0("Log likelihood : ", round(logLik(combined_fit),
  digits = 2)))

print(summarize_into_table(summary(combined_fit)),
  quote = FALSE)
}

## [1] "Combined Model 1"
## [1] "warsa" "sxp" "sxp2" "coldwar" "secm" "gy1" "peace"
## [8] "mount" "geogia" "lnpop" "frac" "grievxb"
## [1] "N : 665"
## [1] "No of wars : 46"
## [1] "Pseudo R2 : 0.24"
## [1] "Log likelihood : -126.7"
## Estimate Std. Error z value Pr(>|z|) Signif
## sxp 19.1073 5.9961 3.1866 0.0014 ***
## sxp2 -30.2619 12.0145 -2.5188 0.0118 **
## coldwar -0.2084 0.4572 -0.4559 0.6484
## secm -0.0212 0.0106 -1.9984 0.0457 **
## gy1 -0.1084 0.0437 -2.4794 0.0132 **
## peace -0.0003 0.0021 -0.1381 0.8902
## mount 0.0052 0.01 0.5198 0.6032
## geogia -1.9761 1.0495 -1.883 0.0597 *
## lnpop 0.4886 0.1929 2.5329 0.0113 **
## frac -0.0002 0.0001 -2.0499 0.0404 **
## grievxb 0.7648 0.4129 1.8524 0.064 *
## [1] "Combined Model 2"
## [1] "warsa" "peace" "mount" "geogia" "lnpop" "elfo"
## [7] "rf" "pol16" "etdo4590" "dem" "greedxb"
## [1] "N : 665"
## [1] "No of wars : 46"
## [1] "Pseudo R2 : 0.25"
## [1] "Log likelihood : -125.29"
## Estimate Std. Error z value Pr(>|z|) Signif
## peace 0.0005 0.0014 0.3607 0.7183
## mount 0.0009 0.008 0.1123 0.9106
## geogia 0.0533 1.1006 0.0484 0.9614
## lnpop -0.022 0.1364 -0.1614 0.8718
## elfo 0.0083 0.0071 1.1706 0.2418
## rf -0.0048 0.0081 -0.6005 0.5482
## pol16 -9.3378 8.7336 -1.0692 0.285
## etdo4590 1.2103 0.6484 1.8666 0.062 *
## dem -0.0365 0.0537 -0.6791 0.4971
## greedxb 1.0435 0.2106 4.9546 0 ***
## [1] "Combined Model 3"
## [1] "warsa" "sxp" "sxp2" "coldwar" "secm" "gy1"
## [7] "peace" "mount" "geogia" "lnpop" "frac" "elfo"
## [13] "rf" "pol16" "etdo4590" "dem" "ygini"
## [1] "N : 479"
## [1] "No of wars : 32"

```

```

## [1] "Pseudo R2 : 0.24"
## [1] "Log likelihood : -89.55"
##      Estimate Std. Error z value Pr(>|z|) Signif
## sxp      37.0716  10.2919   3.602  0.0003   ***
## sxp2     -69.2696  21.6957  -3.1928 0.0014   ***
## coldwar  -0.873   0.6438   -1.356 0.1751
## secm     -0.0288  0.0133   -2.1632 0.0305   **
## gy1      -0.0455  0.0619   -0.7352 0.4622
## peace    -0.0003  0.0015   -0.2283 0.8194
## mount     0.0054  0.0116    0.4673 0.6403
## georgia  -4.0317  1.4898   -2.7061 0.0068   ***
## lnpop     0.9272  0.2501    3.707  0.0002   ***
## frac     -0.0008  0.0004   -2.2865 0.0222   **
## elfo      0.0412  0.0188    2.1902 0.0285   **
## rf        0.0148  0.0202    0.7312 0.4647
## pol16    -25.2763 13.3891   -1.8878 0.059    *
## etdo4590  2.0202  0.915    2.2079 0.0273   **
## dem      -0.0177  0.0618   -0.2861 0.7748
## ygini     0.0252  0.024    1.0507 0.2934
## [1] "Combined Model 4"
## [1] "warsa"      "sxp"      "sxp2"      "coldwar"   "secm"      "gy1"
## [7] "peace"      "mount"    "georgia"   "lnpop"     "frac"      "elfo"
## [13] "rf"         "pol16"    "etdo4590" "dem"
## [1] "N : 665"
## [1] "No of wars : 46"
## [1] "Pseudo R2 : 0.26"
## [1] "Log likelihood : -124.6"
##      Estimate Std. Error z value Pr(>|z|) Signif
## sxp      23.3851  6.6915   3.4947 0.0005   ***
## sxp2     -36.3352 12.9976  -2.7955 0.0052   ***
## coldwar  -0.2811  0.459    -0.6124 0.5403
## secm     -0.022   0.0108   -2.0372 0.0416   **
## gy1      -0.1078  0.0446   -2.4169 0.0157   **
## peace    -0.0032  0.0012   -2.7143 0.0066   ***
## mount     0.015   0.0093    1.6068 0.1081
## georgia  -1.9622  1.1491   -1.7076 0.0877    *
## lnpop     0.6974  0.1807    3.8604 0.0001   ***
## frac     -0.0005  0.0003   -1.5846 0.113
## elfo      0.0228  0.0149    1.5362 0.1245
## rf        0.0136  0.0185    0.7344 0.4627
## pol16    -15.9917 10.5178   -1.5204 0.1284
## etdo4590  1.5918  0.746    2.1338 0.0329   **
## dem      -0.0418  0.0542   -0.7706 0.441
## [1] "Combined Model 5"
## [1] "warsa"      "sxp"      "sxp2"      "secm"      "gy1"      "peace"
## [7] "georgia"    "lnpop"    "frac"      "etdo4590"
## [1] "N : 688"
## [1] "No of wars : 46"
## [1] "Pseudo R2 : 0.24"
## [1] "Log likelihood : -128.21"
##      Estimate Std. Error z value Pr(>|z|) Signif
## sxp      18.937   5.8651   3.2287 0.0012   ***
## sxp2     -29.4432 11.7813  -2.4992 0.0124   **
## secm     -0.0316  0.0098   -3.2252 0.0013   ***

```



```
## gy1      -0.1152  0.0431      -2.6753 0.0075  ***
## peace    -0.0037  0.0011      -3.397  0.0007  ***
## geogia   -2.487   1.0052      -2.4741 0.0134  **
## lnpop     0.7677  0.1658       4.6318 0      ***
## frac     -0.0002  0.0001      -2.3451 0.019   **
## etdo4590 0.6704   0.3535       1.8963 0.0579  *
## [1] "Combined Model 6"
## [1] "warsa"      "sxp"      "sxp2"      "lngdp_"    "gy1"      "peace"
## [7] "geogia"     "lnpop"    "frac"      "etdo4590"
## [1] "N : 750"
## [1] "No of wars : 52"
## [1] "Pseudo R2 : 0.22"
## [1] "Log likelihood : -146.84"
##      Estimate Std. Error z value Pr(>|z|) Signif
## sxp      16.7734  5.2064     3.2217 0.0013  ***
## sxp2     -23.8005 10.0396    -2.3707 0.0178  **
## lngdp_   -0.9504  0.2454    -3.8723 0.0001  ***
## gy1      -0.098   0.0415    -2.3625 0.0182  **
## peace    -0.0038  0.001     -3.8085 0.0001  ***
## geogia   -0.9919  0.9093     -1.0909 0.2753
## lnpop     0.5105  0.1284     3.9751 0.0001  ***
## frac     -0.0002  0.0001     -2.6953 0.007   ***
## etdo4590 0.4801   0.3283     1.4625 0.1436
## [1] "Combined Model 7"
## [1] "warsa"      "sxp"      "sxp2"      "secm"      "gy1"      "peace"
## [7] "geogia"     "lnpop"    "frac"      "etdo4590"  "oilsexp"  "oilsexp2"
## [1] "N : 654"
## [1] "No of wars : 45"
## [1] "Pseudo R2 : 0.3"
## [1] "Log likelihood : -114.2"
##      Estimate Std. Error z value Pr(>|z|) Signif
## sxp      50.6076 13.0928     3.8653 0.0001  ***
## sxp2     -130.9982 42.9311    -3.0514 0.0023  ***
## secm     -0.0343  0.0105     -3.2697 0.0011  ***
## gy1      -0.1335  0.0464     -2.8762 0.004   ***
## peace    -0.0032  0.0012     -2.8139 0.0049  ***
## geogia   -2.8712  1.1298     -2.5415 0.011   **
## lnpop     1.1235  0.2258     4.9752 0      ***
## frac     -0.0003  0.0001     -2.8706 0.0041  ***
## etdo4590 0.7688   0.3681     2.0886 0.0367  **
## oilsexp  -28.2748  9.3506     -3.0239 0.0025  ***
## oilsexp2 106.4589 38.7041     2.7506 0.0059  ***
```

Robustness Check

```
# Robustness Check 1
robustness.data <- data %>% select(warsa, country,
  year, sxp, sxp2, secm, gy1, peace, geogia, frac,
  etdo4590, lnpop)

for (i in c(1:6)) {
  print(paste0("Robustness Check ", i))
}
```

```

if (i == 1) {
  robustness.subdata <- robustness.data %>% filter(country !=
    "Iran") %>% filter(country != "Romania")
}

if (i == 2) {
  robustness.subdata <- robustness.data %>% filter(country !=
    "Iran") %>% filter(country != "Romania") %>%
  filter(!(country == "Angola" & year ==
    "1975")) %>% filter(!(country == "Iraq" &
    year == "1985")) %>% filter(!(country ==
    "Zaire" & year == "1995"))
}

if (i == 3) {
  robustness.subdata <- robustness.data %>% filter(!(country ==
    "Iran" & year == "1970")) %>% filter(!(country ==
    "Romania" & year == "1985")) %>% filter(!(country ==
    "Congo" & year == "1995"))
}

if (i == 4) {
  robustness.subdata <- robustness.data %>% filter(country !=
    "Saudi Arabia") %>% filter(country != "Guyana") %>%
  filter(country != "Oman") %>% filter(country !=
    "Trinidad and Tobago")
}

if (i == 5) {
  robustness.subdata <- robustness.data %>% filter(!(country ==
    "Angola" & year == "1975")) %>% filter(!(country ==
    "Somalia" & year == "1985"))
}

if (i == 6) {
  robustness.subdata <- robustness.data %>% filter(!(country ==
    "Angola" & year == "1975")) %>% filter(!(country ==
    "Somalia" & year == "1985")) %>% filter(!(country ==
    "Mozambique" & year == "1975")) %>% filter(!(country ==
    "Sierra Leone" & year == "1995")) %>% filter(!(country ==
    "Zaire" & year == "1995"))
}

robustness.1.data <- na.omit(robustness.subdata)
print(paste0("N : ", nrow(robustness.subdata)))
print(paste0("No of wars : ", nrow(robustness.subdata[robustness.subdata$warsa ==
  1, ])))

robustness.subdata <- glm(warsa ~ sxp + sxp2 +
  secm + gy1 + peace + geogia + frac + etdo4590 +
  lnpop, family = binomial(link = "logit"), data = robustness.1.data)

print(paste0("Pseudo R2 : ", round(PseudoR2(robustness.subdata),

```

```

        digits = 2)))
print(paste0("Log likelihood : ", round(logLik(robustness.subdata),
        digits = 2)))

print(summarize_into_table(summary(robustness.subdata)),
      quote = FALSE)
}

```

```

## [1] "Robustness Check 1"
## [1] "N : 1272"
## [1] "No of wars : 195"
## [1] "Pseudo R2 : 0.25"
## [1] "Log likelihood : -118.4"
##      Estimate Std. Error z value Pr(>|z|) Signif
## sxp      19.6965  6.6069    2.9812  0.0029   ***
## sxp2     -34.0902 14.3523   -2.3752  0.0175   **
## secm     -0.0345  0.0109   -3.1699  0.0015   ***
## gy1      -0.1398  0.0468   -2.9878  0.0028   ***
## peace    -0.0037  0.0012   -3.1601  0.0016   ***
## georgia  -2.1135  1.0796   -1.9577  0.0503    *
## frac     -0.0002  0.0001   -2.0407  0.0413   **
## etdo4590 0.727    0.3678    1.9766  0.0481   **
## lnpop     0.7472  0.1739    4.2968  0         ***
## [1] "Robustness Check 2"
## [1] "N : 1269"
## [1] "No of wars : 192"
## [1] "Pseudo R2 : 0.22"
## [1] "Log likelihood : -116.17"
##      Estimate Std. Error z value Pr(>|z|) Signif
## sxp      19.0288  6.6699    2.8529  0.0043   ***
## sxp2     -33.2498 14.604    -2.2768  0.0228   **
## secm     -0.0372  0.0112   -3.3188  0.0009   ***
## gy1      -0.0996  0.0518   -1.9247  0.0543    *
## peace    -0.0032  0.0012   -2.6524  0.008    ***
## georgia  -2.2718  1.09      -2.0842  0.0371   **
## frac     -0.0002  0.0001   -2.0445  0.0409   **
## etdo4590 0.7315   0.3695    1.9797  0.0477   **
## lnpop     0.7429  0.175     4.2456  0         ***
## [1] "Robustness Check 3"
## [1] "N : 1285"
## [1] "No of wars : 196"
## [1] "Pseudo R2 : 0.29"
## [1] "Log likelihood : -114.04"
##      Estimate Std. Error z value Pr(>|z|) Signif
## sxp      28.745   7.8622    3.6561  0.0003   ***
## sxp2     -54.818 17.7813   -3.0829  0.002    ***
## secm     -0.0415  0.0114   -3.626   0.0003   ***
## gy1      -0.1375  0.0459   -2.9965  0.0027   ***
## peace    -0.0041  0.0012   -3.5129  0.0004   ***
## georgia  -2.8902  1.1361   -2.5439  0.011    **
## frac     -0.0003  0.0001   -2.7478  0.006    ***
## etdo4590 0.6554   0.3717    1.7633  0.0778    *
## lnpop     0.8986  0.1955    4.5969  0         ***
## [1] "Robustness Check 4"

```

```
## [1] "N : 1256"
## [1] "No of wars : 199"
## [1] "Pseudo R2 : 0.24"
## [1] "Log likelihood : -127.55"
##      Estimate Std. Error z value Pr(>|z|) Signif
## sxp      18.7714  6.0632    3.0959  0.002   ***
## sxp2     -28.4663 12.2989   -2.3145  0.0206  **
## secm     -0.0312  0.0098   -3.1933  0.0014  ***
## gy1      -0.1215  0.044    -2.7622  0.0057  ***
## peace    -0.0036  0.0011   -3.2808  0.001   ***
## georgia  -2.4491  1.0079   -2.4299  0.0151  **
## frac     -0.0002  0.0001   -2.3871  0.017   **
## etdo4590  0.6468  0.3536    1.8293  0.0674   *
## lnpop     0.7722  0.1682    4.5904  0       ***
## [1] "Robustness Check 5"
## [1] "N : 1286"
## [1] "No of wars : 197"
## [1] "Pseudo R2 : 0.23"
## [1] "Log likelihood : -126.33"
##      Estimate Std. Error z value Pr(>|z|) Signif
## sxp      19.1466  5.9393    3.2237  0.0013  ***
## sxp2     -30.1497 12.0316   -2.5059  0.0122  **
## secm     -0.0306  0.0097   -3.1538  0.0016  ***
## gy1      -0.1024  0.0441   -2.3198  0.0204  **
## peace    -0.0034  0.0011   -3.0647  0.0022  ***
## georgia  -2.5411  1.0115   -2.5121  0.012   **
## frac     -0.0002  0.0001   -2.2107  0.0271  **
## etdo4590  0.7318  0.3573    2.0484  0.0405  **
## lnpop     0.7822  0.167    4.6841  0       ***
## [1] "Robustness Check 6"
## [1] "N : 1283"
## [1] "No of wars : 194"
## [1] "Pseudo R2 : 0.21"
## [1] "Log likelihood : -124.2"
##      Estimate Std. Error z value Pr(>|z|) Signif
## sxp      19.7632  5.9958    3.2962  0.001   ***
## sxp2     -31.0063 12.0769   -2.5674  0.0102  **
## secm     -0.0308  0.0097   -3.1734  0.0015  ***
## gy1      -0.0795  0.0458   -1.7345  0.0828   *
## peace    -0.0031  0.0011   -2.7503  0.006   ***
## georgia  -2.7197  1.0203   -2.6656  0.0077  ***
## frac     -0.0002  0.0001   -2.4131  0.0158  **
## etdo4590  0.6984  0.3602    1.9389  0.0525   *
## lnpop     0.7949  0.1689    4.7069  0       ***
```

The following is a list of all packages used to generate these results. (Leave at very end of file.)

```
sessionInfo()
```

```
## R version 3.5.2 (2018-12-20)
## Platform: x86_64-apple-darwin17.7.0 (64-bit)
## Running under: macOS High Sierra 10.13.6
##
## Matrix products: default
## BLAS/LAPACK: /usr/local/Cellar/openblas/0.3.5/lib/libopenblas-r0.3.5.dylib
```

```
##
## locale:
## [1] en_US.UTF-8/en_US.UTF-8/en_US.UTF-8/C/en_US.UTF-8/en_US.UTF-8
##
## attached base packages:
## [1] stats      graphics  grDevices  utils      datasets  methods   base
##
## other attached packages:
## [1] lme4_1.1-21      Matrix_1.2-15    DescTools_0.99.28
## [4] foreign_0.8-71   forcats_0.3.0     stringr_1.4.0
## [7] dplyr_0.8.0      purrr_0.3.0       readr_1.3.1
## [10] tidyr_0.8.2      tibble_2.0.1      ggplot2_3.1.0
## [13] tidyverse_1.2.1  scales_1.0.0      here_0.1
##
## loaded via a namespace (and not attached):
## [1] tidyselect_0.2.5 xfun_0.4          splines_3.5.2     haven_2.0.0
## [5] lattice_0.20-38  expm_0.999-4      colorspace_1.4-0  generics_0.0.2
## [9] htmltools_0.3.6  yaml_2.2.0        rlang_0.3.1       nloptr_1.2.1
## [13] pillar_1.3.1     glue_1.3.0        withr_2.1.2       modelr_0.1.3
## [17] readxl_1.3.0     plyr_1.8.4        munsell_0.5.0     gtable_0.2.0
## [21] cellranger_1.1.0 rvest_0.3.2       mvtnorm_1.0-10    evaluate_0.13
## [25] knitr_1.21       manipulate_1.0.1  broom_0.5.1       Rcpp_1.0.0
## [29] formatR_1.6      backports_1.1.3   jsonlite_1.6      hms_0.4.2
## [33] digest_0.6.18    stringi_1.3.1     grid_3.5.2        rprojroot_1.3-2
## [37] cli_1.0.1        tools_3.5.2       magrittr_1.5       lazyeval_0.2.1
## [41] crayon_1.3.4     pkgconfig_2.0.2   MASS_7.3-51.1     xml2_1.2.0
## [45] lubridate_1.7.4  minqa_1.2.4       assertthat_0.2.0  rmarkdown_1.11
## [49] httr_1.4.0       rstudioapi_0.9.0  R6_2.4.0          boot_1.3-20
## [53] nlme_3.1-137     compiler_3.5.2
```