Script for Comparing Stability Score with Regime Durability and State Fragility

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## Purpose

The purpose of this script is to compile and compare the other measures state or regime characteristics to see if they are correlated and can be used interchangeably.

## Loading the packages and data

library(dplyr)  
library(ggplot2)  
library(readxl)  
library(lubridate)  
library(psych)  
library(Hmisc)  
library(PerformanceAnalytics)

The data on stability score and durability from the full dataset:

# Loading the data on stability and durability from the full dataset (WGI2popDevIneqPovRegimeConflict1.csv) available in the local repository which include the Polity IV data with regime durability  
  
stabilityDurabilityDataset <- read.csv("WGI2popDevIneqPovRegimeConflict1.csv", header = TRUE)  
stabilityDurabilityDataset <- as.data.frame(stabilityDurabilityDataset)  
  
# Selecting the variables of interest  
stabilityDurabilityDataset <- select(stabilityDurabilityDataset, country, date, stability, durability = durable)  
  
# Correcting the variable types  
stabilityDurabilityDataset$country <- as.character(stabilityDurabilityDataset$country)  
stabilityDurabilityDataset$date <- as.numeric(stabilityDurabilityDataset$date)  
stabilityDurabilityDataset$durability <- as.numeric(stabilityDurabilityDataset$durability)  
  
# Filtering the data for the period 2010 to 2017  
stabilityDurabilityDataset <- filter(stabilityDurabilityDataset, date > 2009)  
str(stabilityDurabilityDataset)

## 'data.frame': 1665 obs. of 4 variables:  
## $ country : chr "Aruba" "Aruba" "Aruba" "Aruba" ...  
## $ date : num 2010 2011 2012 2013 2014 ...  
## $ stability : num 1.1 1.29 1.26 1.31 1.16 ...  
## $ durability: num NA NA NA NA NA NA NA NA NA NA ...

# Downloading the data on state fragility index (SFIv2017) for the Center of Systemic Peace  
# url <- "http://www.systemicpeace.org/inscr/SFIv2017.xls"  
# destfile <- "SFIv2017.xls"  
# curl::curl\_download(url, destfile)  
# SFIv2017 <- read\_excel(destfile)  
#  
# Making SFIv2017 available in the local repository  
# SFIv2017 <- write.csv(SFIv2017, "SFIv2017.csv")  
  
# Loading the data on state fragility index (SFIv2017)  
SFIv2017 <- read.csv("SFIv2017.csv", header = TRUE)  
SFIv2017 <- as.data.frame(SFIv2017)  
# Selecting the variables of interest from SFIv2017  
SFIv2017 <- select(SFIv2017, country, date = year, SFI = sfi)  
# Filtering the data for the period 2010-2017  
SFIv2017 <- filter(SFIv2017, date > 2009)  
  
# Correcting the variable types  
SFIv2017$country <- as.character(SFIv2017$country)  
SFIv2017$date <- as.numeric(SFIv2017$date)  
SFIv2017$SFI <- as.numeric(SFIv2017$SFI)  
  
# Correcting country names  
# The following country names have been changed:  
SFIv2017$country <- replace(SFIv2017$country, SFIv2017$country == "Cote d'Ivoire", "Côte d'Ivoire")  
SFIv2017$country <- replace(SFIv2017$country, SFIv2017$country == "Gambia", "Gambia, The")  
SFIv2017$country <- replace(SFIv2017$country, SFIv2017$country == "Cape Verde", "Cabo Verde")  
SFIv2017$country <- replace(SFIv2017$country, SFIv2017$country == "Congo-Brazzaville", "Congo, Rep.")  
SFIv2017$country <- replace(SFIv2017$country, SFIv2017$country == "Dem. Rep. of Congo", "Congo, Dem. Rep.")  
SFIv2017$country <- replace(SFIv2017$country, SFIv2017$country == "Timor Leste", "Timor-Leste")  
SFIv2017$country <- replace(SFIv2017$country, SFIv2017$country == "Egypt", "Egypt, Arab Rep.")  
SFIv2017$country <- replace(SFIv2017$country, SFIv2017$country == "Syria", "Syrian Arab Republic")  
SFIv2017$country <- replace(SFIv2017$country, SFIv2017$country == "Iran", "Iran, Islamic Rep.")  
SFIv2017$country <- replace(SFIv2017$country, SFIv2017$country == "Kyrgyzstan", "Kyrgyz Republic")  
SFIv2017$country <- replace(SFIv2017$country, SFIv2017$country == "Korea, North", "Korea, Dem. People's Rep.")  
SFIv2017$country <- replace(SFIv2017$country, SFIv2017$country == "Russia", "Russian Federation")  
SFIv2017$country <- replace(SFIv2017$country, SFIv2017$country == "Taiwan", "Taiwan, China")  
SFIv2017$country <- replace(SFIv2017$country, SFIv2017$country == "Korea South", "Korea, Rep.")  
SFIv2017$country <- replace(SFIv2017$country, SFIv2017$country == "Laos", "Lao PDR")  
SFIv2017$country <- replace(SFIv2017$country, SFIv2017$country == "Yemen", "Yemen, Rep.")  
SFIv2017$country <- replace(SFIv2017$country, SFIv2017$country == "Venezuela", "Venezuela, RB")  
  
# The following country names have been deleted:  
SFIv2017 <- SFIv2017[! SFIv2017$country == "Serbia & Montenegro",]  
SFIv2017 <- SFIv2017[! SFIv2017$country == "Sudan (North)",]  
  
# # Downloading the data on fragile state index (fsi-year) from Fund for Peace at: https://fragilestatesindex.org/excel/ for the period 2010-2017  
#   
# # For 2017  
# url <- "https://fragilestatesindex.org/wp-content/uploads/data/fsi-2017.xlsx"  
# destfile <- "fsi\_2017.xlsx"  
# curl::curl\_download(url, destfile)  
# fsi\_2017 <- read\_excel(destfile)  
# str(fsi\_2017)  
#   
# # For 2016  
# url <- "https://fragilestatesindex.org/wp-content/uploads/data/fsi-2016.xlsx"  
# destfile <- "fsi\_2016.xlsx"  
# curl::curl\_download(url, destfile)  
# fsi\_2016 <- read\_excel(destfile)  
# str(fsi\_2016)  
#   
# # For 2015  
# url <- "https://fragilestatesindex.org/wp-content/uploads/data/fsi-2015.xlsx"  
# destfile <- "fsi\_2015.xlsx"  
# curl::curl\_download(url, destfile)  
# fsi\_2015 <- read\_excel(destfile)  
# str(fsi\_2015)  
#   
# # For 2014  
# url <- "https://fragilestatesindex.org/wp-content/uploads/data/fsi-2014.xlsx"  
# destfile <- "fsi\_2014.xlsx"  
# curl::curl\_download(url, destfile)  
# fsi\_2014 <- read\_excel(destfile)  
# str(fsi\_2014)  
#   
# # For 2013  
# url <- "https://fragilestatesindex.org/wp-content/uploads/data/fsi-2013.xlsx"  
# destfile <- "fsi\_2013.xlsx"  
# curl::curl\_download(url, destfile)  
# fsi\_2013 <- read\_excel(destfile)  
# str(fsi\_2013)  
#   
# # For 2012  
# url <- "https://fragilestatesindex.org/wp-content/uploads/data/fsi-2012.xlsx"  
# destfile <- "fsi\_2012.xlsx"  
# curl::curl\_download(url, destfile)  
# fsi\_2012 <- read\_excel(destfile)  
# str(fsi\_2012)  
#   
# # For 2011  
# url <- "https://fragilestatesindex.org/wp-content/uploads/data/fsi-2011.xlsx"  
# destfile <- "fsi\_2011.xlsx"  
# curl::curl\_download(url, destfile)  
# fsi\_2011 <- read\_excel(destfile)  
# str(fsi\_2011)  
#   
# # For 2010  
# url <- "https://fragilestatesindex.org/wp-content/uploads/data/fsi-2010.xlsx"  
# destfile <- "fsi\_2010.xlsx"  
# curl::curl\_download(url, destfile)  
# fsi\_2010 <- read\_excel(destfile)  
# str(fsi\_2010)  
#   
# # Merging the data on fragile state index (fsi2010\_2017) from Fund for Peace  
# fsi2010\_2017 <- rbind(fsi\_2017, fsi\_2016, fsi\_2015, fsi\_2014, fsi\_2013, fsi\_2012, fsi\_2011, fsi\_2010)  
# str(fsi2010\_2017)  
#   
# # Making fsi2010\_2017 available in the local repository  
# fsi2010\_2017 <- write.csv(fsi2010\_2017, "fsi2010\_2017.csv")  
#   
  
# Loading the data on fragile state index (fsi2010\_2017) from   
fsi2010\_2017 <- read.csv("fsi2010\_2017.csv", header = TRUE)  
fsi2010\_2017 <- as.data.frame(fsi2010\_2017)  
  
# Selecting the variables of interest from SFIv2017  
fsi2010\_2017 <- select(fsi2010\_2017, country = Country, date = Year, fsi = Total)  
# Correcting the variable types  
fsi2010\_2017$country <- as.character(fsi2010\_2017$country)  
fsi2010\_2017$fsi <- as.numeric(fsi2010\_2017$fsi)  
  
# Changing the date format  
fsi2010\_2017$date <- as.Date(fsi2010\_2017$date)  
fsi2010\_2017$date <- format(fsi2010\_2017$date,"%Y")  
fsi2010\_2017$date <- as.numeric(fsi2010\_2017$date)  
str(fsi2010\_2017)

## 'data.frame': 1422 obs. of 3 variables:  
## $ country: chr "South Sudan" "Somalia" "Central African Republic" "Yemen" ...  
## $ date : num 2017 2017 2017 2017 2017 ...  
## $ fsi : num 114 113 113 111 111 ...

# Correcting country names  
# The following country names have been changed:  
fsi2010\_2017$country <- replace(fsi2010\_2017$country, fsi2010\_2017$country == "Yemen", "Yemen, Rep.")  
fsi2010\_2017$country <- replace(fsi2010\_2017$country, fsi2010\_2017$country == "Cote d'Ivoire", "Côte d'Ivoire")  
fsi2010\_2017$country <- replace(fsi2010\_2017$country, fsi2010\_2017$country == "Gambia", "Gambia, The")  
fsi2010\_2017$country <- replace(fsi2010\_2017$country, fsi2010\_2017$country == "Cape Verde", "Cabo Verde")  
fsi2010\_2017$country <- replace(fsi2010\_2017$country, fsi2010\_2017$country == "Congo Republic", "Congo, Rep.")  
fsi2010\_2017$country <- replace(fsi2010\_2017$country, fsi2010\_2017$country == "Congo Democratic Republic", "Congo, Dem. Rep.")  
fsi2010\_2017$country <- replace(fsi2010\_2017$country, fsi2010\_2017$country == "Egypt", "Egypt, Arab Rep.")  
fsi2010\_2017$country <- replace(fsi2010\_2017$country, fsi2010\_2017$country == "North Korea", "Korea, Dem. People's Rep.")  
fsi2010\_2017$country <- replace(fsi2010\_2017$country, fsi2010\_2017$country == "Iran", "Iran, Islamic Rep.")  
fsi2010\_2017$country <- replace(fsi2010\_2017$country, fsi2010\_2017$country == "Russia", "Russian Federation")  
fsi2010\_2017$country <- replace(fsi2010\_2017$country, fsi2010\_2017$country == "Venezuela", "Venezuela, RB")  
fsi2010\_2017$country <- replace(fsi2010\_2017$country, fsi2010\_2017$country == "Laos", "Lao PDR")  
fsi2010\_2017$country <- replace(fsi2010\_2017$country, fsi2010\_2017$country == "Syria", "Syrian Arab Republic")  
fsi2010\_2017$country <- replace(fsi2010\_2017$country, fsi2010\_2017$country == "Bahamas", "Bahamas, The")  
fsi2010\_2017$country <- replace(fsi2010\_2017$country, fsi2010\_2017$country == "Macedonia", "Macedonia, FYR")  
fsi2010\_2017$country <- replace(fsi2010\_2017$country, fsi2010\_2017$country == "Sao Tome and Principe", "São Tomé and Principe")  
fsi2010\_2017$country <- replace(fsi2010\_2017$country, fsi2010\_2017$country == "South Korea", "Korea, Rep.")  
  
# Merging the data on stability and durability with SFI and fsi  
stabilityDurabilitySFIfsi <- left\_join(stabilityDurabilityDataset, SFIv2017, by = c("country", "date")) %>%  
 left\_join(., fsi2010\_2017, by = c("country", "date"))  
  
# Droping NAs  
stabilityDurabilitySFIfsi <- na.omit(stabilityDurabilitySFIfsi)  
str(stabilityDurabilitySFIfsi)

## 'data.frame': 1225 obs. of 6 variables:  
## $ country : chr "Afghanistan" "Afghanistan" "Afghanistan" "Afghanistan" ...  
## $ date : num 2010 2011 2012 2013 2014 ...  
## $ stability : num -2.58 -2.5 -2.42 -2.52 -2.41 ...  
## $ durability: num 0 0 0 0 0 1 2 3 13 14 ...  
## $ SFI : num 22 22 22 21 21 21 21 21 16 16 ...  
## $ fsi : num 109 108 106 107 106 ...  
## - attr(\*, "na.action")= 'omit' Named int 1 2 3 4 5 6 7 8 9 10 ...  
## ..- attr(\*, "names")= chr "1" "2" "3" "4" ...

summary(stabilityDurabilitySFIfsi)

## country date stability durability   
## Length:1225 Min. :2010 Min. :-3.1310 Min. : 0.00   
## Class :character 1st Qu.:2011 1st Qu.:-0.7778 1st Qu.: 9.00   
## Mode :character Median :2013 Median :-0.1404 Median : 20.00   
## Mean :2013 Mean :-0.2293 Mean : 29.62   
## 3rd Qu.:2015 3rd Qu.: 0.4862 3rd Qu.: 40.00   
## Max. :2017 Max. : 1.5935 Max. :208.00   
## SFI fsi   
## Min. : 0.000 Min. : 17.70   
## 1st Qu.: 3.000 1st Qu.: 53.10   
## Median : 8.000 Median : 76.60   
## Mean : 8.258 Mean : 70.97   
## 3rd Qu.:12.000 3rd Qu.: 87.90   
## Max. :24.000 Max. :114.90

## Correlation matrix among the variables

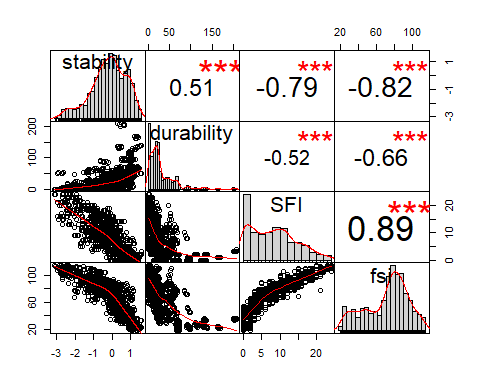
First, we need to generate a correlation matrix with significance:

# selecting the variables to be included in the matrix  
stabilityDurabilitySFIfsiScores <- select(stabilityDurabilitySFIfsi, stability, durability, SFI, fsi)  
correlationScores <- rcorr(as.matrix(stabilityDurabilitySFIfsiScores))  
correlationScores

## stability durability SFI fsi  
## stability 1.00 0.51 -0.79 -0.82  
## durability 0.51 1.00 -0.52 -0.66  
## SFI -0.79 -0.52 1.00 0.89  
## fsi -0.82 -0.66 0.89 1.00  
##   
## n= 1225   
##   
##   
## P  
## stability durability SFI fsi  
## stability 0 0 0   
## durability 0 0 0   
## SFI 0 0 0   
## fsi 0 0 0

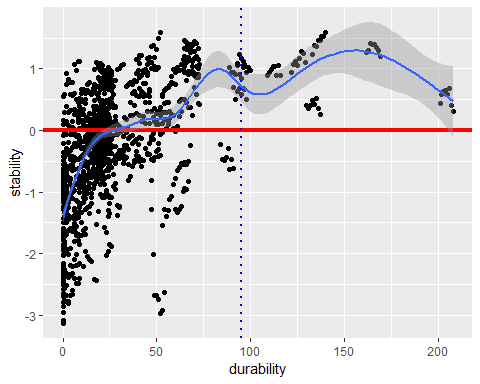
The tables below calculate and plot the correlations among stability, durability, Center of Systemic Peace’s SFI and Fund for Peace’s fsi:

# Plot with PerformanceAnalytics  
chart.Correlation(stabilityDurabilitySFIfsiScores, histogram=TRUE, pch=19)



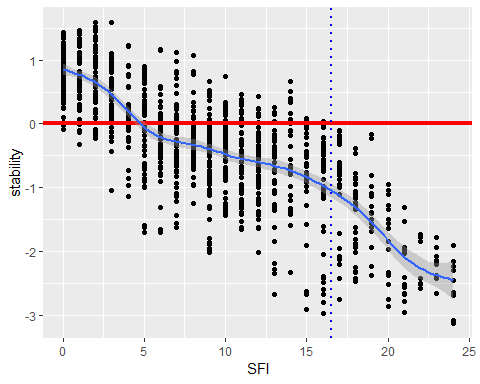
Scaterplot of stability against durability:

ggplot(stabilityDurabilitySFIfsi, aes(x = durability, y = stability)) +  
 geom\_point() + geom\_hline(yintercept=0, color = "red", size=1.5) +  
 geom\_smooth() + geom\_vline(xintercept = 95, linetype="dotted", color = "blue", size=1)



Scaterplot of stability against SFI:

ggplot(stabilityDurabilitySFIfsi, aes(x = SFI, y = stability)) +  
 geom\_point() + geom\_hline(yintercept=0, color = "red", size=1.5) +  
 geom\_smooth() + geom\_vline(xintercept = 16.5, linetype="dotted", color = "blue", size=1)



Scaterplot of stability against fsi:

ggplot(stabilityDurabilitySFIfsi, aes(x = fsi, y = stability)) +  
 geom\_point() + geom\_hline(yintercept=0, color = "red", size=1.5) +  
 geom\_smooth() + geom\_vline(xintercept = 34, linetype="dotted", color = "blue", size=1) +  
 geom\_vline(xintercept = 94, linetype="dotted", color = "red", size=1.5)

