Unemployment\_Project

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rm(list=ls())  
library(rio)  
library(moments)   
library(corrplot)

## corrplot 0.84 loaded

library(car)

## Loading required package: carData

library(plm)  
library(stargazer)

##   
## Please cite as:

## Hlavac, Marek (2018). stargazer: Well-Formatted Regression and Summary Statistics Tables.

## R package version 5.2.2. https://CRAN.R-project.org/package=stargazer

library(corrplot)  
library(plotly)

## Loading required package: ggplot2

##   
## Attaching package: 'plotly'

## The following object is masked from 'package:ggplot2':  
##   
## last\_plot

## The following object is masked from 'package:rio':  
##   
## export

## The following object is masked from 'package:stats':  
##   
## filter

## The following object is masked from 'package:graphics':  
##   
## layout

library(ggplot2)  
library(dplyr)

##   
## Attaching package: 'dplyr'

## The following objects are masked from 'package:plm':  
##   
## between, lag, lead

## The following object is masked from 'package:car':  
##   
## recode

## The following objects are masked from 'package:stats':  
##   
## filter, lag

## The following objects are masked from 'package:base':  
##   
## intersect, setdiff, setequal, union

library(lattice)  
setwd("C:/Users/yagna/Documents/R/R workings")  
d <- import("Unemployment.xlsx")  
names(d)

## [1] "country" "year" "unemp" "inf" "snp" "gdp"

head(d)

## country year unemp inf snp gdp  
## 1 UK 1985 11.4 6.1 1314.8 4.20  
## 2 UK 1986 11.3 3.4 1607.0 3.14  
## 3 UK 1987 10.4 4.1 2028.6 5.30  
## 4 UK 1988 8.6 4.2 1801.5 5.76  
## 5 UK 1989 7.2 5.8 2194.9 2.57  
## 6 UK 1990 7.1 8.1 2207.2 0.74

str(d)

## 'data.frame': 68 obs. of 6 variables:  
## $ country: chr "UK" "UK" "UK" "UK" ...  
## $ year : num 1985 1986 1987 1988 1989 ...  
## $ unemp : num 11.4 11.3 10.4 8.6 7.2 7.1 8.9 9.9 10.4 9.5 ...  
## $ inf : num 6.1 3.4 4.1 4.2 5.8 8.1 7.5 4.6 2.6 2.2 ...  
## $ snp : num 1315 1607 2029 1802 2195 ...  
## $ gdp : num 4.2 3.14 5.3 5.76 2.57 0.74 -1.09 0.37 2.53 3.89 ...

if(!require(FSA)){install.packages("FSA")}

## Loading required package: FSA

## ## FSA v0.8.27. See citation('FSA') if used in publication.  
## ## Run fishR() for related website and fishR('IFAR') for related book.

##   
## Attaching package: 'FSA'

## The following object is masked from 'package:car':  
##   
## bootCase

if(!require(psych)){install.packages("psych")}

## Loading required package: psych

##   
## Attaching package: 'psych'

## The following object is masked from 'package:FSA':  
##   
## headtail

## The following objects are masked from 'package:ggplot2':  
##   
## %+%, alpha

## The following object is masked from 'package:car':  
##   
## logit

if(!require(lme4)){install.packages("lme4")}

## Loading required package: lme4

## Loading required package: Matrix

## Registered S3 methods overwritten by 'lme4':  
## method from  
## cooks.distance.influence.merMod car   
## influence.merMod car   
## dfbeta.influence.merMod car   
## dfbetas.influence.merMod car

##   
## Attaching package: 'lme4'

## The following object is masked from 'package:rio':  
##   
## factorize

if(!require(lmerTest)){install.packages("lmerTest")}

## Loading required package: lmerTest

##   
## Attaching package: 'lmerTest'

## The following object is masked from 'package:lme4':  
##   
## lmer

## The following object is masked from 'package:stats':  
##   
## step

if(!require(nlme)){install.packages("nlme")}

## Loading required package: nlme

##   
## Attaching package: 'nlme'

## The following object is masked from 'package:lme4':  
##   
## lmList

## The following object is masked from 'package:dplyr':  
##   
## collapse

#  
a <-pdata.frame(d, index=c("country","year"))  
pdim(a)

## Balanced Panel: n = 2, T = 34, N = 68

summary(a)

## country year unemp inf snp   
## UK:34 1985 : 2 Min. : 3.900 Min. :0.400 Min. : 186.8   
## US:34 1986 : 2 1st Qu.: 5.100 1st Qu.:1.800 1st Qu.:1119.0   
## 1987 : 2 Median : 6.000 Median :2.400 Median :2044.9   
## 1988 : 2 Mean : 6.532 Mean :2.793 Mean :2838.0   
## 1989 : 2 3rd Qu.: 7.675 3rd Qu.:3.425 3rd Qu.:4813.0   
## 1990 : 2 Max. :11.400 Max. :8.100 Max. :7367.1   
## (Other):56   
## gdp   
## Min. :-4.250   
## 1st Qu.: 2.368   
## Median : 3.600   
## Mean : 3.620   
## 3rd Qu.: 5.075   
## Max. : 7.800   
##

# Pooled Effects Model  
  
pooled <-plm(unemp ~ inf + gdp + snp, data=a, model="pooling")  
summary(pooled)

## Pooling Model  
##   
## Call:  
## plm(formula = unemp ~ inf + gdp + snp, data = a, model = "pooling")  
##   
## Balanced Panel: n = 2, T = 34, N = 68  
##   
## Residuals:  
## Min. 1st Qu. Median 3rd Qu. Max.   
## -2.48086 -1.24925 -0.56813 1.15146 4.19319   
##   
## Coefficients:  
## Estimate Std. Error t-value Pr(>|t|)   
## (Intercept) 7.04204323 0.98697992 7.1349 1.078e-09 \*\*\*  
## inf 0.35866600 0.16078945 2.2307 0.02922 \*   
## gdp -0.27412652 0.11804322 -2.3223 0.02341 \*   
## snp -0.00018291 0.00012498 -1.4635 0.14823   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Total Sum of Squares: 238.45  
## Residual Sum of Squares: 191.57  
## R-Squared: 0.19658  
## Adj. R-Squared: 0.15892  
## F-statistic: 5.21982 on 3 and 64 DF, p-value: 0.0027528

# Fixed Effects Model  
fixed\_w <-plm(unemp ~ inf + gdp + snp , data=a, model="within")  
summary(fixed\_w)

## Oneway (individual) effect Within Model  
##   
## Call:  
## plm(formula = unemp ~ inf + gdp + snp, data = a, model = "within")  
##   
## Balanced Panel: n = 2, T = 34, N = 68  
##   
## Residuals:  
## Min. 1st Qu. Median 3rd Qu. Max.   
## -2.88511 -0.96033 -0.17268 0.88002 3.19089   
##   
## Coefficients:  
## Estimate Std. Error t-value Pr(>|t|)   
## inf -0.23018800 0.15439764 -1.4909 0.14098   
## gdp -0.19035321 0.09282889 -2.0506 0.04447 \*   
## snp -0.00107337 0.00016771 -6.4001 2.192e-08 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Total Sum of Squares: 216.54  
## Residual Sum of Squares: 114.39  
## R-Squared: 0.47174  
## Adj. R-Squared: 0.4382  
## F-statistic: 18.7531 on 3 and 63 DF, p-value: 8.3292e-09

summary(fixef(fixed\_w))

## Estimate Std. Error t-value Pr(>|t|)   
## UK 13.15910 1.21289 10.849 4.725e-16 \*\*\*  
## US 8.66168 0.80783 10.722 7.683e-16 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

fixed\_w2 <-plm(unemp ~ inf + gdp + snp , data=a, model="within", effect="twoways")  
summary(fixed\_w2)

## Twoways effects Within Model  
##   
## Call:  
## plm(formula = unemp ~ inf + gdp + snp, data = a, effect = "twoways",   
## model = "within")  
##   
## Balanced Panel: n = 2, T = 34, N = 68  
##   
## Residuals:  
## Min. 1st Qu. Median 3rd Qu. Max.   
## -1.3393e+00 -3.7843e-01 2.4633e-16 3.7843e-01 1.3393e+00   
##   
## Coefficients:  
## Estimate Std. Error t-value Pr(>|t|)   
## inf -0.37373631 0.22627524 -1.6517 0.1090   
## gdp 0.08764085 0.17069304 0.5134 0.6114   
## snp -0.00107293 0.00019017 -5.6418 3.808e-06 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Total Sum of Squares: 48.569  
## Residual Sum of Squares: 23.363  
## R-Squared: 0.51897  
## Adj. R-Squared: -0.074311  
## F-statistic: 10.7885 on 3 and 30 DF, p-value: 5.668e-05

summary(fixef(fixed\_w2))

## Estimate Std. Error t-value Pr(>|t|)   
## UK 12.9198 1.2892 10.0213 4.354e-11 \*\*\*  
## US 7.6878 1.2216 6.2931 6.164e-07 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

#Comparing  
  
stargazer(summary(fixef(fixed\_w)), type = "text", summary = FALSE, title = "Intercept for Within one way ")

##   
## Intercept for Within one way  
## ==========================================  
## Estimate Std. Error t-value Pr(> | t| )  
## ------------------------------------------  
## UK 13.159 1.213 10.849 0   
## US 8.662 0.808 10.722 0   
## ------------------------------------------

stargazer(summary(fixef(fixed\_w2)), type = "text", summary = FALSE, title = "Intercept for Within Two way ")

##   
## Intercept for Within Two way  
## ==========================================  
## Estimate Std. Error t-value Pr(> | t| )  
## ------------------------------------------  
## UK 12.920 1.289 10.021 0   
## US 7.688 1.222 6.293 0.00000   
## ------------------------------------------

stargazer(pooled,fixed\_w,fixed\_w2,type='text',summary=FALSE)

##   
## ================================================================================  
## Dependent variable:   
## -------------------------------------------------------------------  
## unemp   
## (1) (2) (3)   
## --------------------------------------------------------------------------------  
## inf 0.359\*\* -0.230 -0.374   
## (0.161) (0.154) (0.226)   
##   
## gdp -0.274\*\* -0.190\*\* 0.088   
## (0.118) (0.093) (0.171)   
##   
## snp -0.0002 -0.001\*\*\* -0.001\*\*\*   
## (0.0001) (0.0002) (0.0002)   
##   
## Constant 7.042\*\*\*   
## (0.987)   
##   
## --------------------------------------------------------------------------------  
## Observations 68 68 68   
## R2 0.197 0.472 0.519   
## Adjusted R2 0.159 0.438 -0.074   
## F Statistic 5.220\*\*\* (df = 3; 64) 18.753\*\*\* (df = 3; 63) 10.789\*\*\* (df = 3; 30)  
## ================================================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

?plmtest

## starting httpd help server ... done

pFtest(fixed\_w, pooled)

##   
## F test for individual effects  
##   
## data: unemp ~ inf + gdp + snp  
## F = 42.511, df1 = 1, df2 = 63, p-value = 1.361e-08  
## alternative hypothesis: significant effects

plmtest(fixed\_w, effect = "individual")

##   
## Lagrange Multiplier Test - (Honda) for balanced panels  
##   
## data: unemp ~ inf + gdp + snp  
## normal = 2.1062, p-value = 0.01759  
## alternative hypothesis: significant effects

plmtest(fixed\_w2, effect="twoways", type="bp")

##   
## Lagrange Multiplier Test - two-ways effects (Breusch-Pagan) for  
## balanced panels  
##   
## data: unemp ~ inf + gdp + snp  
## chisq = 7.5561, df = 2, p-value = 0.02287  
## alternative hypothesis: significant effects

pFtest(fixed\_w, fixed\_w2)

## Warning in pf(stat, df1, df2, lower.tail = FALSE): NaNs produced

##   
## F test for individual effects  
##   
## data: unemp ~ inf + gdp + snp  
## F = 1.5192, df1 = -33, df2 = 63, p-value = NA  
## alternative hypothesis: significant effects

plmtest(fixed\_w2,)

##   
## Lagrange Multiplier Test - (Honda) for balanced panels  
##   
## data: unemp ~ inf + gdp + snp  
## normal = 2.1062, p-value = 0.01759  
## alternative hypothesis: significant effects

#Mixed effects  
  
model = lmer(unemp ~ inf + gdp +snp + (1|country),  
 data=d,  
 REML=TRUE)

## Warning: Some predictor variables are on very different scales: consider  
## rescaling  
  
## Warning: Some predictor variables are on very different scales: consider  
## rescaling

summary(model)

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
## lmerModLmerTest]  
## Formula: unemp ~ inf + gdp + snp + (1 | country)  
## Data: d  
##   
## REML criterion at convergence: 257.6  
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -2.1066 -0.7185 -0.1337 0.6539 2.3745   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## country (Intercept) 9.875 3.143   
## Residual 1.816 1.347   
## Number of obs: 68, groups: country, 2  
##   
## Fixed effects:  
## Estimate Std. Error df t value Pr(>|t|)   
## (Intercept) 10.8193948 2.4232853 1.3436928 4.465 0.0916 .   
## inf -0.2163360 0.1537750 63.7661262 -1.407 0.1643   
## gdp -0.1923239 0.0928080 63.0560354 -2.072 0.0423 \*   
## snp -0.0010524 0.0001664 63.9997960 -6.325 2.8e-08 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) inf gdp   
## inf -0.328   
## gdp -0.209 0.138   
## snp -0.347 0.675 0.233  
## fit warnings:  
## Some predictor variables are on very different scales: consider rescaling

fixef(model)

## (Intercept) inf gdp snp   
## 10.819394809 -0.216336006 -0.192323861 -0.001052422

ranef(model)

## $country  
## (Intercept)  
## UK 2.195811  
## US -2.195811  
##   
## with conditional variances for "country"

coef(model)

## $country  
## (Intercept) inf gdp snp  
## UK 13.015205 -0.216336 -0.1923239 -0.001052422  
## US 8.623584 -0.216336 -0.1923239 -0.001052422  
##   
## attr(,"class")  
## [1] "coef.mer"