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###Class Code 2 ECON416 , KSU
### Course instructor : Abrar Bagalb
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```
(1) ##### تحميل البيانات
```

```
# We have different ways to download data : 1. imprt Dataset or 2. from
library(readxl)
DATA2 <- read_excel("Desktop/DATA2.xlsx")
View(DATA2)
```

```
### (2) ### Rename data variables إعادة تسمية المتغيرات
```

```
unemplo<-DATA2$`Unemployment( y)`
Inflation<-DATA2$`Inf (x1)`
GDP<-DATA2$`GDP (x2)`
```

```
#### (3) Check for Stationary ##### ADF التأكد من سكون السلسلة الزمنية بتطبيق
```

```
install.packages("tseries")
```

```
library(tseries)
```

```
####ADF ### FIRST CODE : nono تطبيقه بشكل عام من غير تحديد
```

```
المتغير الاول #####
```

```
adf.test(unemplo)
```

```
##### النتائج توضح لنا انها غير ساكنة نعمل على تحويلها
```

```
### Take a log
```

```
lunemplo=log(unemplo)
```

```
adf.test(lunemplo)
```

```
### Take a first difference
```

```
dunemplo=diff(unemplo)
```

```
adf.test(dunemplo)
```

```
### Take a second difference
```

```
d2unemplo=diff(unemplo, differences = 2)
```

```
adf.test(d2unemplo)
```

```
##### النتائج غير ساكنة
```

```
المتغير الثاني #####
```

```
adf.test(Inflation)
```

```
### Take a first difference
```

```
dinflation=diff(Inflation)
```

```
adf.test(dinflation)
```

```
### Take a second difference
```

```
dinflation=diff(Inflation, differences = 2)
```

```
adf.test(dinflation)
```

```
##### المتغير الثالث
```

```
lgdp=log(GDP)
```

```
adf.test(lgdp)
```

```
### Take a first difference
```

```
dlgdp=diff(lgdp)
```

```
adf.test(dlgdp)
```

```
### Take a second difference
```

```
d2Gdp=diff(GDP, differences = 2)
```

```
adf.test(d2Gdp)
```

```
####ADF ### Secod CODE : ADF with drift or trend
```

```
install.packages("urca")
```

```
library(urca)
ur.df(GDP, type= c("non", "drift", "trend"), lags=1, selectlags= c("fixed",
"AIC", "BIC"))
```

```
### (3) Visualize the data
install.packages("ggplot2")
library("ggplot2")
##create scatter plot
ggplot(DATA2, aes(x=DATA2$`GDP (x2)`, y=DATA2$`Unemployment( y)`))
+geom_point(size=2)
plot(DATA2$`Unemployment( y)` , DATA2$`Inf (x1)`)
```

```
###(4) PERFORM OLS REGRESSION
install.packages("olsrr")
library("olsrr")
model<-lm(unemplo~Inflation+GDP)
summary(model)
```

```
library(htest)
white_test(model)
###(5) Check multicollinearity
##1 ## Calculating a metric known as the variance inflation factor VIF
library(car)
vif(model)
##2 ## Correlation Matrix
install.packages("corrplot")
library("corrplot")
data_set<-data.frame(unemplo, GDP, Inflation)
corrplot(cor(data_set),method = "number")
```

```
###Check Autocorrelation ##
#####(1) First Way ACF ###Extract Residuals
residuals<-residuals(model)
acf(residuals, main= "ACF of Residuals")
###Plot ACF of residuals
#####(2) Second Way Durbin-Watson test - first order
##load necessary package
install.packages("lmtest")
library(lmtest)
###Perform DURBIN-WATSON TEST
dw_test<-dwtest(model)
print(dw_test)
###(3) Ljung-Box Test
lb_test<-Box.test(residuals, type="Ljung-Box", lag = 10)
print(lb_test)
###(4 )Breusch Godfrey usually use to test autocorrelation at higher orders
ten one
bptest(unemplo~Inflation+GDP, order=3)
```

```
###Check Heteroskedasticity
```

```
#####(1) using Breusch-Pagan Test
```

```
install.packages("car")
library(car)
bp_test<-ncvTest(model)
print(bp_test)
```

```
####(2) using White test
library(lmtest)
bptest(model,~Inflation*GDP+I(Inflation^2)+I(GDP^2))
```

```
####(3) using GOLDFELD-Quandt test
library(lmtest)
gqtest(model, order.by = ~Inflation+GDP, fraction = 4)
```

```
### To deal with Heteroskedasticity -consistent standard errors (Robust
Standard Errors)
library(sandwich)
library(lmtest)
coefTest(model, vcov= vcovHC(model, type="HC1"))
```