Sub BoxPierceTestMultiColumn()

Dim ws As Worksheet

Dim rng As Range

Dim data() As Double

Dim n As Integer

Dim lags As Integer

Dim i As Integer, j As Integer, col As Integer

Dim autocorr() As Double

Dim partcorr() As Double

Dim Q() As Double

Dim pValue() As Double

' تنظيمات اوليه

Set ws = ActiveSheet

lags = 90 ' تعداد تأخيرها (بر اساس درخواست شما)

' تعريف ستون‌ها و محدوده داده‌ها

Dim colNames As Variant

Dim colRanges As Variant

colNames = Array("بخش کشاورزي", "بخش نفت", "بخش صنايع و معادن", "بخش خدمات")

colRanges = Array("x3:x94", "w3:w94", "v3:v94", "u3:u94")

' حلقه براي هر ستون

For col = 0 To UBound(colNames)

Set rng = ws.Range(colRanges(col)) ' محدوده داده‌ها براي هر ستون

n = Application.WorksheetFunction.Count(rng) ' تعداد داده‌هاي غيرخالي

' بررسي تعداد داده‌ها

If n < lags + 1 Then

MsgBox "ستون " & colNames(col) & ": تعداد داده‌ها کمتر از تأخيرها است."

GoTo NextColumn

End If

' انتقال داده‌ها به آرايه

ReDim data(1 To n)

For i = 1 To n

data(i) = rng.Cells(i, 1).Value

Next i

' محاسبه ميانگين

Dim mean As Double

mean = Application.WorksheetFunction.Average(rng)

' محاسبه AC (Autocorrelation)

ReDim autocorr(1 To lags)

For j = 1 To lags

Dim numerator As Double, denominator As Double

numerator = 0

denominator = 0

For i = 1 To n - j

numerator = numerator + (data(i) - mean) \* (data(i + j) - mean)

Next i

For i = 1 To n

denominator = denominator + (data(i) - mean) ^ 2

Next i

If denominator = 0 Then

MsgBox "ستون " & colNames(col) & ": خطا در محاسبه AC (مخرج صفر)"

GoTo NextColumn

End If

autocorr(j) = numerator / denominator

Next j

' محاسبه PAC (Partial Autocorrelation) با روش ساده Durbin-Levinson

ReDim partcorr(1 To lags)

partcorr(1) = autocorr(1)

For j = 2 To lags

Dim numeratorPac As Double, denominatorPac As Double

numeratorPac = autocorr(j)

denominatorPac = 1

For i = 1 To j - 1

numeratorPac = numeratorPac - partcorr(i) \* autocorr(j - i)

denominatorPac = denominatorPac - partcorr(i) \* autocorr(i)

Next i

If denominatorPac = 0 Then

partcorr(j) = 0 ' در صورت صفر شدن مخرج

Else

partcorr(j) = numeratorPac / denominatorPac

End If

Next j

' محاسبه Q-Statistic براي هر تأخير

ReDim Q(1 To lags)

Dim sumR2 As Double

sumR2 = 0

For j = 1 To lags

sumR2 = sumR2 + autocorr(j) ^ 2

Q(j) = n \* sumR2

Next j

' محاسبه p-value با استفاده از توزيع چي-دو

ReDim pValue(1 To lags)

For j = 1 To lags

pValue(j) = Application.WorksheetFunction.ChiSq\_Dist\_RT(Q(j), j)

Next j

' نوشتن نتايج براي هر ستون

Dim offset As Integer

offset = col \* 5 ' فاصله براي هر ستون

ws.Cells(1, 2 + offset).Value = "Lag (" & colNames(col) & ")"

ws.Cells(1, 3 + offset).Value = "AC"

ws.Cells(1, 4 + offset).Value = "PAC"

ws.Cells(1, 5 + offset).Value = "Q-Stat"

ws.Cells(1, 6 + offset).Value = "Prob"

For j = 1 To lags

ws.Cells(j + 1, 2 + offset).Value = j

ws.Cells(j + 1, 3 + offset).Value = Round(autocorr(j), 4)

ws.Cells(j + 1, 4 + offset).Value = Round(partcorr(j), 4)

ws.Cells(j + 1, 5 + offset).Value = Round(Q(j), 2)

ws.Cells(j + 1, 6 + offset).Value = Round(pValue(j), 4)

Next j

NextColumn:

Next col

MsgBox "آزمون Box-Pierce براي 4 ستون تکميل شد. نتايج را در شيت بررسي کنيد."

End Sub