EXERCICES DU CHAPITRE V

1 Exercice V-1

On reprend l'exercice du chapitre IV sur le taux de salaire.
On étudie l'évolution du salaire horaire dans le secteur marchand.

TW	le taux de croissance trimestirel du salaire horaire
TP	le taux de croissance trimestriel de l'indice des prix à le consommation
TCHO	le taux de chômage
TSMIC	le taux de croissance du SMIC
DU821	une variable muette au premier trimestre 1982

Etudier l'intégration des 4 séries

1.1 Intégration de TW

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ETUDE DE L INTEGRATION DE LA SERIE  TW
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********* avec tendance et constante

Linear Regression - Estimation by Least Squares
Dependent Variable dTW
Quarterly Data From 71:01 To 90:02
Usable Observations     78      Degrees of Freedom    73
Centered R**2     0.212263      R Bar **2   0.169099
Uncentered R**2   0.214374      T x R**2      16.721
Mean of Dependent Variable      -0.024098542
Std Error of Dependent Variable  0.467897156
Standard Error of Estimate       0.426505783
Sum of Squared Residuals        13.279224361
Regression F(4,73)                   4.9176
Significance Level of F           0.00144478
Log Likelihood                     -41.62739
Durbin-Watson Statistic             1.853060

   Variable                     Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  TW{1}                   -0.144117455  0.065153959     -2.21195  0.03009958
2.  Constant                 0.623773409  0.302011634      2.06540  0.04243660
3.  TENDANCE                -0.006022374  0.003259366     -1.84771  0.06869510
4.  dTW{1}                   0.220925143  0.107168866      2.06147  0.04282003
5.  dTW{2}                  -0.297390728  0.109498479     -2.71593  0.00824534

valeur de la statistique de Durbin   h=       2.01054

 statistique Q( 17 )=       16.56262   niveau de significativite   0.4844
 stat. modifiee  Q( 17 - 2)  16.56262   niveau de significativite   0.3457

   calcul de phi3 avec H0 (a,0,1) :       2.48571

*****modele sans le tendance avec la constante

Linear Regression - Estimation by Least Squares
Dependent Variable dTW
Quarterly Data From 71:01 To 90:02
Usable Observations     78      Degrees of Freedom    74
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Centered R**2     0.175422      R Bar **2   0.141994
Uncentered R**2   0.177632      T x R**2      13.855
Mean of Dependent Variable      -0.024098542
Std Error of Dependent Variable  0.467897156
Standard Error of Estimate       0.433406737
Sum of Squared Residuals        13.900263574
Regression F(3,74)                   5.2476
Significance Level of F           0.00244498
Log Likelihood                    -43.40997
Durbin-Watson Statistic             1.877354

   Variable                     Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  TW{1}                   -0.053624252  0.043665149     -1.22808  0.22330915
2.  Constant                 0.118456385  0.130207615      0.90975  0.36590803
3.  dTW{1}                   0.193710146  0.107869442      1.79578  0.07661111
4.  dTW{2}                  -0.344994869  0.108146321     -3.19007  0.00208688


 statistique Q( 17 )=       15.10296   niveau de significativite   0.5881
 stat. modifiee Q( 17 - 2 ) 15.10296   niveau de significativite   0.4440

 calcul de phi1 avec H0 (0,0,1) :       0.93534

 ******** sans tendance ni constante

Linear Regression - Estimation by Least Squares
Dependent Variable dTW
Quarterly Data From 71:01 To 90:02
Usable Observations     78      Degrees of Freedom    75
Centered R**2     0.166200      R Bar **2   0.143965
Uncentered R**2   0.168435      T x R**2      13.138
Mean of Dependent Variable      -0.024098542
Std Error of Dependent Variable  0.467897156
Standard Error of Estimate       0.432908452
Sum of Squared Residuals        14.055729600
Log Likelihood                    -43.84374
Durbin-Watson Statistic             1.885038

   Variable                     Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  TW{1}                   -0.016841665  0.016471539     -1.02247  0.30984498
2.  dTW{1}                   0.174020814  0.105554498      1.64863  0.10340552
3.  dTW{2}                  -0.368195034  0.104975748     -3.50743  0.00076812


 statistique Q( 17 )=       16.80956   niveau de significativite   0.4673
 stat. modifiee Q( 17 - 2 ) 16.80956   niveau de significativite   0.3304


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ETUDE DE L INTEGRATION DE LA SERIE  DTW
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********* avec tendance et constante

Linear Regression - Estimation by Least Squares
Dependent Variable dDTW
Quarterly Data From 71:01 To 90:02
Usable Observations     78      Degrees of Freedom    74
Centered R**2     0.522259      R Bar **2   0.502891
Uncentered R**2   0.522273      T x R**2      40.737
Mean of Dependent Variable      -0.003333371
Std Error of Dependent Variable  0.620628575
Standard Error of Estimate       0.437580073
Sum of Squared Residuals        14.169247711
Regression F(3,74)                  26.9652
Significance Level of F           0.00000000
Log Likelihood                    -44.15745
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Durbin-Watson Statistic             1.884292

   Variable                      Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  DTW{1}                   -1.211654394  0.141972069     -8.53446  0.00000000
2.  Constant                 -0.004029563  0.105905896     -0.03805  0.96975146
3.  TENDANCE                 -0.000602996  0.002205409     -0.27342  0.78529460
4.  dDTW{1}                   0.376939919  0.106109576      3.55236  0.00066865

valeur de la statistique de Durbin   h=       1.46418

 statistique Q( 17 )=       17.79816   niveau de significativite   0.4017
 stat. modifiee  Q( 17 - 1  17.79816   niveau de significativite   0.3358

   calcul de phi3 avec H0 (a,0,1) :      36.44645

*****modele sans le tendance avec la constante

Linear Regression - Estimation by Least Squares
Dependent Variable dDTW
Quarterly Data From 71:01 To 90:02
Usable Observations     78      Degrees of Freedom    75
Centered R**2     0.521776      R Bar **2   0.509024
Uncentered R**2   0.521790      T x R**2      40.700
Mean of Dependent Variable      -0.003333371
Std Error of Dependent Variable  0.620628575
Standard Error of Estimate       0.434872577
Sum of Squared Residuals        14.183561845
Regression F(2,75)                   40.9152
Significance Level of F            0.00000000
Log Likelihood                      -44.19682
Durbin-Watson Statistic              1.885816

   Variable                      Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  DTW{1}                   -1.209336851  0.140841937     -8.58648  0.00000000
2.  Constant                 -0.029607087  0.049340277     -0.60006  0.55027558
3.  dDTW{1}                   0.376399919  0.105434762      3.56998  0.00062715


 statistique Q( 17 )=       17.37476   niveau de significativite   0.4293
 stat. modifiee Q( 17 - 1 ) 17.37476   niveau de significativite   0.3618

 calcul de phi1 avec H0 (0,0,1) :      36.86528

 ******** sans tendance ni constante

Linear Regression - Estimation by Least Squares
Dependent Variable dDTW
Quarterly Data From 71:01 To 90:02
Usable Observations     78      Degrees of Freedom    76
Centered R**2     0.519480      R Bar **2   0.513158
Uncentered R**2   0.519494      T x R**2      40.521
Mean of Dependent Variable      -0.003333371
Std Error of Dependent Variable  0.620628575
Standard Error of Estimate       0.433037867
Sum of Squared Residuals        14.251656375
Log Likelihood                     -44.38361
Durbin-Watson Statistic              1.882171

   Variable                      Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  DTW{1}                   -1.203957450  0.139963336     -8.60195  0.00000000
2.  dDTW{1}                   0.373493628  0.104879104      3.56118  0.00064110


 statistique Q( 17 )=       17.27353   niveau de significativite   0.4360
 stat. modifiee Q( 17 - 1 ) 17.27353   niveau de significativite   0.3681
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1.2 Intégration de TP

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ETUDE DE L INTEGRATION DE LA SERIE  TP
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********* avec tendance et constante

Linear Regression - Estimation by Least Squares
Dependent Variable dTP
Quarterly Data From 70:03 To 90:02
Usable Observations     80      Degrees of Freedom    77
Centered R**2     0.115346      R Bar **2   0.092367
Uncentered R**2   0.115398      T x R**2       9.232
Mean of Dependent Variable      -0.004234693
Std Error of Dependent Variable  0.551504904
Standard Error of Estimate       0.525417343
Sum of Squared Residuals        21.256880557
Regression F(2,77)                    5.0198
Significance Level of F            0.00892867
Log Likelihood                      -60.50124
Durbin-Watson Statistic              2.303495

   Variable                     Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  TP{1}                   -0.205845743  0.066390345     -3.10054  0.00269852
2.  Constant                 0.606197410  0.212362710      2.85454  0.00553518
3.  TENDANCE                -0.005084464  0.002773166     -1.83345  0.07059999

valeur de la statistique Q       17.50477 niveau de significativite       0.42071
   calcul de phi3 avec H0 (a,0,1) :       5.01982

*****modele sans le tendance avec la constante

Linear Regression - Estimation by Least Squares
Dependent Variable dTP
Quarterly Data From 70:03 To 90:02
Usable Observations     80      Degrees of Freedom    78
Centered R**2     0.076725      R Bar **2   0.064888
Uncentered R**2   0.076780      T x R**2       6.142
Mean of Dependent Variable      -0.004234693
Std Error of Dependent Variable  0.551504904
Standard Error of Estimate       0.533311852
Sum of Squared Residuals        22.184879481
Regression F(1,78)                    6.4818
Significance Level of F            0.01286886
Log Likelihood                      -62.21046
Durbin-Watson Statistic              2.319758

   Variable                     Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  TP{1}                   -0.157379857  0.061815860     -2.54595  0.01286886
2.  Constant                 0.301148070  0.133951269      2.24819  0.02738737

valeur de la statistique Q       17.50477 niveau de signif.       0.42071

 calcul de phi1 avec H0 (0,0,1) :       3.24344

 ******** sans tendance ni constante

Linear Regression - Estimation by Least Squares
Dependent Variable dTP
Quarterly Data From 70:03 To 90:02
Usable Observations     80      Degrees of Freedom    79
Centered R**2     0.016897      R Bar **2   0.016897
Uncentered R**2   0.016956      T x R**2       1.356
Mean of Dependent Variable      -0.004234693
Std Error of Dependent Variable  0.551504904
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Standard Error of Estimate       0.546825700
Sum of Squared Residuals        23.622449387
Log Likelihood                     -64.72192
Durbin-Watson Statistic             2.472581

   Variable                     Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  TP{1}                   -0.032933664  0.028213502     -1.16730  0.24659988

valeur de la statistique Q       20.74232 niveau de signif.       0.23803


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ETUDE DE L INTEGRATION DE LA SERIE  DTP
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********* avec tendance et constante

Linear Regression - Estimation by Least Squares
Dependent Variable dDTP
Quarterly Data From 70:04 To 90:02
Usable Observations     79      Degrees of Freedom    76
Centered R**2     0.633355      R Bar **2   0.623706
Uncentered R**2   0.633369      T x R**2      50.036
Mean of Dependent Variable      0.0054734390
Std Error of Dependent Variable 0.8797453908
Standard Error of Estimate      0.5396602755
Sum of Squared Residuals        22.133724182
Regression F(2,76)                   65.6425
Significance Level of F           0.00000000
Log Likelihood                     -61.83850
Durbin-Watson Statistic             2.098845

   Variable                     Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  DTP{1}                  -1.266820454  0.110562454    -11.45796  0.00000000
2.  Constant                 0.099409075  0.127514549      0.77959  0.43805321
3.  TENDANCE                -0.002448536  0.002671218     -0.91664  0.36223268

valeur de la statistique Q       20.66816 niveau de significativite       0.24149
   calcul de phi3 avec H0 (a,0,1) :      65.64246

*****modele sans le tendance avec la constante

Linear Regression - Estimation by Least Squares
Dependent Variable dDTP
Quarterly Data From 70:04 To 90:02
Usable Observations     79      Degrees of Freedom    77
Centered R**2     0.629301      R Bar **2   0.624487
Uncentered R**2   0.629316      T x R**2      49.716
Mean of Dependent Variable      0.0054734390
Std Error of Dependent Variable 0.8797453908
Standard Error of Estimate      0.5391000790
Sum of Squared Residuals        22.378424925
Regression F(1,77)                  130.7159
Significance Level of F           0.00000000
Log Likelihood                     -62.27280
Durbin-Watson Statistic             2.088964

   Variable                     Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  DTP{1}                  -1.258684114  0.110091170    -11.43311  0.00000000
2.  Constant                -0.003372271  0.060658432     -0.05559  0.95580891

valeur de la statistique Q       20.66816 niveau de signif.       0.24149

 calcul de phi1 avec H0 (0,0,1) :      65.36204

 ******** sans tendance ni constante
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Linear Regression - Estimation by Least Squares
Dependent Variable dDTP
Quarterly Data From 70:04 To 90:02
Usable Observations     79      Degrees of Freedom    78
Centered R**2     0.629287      R Bar **2   0.629287
Uncentered R**2   0.629301      T x R**2      49.715
Mean of Dependent Variable      0.0054734390
Std Error of Dependent Variable 0.8797453908
Standard Error of Estimate      0.5356439114
Sum of Squared Residuals        22.379323183
Log Likelihood                     -62.27438
Durbin-Watson Statistic             2.089008

   Variable                     Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  DTP{1}                  -1.258606048  0.109376478    -11.50710  0.00000000

valeur de la statistique Q       25.03042 niveau de signif.       0.09403
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1.3 Intégration de TCHO

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ETUDE DE L INTEGRATION DE LA SERIE  TCHO
**************************************************
********* avec tendance et constante

Linear Regression - Estimation by Least Squares
Dependent Variable dTCHO
Quarterly Data From 71:03 To 90:02
Usable Observations     76      Degrees of Freedom    69
Centered R**2     0.596224      R Bar **2   0.561113
Uncentered R**2   0.720931      T x R**2      54.791
Mean of Dependent Variable      0.1093370834
Std Error of Dependent Variable 0.1646471113
Standard Error of Estimate      0.1090762742
Sum of Squared Residuals        0.8209367175
Regression F(6,69)                   16.9812
Significance Level of F            0.00000000
Log Likelihood                     64.22629
Durbin-Watson Statistic            1.892735

   Variable                     Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  TCHO{1}                  0.005465408  0.025277147      0.21622  0.82945473
2.  Constant                 0.091404895  0.033860885      2.69942  0.00872810
3.  TENDANCE                -0.001673630  0.003737214     -0.44783  0.65568001
4.  dTCHO{1}                 0.930901055  0.117106752      7.94917  0.00000000
5.  dTCHO{2}                -0.434771579  0.159677971     -2.72280  0.00819032
6.  dTCHO{3}                 0.283818761  0.157982099      1.79652  0.07678810
7.  dTCHO{4}                -0.271329644  0.124587714     -2.17782  0.03284071

valeur de la statistique de Durbin   h=      NA

dans le modele residu en fonction de residu{1} et des variables explicatives du
modele on regarde le t de student de residu{1}      t=       1.19859

 statistique Q( 17 )=       18.49674   niveau de significativite   0.3582
 stat. modifiee  Q( 17 - 4  18.49674   niveau de significativite   0.1396

   calcul de phi3 avec H0 (a,0,1) :       1.12671

*****modele sans le tendance avec la constante
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Linear Regression - Estimation by Least Squares
Dependent Variable dTCHO
Quarterly Data From 71:03 To 90:02
Usable Observations     76      Degrees of Freedom    70
Centered R**2     0.595051      R Bar **2   0.566126
Uncentered R**2   0.720120      T x R**2      54.729
Mean of Dependent Variable      0.1093370834
Std Error of Dependent Variable 0.1646471113
Standard Error of Estimate      0.1084516212
Sum of Squared Residuals        0.8233227905
Regression F(5,70)                   20.5722
Significance Level of F           0.00000000
Log Likelihood                       64.11600
Durbin-Watson Statistic              1.889177

   Variable                     Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  TCHO{1}                  -0.005712704  0.003964300     -1.44104  0.15403259
2.  Constant                  0.086912858  0.032155854      2.70286  0.00862047
3.  dTCHO{1}                  0.938727229  0.115132319      8.15346  0.00000000
4.  dTCHO{2}                 -0.424185329  0.157014126     -2.70157  0.00865071
5.  dTCHO{3}                  0.285694386  0.157022165      1.81945  0.07311873
6.  dTCHO{4}                 -0.251176097  0.115510604     -2.17449  0.03305077


 statistique Q( 17 )=       19.18093   niveau de significativite   0.3182
 stat. modifiee Q( 17 - 4 ) 19.18093   niveau de significativite   0.1176

 calcul de phi1 avec H0 (0,0,1) :       4.91423

 ******** sans tendance ni constante

Linear Regression - Estimation by Least Squares
Dependent Variable dTCHO
Quarterly Data From 71:03 To 90:02
Usable Observations     76      Degrees of Freedom    71
Centered R**2     0.552789      R Bar **2   0.527594
Uncentered R**2   0.690911      T x R**2      52.509
Mean of Dependent Variable      0.1093370834
Std Error of Dependent Variable 0.1646471113
Standard Error of Estimate      0.1131649609
Sum of Squared Residuals        0.9092478952
Log Likelihood                      60.34376
Durbin-Watson Statistic             1.892147

   Variable                     Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  TCHO{1}                   0.003354858  0.002203899      1.52224  0.13239128
2.  dTCHO{1}                  1.012249717  0.116734800      8.67136  0.00000000
3.  dTCHO{2}                 -0.428714042  0.163828678     -2.61684  0.01083658
4.  dTCHO{3}                  0.294394513  0.163811966      1.79715  0.07656459
5.  dTCHO{4}                 -0.199434702  0.118863998     -1.67784  0.09777554


 statistique Q( 17 )=       23.72357   niveau de significativite   0.1271
 stat. modifiee Q( 17 - 4 ) 23.72357   niveau de significativite   0.0338


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************************************************
ETUDE DE L INTEGRATION DE LA SERIE  DTCHO
************************************************
********* avec tendance et constante

Linear Regression - Estimation by Least Squares
Dependent Variable dDTCHO
Quarterly Data From 71:04 To 90:02
Usable Observations     75      Degrees of Freedom    68
Centered R**2     0.314210      R Bar **2   0.253699
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Uncentered R**2   0.314360      T x R**2      23.577
Mean of Dependent Variable      -0.001827521
Std Error of Dependent Variable  0.124362016
Standard Error of Estimate       0.107434761
Sum of Squared Residuals        0.7848714933
Regression F(6,68)                    5.1926
Significance Level of F             0.00018978
Log Likelihood                        64.56924
Durbin-Watson Statistic               1.975335

   Variable                     Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  DTCHO{1}                -0.373359714  0.120374147     -3.10166  0.00280116
2.  Constant                 0.075969520  0.035101697      2.16427  0.03395872
3.  TENDANCE                -0.000812583  0.000596828     -1.36150  0.17784855
4.  dDTCHO{1}                0.361263502  0.122905471      2.93936  0.00448938
5.  dDTCHO{2}               -0.129422632  0.129956135     -0.99589  0.32283202
6.  dDTCHO{3}                0.247208829  0.115057473      2.14857  0.03523276
7.  dDTCHO{4}               -0.209363465  0.119394458     -1.75354  0.08401480

valeur de la statistique de Durbin   h=      NA

dans le modele residu en fonction de residu{1} et des variables explicatives du
modele on regarde le t de student de residu{1}      t=       0.16199

 statistique Q( 17 )=       14.35728   niveau de significativite   0.6417
 stat. modifiee  Q( 17 - 4  14.35728   niveau de significativite   0.3492

   calcul de phi3 avec H0 (a,0,1) :       4.96087

*****modele sans le tendance avec la constante

Linear Regression - Estimation by Least Squares
Dependent Variable dDTCHO
Quarterly Data From 71:04 To 90:02
Usable Observations     75      Degrees of Freedom    69
Centered R**2     0.295515      R Bar **2   0.244465
Uncentered R**2   0.295669      T x R**2      22.175
Mean of Dependent Variable      -0.001827521
Std Error of Dependent Variable  0.124362016
Standard Error of Estimate       0.108097330
Sum of Squared Residuals        0.8062672605
Regression F(5,69)                    5.7888
Significance Level of F             0.00016093
Log Likelihood                        63.56066
Durbin-Watson Statistic               1.974268

   Variable                     Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  DTCHO{1}                -0.329365071  0.116671099     -2.82302  0.00621152
2.  Constant                 0.035171846  0.018394420      1.91209  0.06001686
3.  dDTCHO{1}                0.344134023  0.123013828      2.79752  0.00666832
4.  dDTCHO{2}               -0.150680077  0.129810482     -1.16077  0.24973581
5.  dDTCHO{3}                0.234594434  0.115391106      2.03304  0.04589792
6.  dDTCHO{4}               -0.225250198  0.119555705     -1.88406  0.06377036


 statistique Q( 17 )=       15.21652   niveau de significativite   0.5799
 stat. modifiee Q( 17 - 4 ) 15.21652   niveau de significativite   0.2940

 calcul de phi1 avec H0 (0,0,1) :       4.01264

 ******** sans tendance ni constante

Linear Regression - Estimation by Least Squares
Dependent Variable dDTCHO
Quarterly Data From 71:04 To 90:02
Usable Observations     75      Degrees of Freedom    70
Centered R**2     0.258186      R Bar **2   0.215797
Uncentered R**2   0.258349      T x R**2      19.376
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```
Mean of Dependent Variable      -0.001827521
Std Error of Dependent Variable  0.124362016
Standard Error of Estimate       0.110129075
Sum of Squared Residuals        0.8489889138
Log Likelihood                      61.62451
Durbin-Watson Statistic             2.013245

   Variable                     Coeff       Std Error      T-Stat     Signif
********************************************************************************
1.  DTCHO{1}                -0.165586982  0.080707436     -2.05169  0.04394207
2.  dDTCHO{1}                0.252353430  0.115391336      2.18694  0.03209085
3.  dDTCHO{2}               -0.257865549  0.119283584     -2.16179  0.03405565
4.  dDTCHO{3}                0.169233616  0.112283280      1.50720  0.13625878
5.  dDTCHO{4}               -0.307755709  0.113593202     -2.70928  0.00847127


 statistique Q( 17 )=       17.09021   niveau de significativite   0.4483
 stat. modifiee Q( 17 - 4 ) 17.09021   niveau de significativite   0.1952
```

1.4 Intégration de TSMIC

```
                TEST UTILISANT LA PROCEDURE DFAUTOAIC.SRC

**************************************************
ETUDE DE L INTEGRATION DE LA SERIE  TSMIC
**************************************************
********* avec tendance et constante

Linear Regression - Estimation by Least Squares
Dependent Variable dTSMIC
Quarterly Data From 71:01 To 90:02
Usable Observations     78      Degrees of Freedom    73
Centered R**2     0.448809      R Bar **2   0.418607
Uncentered R**2   0.448813      T x R**2      35.007
Mean of Dependent Variable      0.0038833151
Std Error of Dependent Variable 1.5179202018
Standard Error of Estimate      1.1574009430
Sum of Squared Residuals        97.789116830
Regression F(4,73)                   14.8601
Significance Level of F            0.00000001
Log Likelihood                     -119.49528
Durbin-Watson Statistic              1.876511

   Variable                     Coeff       Std Error      T-Stat     Signif
********************************************************************************
1.  TSMIC{1}                -0.398098104  0.121629260     -3.27305  0.00162726
2.  Constant                 2.069315696  0.619639589      3.33955  0.00132414
3.  TENDANCE                -0.022287650  0.007604334     -2.93091  0.00450945
4.  dTSMIC{1}               -0.399604855  0.121926206     -3.27743  0.00160541
5.  dTSMIC{2}               -0.340157872  0.103972177     -3.27162  0.00163440

valeur de la statistique de Durbin   h=      NA

dans le modele residu en fonction de residu{1} et des variables explicatives du
modele on regarde le t de student de residu{1}      t=       0.59706

 statistique Q( 17 )=       22.27711   niveau de significativite   0.1743
 stat. modifiee  Q( 17 - 2  22.27711   niveau de significativite   0.1007

   calcul de phi3 avec H0 (a,0,1) :       5.95051

*****modele sans le tendance avec la constante

Linear Regression - Estimation by Least Squares
Dependent Variable dTSMIC
Quarterly Data From 71:01 To 90:02
Usable Observations     78      Degrees of Freedom    74
```

```
Centered R**2     0.383948      R Bar **2   0.358973
Uncentered R**2   0.383952      T x R**2      29.948
Mean of Dependent Variable      0.0038833151
Std Error of Dependent Variable 1.5179202018
Standard Error of Estimate      1.2153101486
Sum of Squared Residuals        109.29642805
Regression F(3,74)                   15.3732
Significance Level of F           0.00000007
Log Likelihood                    -123.83405
Durbin-Watson Statistic             1.880410

   Variable                     Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  TSMIC{1}                -0.170158171  0.098195617     -1.73285  0.08728819
2.  Constant                 0.474591706  0.311319290      1.52445  0.13165811
3.  dTSMIC{1}               -0.518719195  0.120705191     -4.29741  0.00005189
4.  dTSMIC{2}               -0.398338015  0.107166078     -3.71702  0.00038921


 statistique Q( 17 )=       21.09380   niveau de significativite   0.2221
 stat. modifiee Q( 17 - 2 ) 21.09380   niveau de significativite   0.1339

 calcul de phi1 avec H0 (0,0,1) :       1.50367

 ******** sans tendance ni constante

Linear Regression - Estimation by Least Squares
Dependent Variable dTSMIC
Quarterly Data From 71:01 To 90:02
Usable Observations     78      Degrees of Freedom    75
Centered R**2     0.364601      R Bar **2   0.347657
Uncentered R**2   0.364605      T x R**2      28.439
Mean of Dependent Variable      0.0038833151
Std Error of Dependent Variable 1.5179202018
Standard Error of Estimate      1.2259900176
Sum of Squared Residuals        112.72886425
Log Likelihood                    -125.04000
Durbin-Watson Statistic             1.908801

   Variable                     Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  TSMIC{1}                -0.035885409  0.043791358     -0.81946  0.41511867
2.  dTSMIC{1}               -0.608790934  0.106180609     -5.73354  0.00000019
3.  dTSMIC{2}               -0.448698607  0.102843155     -4.36294  0.00004039


 statistique Q( 17 )=       22.92675   niveau de significativite   0.1517
 stat. modifiee Q( 17 - 2 ) 22.92675   niveau de significativite   0.0857


                  TEST UTILISANT LA PROCEDURE DFAUTOAIC.SRC

**************************************************
ETUDE DE L INTEGRATION DE LA SERIE  DTSMIC
**************************************************
********* avec tendance et constante

Linear Regression - Estimation by Least Squares
Dependent Variable dDTSMIC
Quarterly Data From 71:01 To 90:02
Usable Observations     78      Degrees of Freedom    74
Centered R**2     0.778179      R Bar **2   0.769187
Uncentered R**2   0.778183      T x R**2      60.698
Mean of Dependent Variable      0.0105381604
Std Error of Dependent Variable 2.5623206456
Standard Error of Estimate      1.2310167889
Sum of Squared Residuals        112.13977275
Regression F(3,74)                   86.5343
Significance Level of F           0.00000000
Log Likelihood                    -124.83566
```

```
Durbin-Watson Statistic             1.926302

   Variable                      Coeff       Std Error      T-Stat     Signif
********************************************************************************
1.  DTSMIC{1}                -2.109211568  0.174168121    -12.11020  0.00000000
2.  Constant                  0.261355906  0.298627237      0.87519  0.38430178
3.  TENDANCE                 -0.006373169  0.006218592     -1.02486  0.30876915
4.  dDTSMIC{1}                0.468011893  0.102483785      4.56669  0.00001936

valeur de la statistique de Durbin   h=       0.76544

 statistique Q( 17 )=       25.38311   niveau de significativite   0.0865
 stat. modifiee  Q( 17 - 1  25.38311   niveau de significativite   0.0634

   calcul de phi3 avec H0 (a,0,1) :      73.33346

*****modele sans le tendance avec la constante

Linear Regression - Estimation by Least Squares
Dependent Variable dDTSMIC
Quarterly Data From 71:01 To 90:02
Usable Observations     78      Degrees of Freedom    75
Centered R**2     0.775031      R Bar **2   0.769032
Uncentered R**2   0.775035      T x R**2      60.453
Mean of Dependent Variable      0.0105381604
Std Error of Dependent Variable 2.5623206456
Standard Error of Estimate      1.2314297857
Sum of Squared Residuals        113.73144879
Regression F(2,75)                  129.1895
Significance Level of F           0.00000000
Log Likelihood                    -125.38532
Durbin-Watson Statistic             1.917478

   Variable                      Coeff       Std Error      T-Stat     Signif
********************************************************************************
1.  DTSMIC{1}                -2.092648351  0.173474848    -12.06312  0.00000000
2.  Constant                 -0.009300291  0.139452099     -0.06669  0.94700465
3.  dDTSMIC{1}                0.460743820  0.102272418      4.50506  0.00002396


 statistique Q( 17 )=       23.46048   niveau de significativite   0.1349
 stat. modifiee Q( 17 - 1 ) 23.46048   niveau de significativite   0.1020

 calcul de phi1 avec H0 (0,0,1) :      72.76780

 ******** sans tendance ni constante

Linear Regression - Estimation by Least Squares
Dependent Variable dDTSMIC
Quarterly Data From 71:01 To 90:02
Usable Observations     78      Degrees of Freedom    76
Centered R**2     0.775018      R Bar **2   0.772057
Uncentered R**2   0.775021      T x R**2      60.452
Mean of Dependent Variable      0.0105381604
Std Error of Dependent Variable 2.5623206456
Standard Error of Estimate      1.2233377201
Sum of Squared Residuals        113.73819348
Log Likelihood                    -125.38763
Durbin-Watson Statistic             1.917505

   Variable                      Coeff       Std Error      T-Stat     Signif
********************************************************************************
1.  DTSMIC{1}                -2.092460602  0.172312202    -12.14343  0.00000000
2.  dDTSMIC{1}                0.460631933  0.101586686      4.53437  0.00002118


 statistique Q( 17 )=       23.45643   niveau de significativite   0.1350
 stat. modifiee Q( 17 - 1 ) 23.45643   niveau de significativite   0.1021
```

2 Exercice V-2

Toujours sur le même modèle
Etudier la cointégration entre les 4 séries

```
Linear Regression - Estimation by Least Squares
Dependent Variable TW
Quarterly Data From 71:01 To 90:02
Usable Observations     78      Degrees of Freedom    73
Centered R**2     0.898940      R Bar **2   0.893402
Uncentered R**2   0.983631      T x R**2      76.723
Mean of Dependent Variable      2.7127431308
Std Error of Dependent Variable 1.2003302451
Standard Error of Estimate      0.3918991649
Sum of Squared Residuals        11.211701746
Regression F(4,73)                  162.3358
Significance Level of F           0.00000000
Log Likelihood                     -35.02692
Durbin-Watson Statistic              1.531488

   Variable                     Coeff       Std Error      T-Stat     Signif
********************************************************************************
1.  Constant                 2.028374490  0.202618992     10.01078  0.00000000
2.  TCHO                    -0.142141667  0.017619065     -8.06749  0.00000000
3.  TP                       0.585284028  0.068695111      8.52002  0.00000000
4.  TSMIC                    0.154295514  0.044394795      3.47553  0.00086199
5.  DU821                    1.970459744  0.401775623      4.90438  0.00000551
```

On note RES les résidus de ce modèle et RESIDUS = RES+constant+1,970*DU821, RESIDUS représente tout ce qui doit être I(0) dans le modèle.
On étudie l'intégration de cette série RESIDUS.

```
                  TEST UTILISANT LA PROCEDURE DFAUTOAIC.SRC

**************************************************
ETUDE DE L INTEGRATION DE LA SERIE  RESIDUS
**************************************************
********* avec tendance et constante

Linear Regression - Estimation by Least Squares
Dependent Variable dRESIDUS
Quarterly Data From 71:03 To 90:02
Usable Observations     76      Degrees of Freedom    72
Centered R**2     0.342806      R Bar **2   0.315423
Uncentered R**2   0.342995      T x R**2      26.068
Mean of Dependent Variable      0.0084139118
Std Error of Dependent Variable 0.4994097701
Standard Error of Estimate      0.4132073658
Sum of Squared Residuals        12.293303557
Regression F(3,72)                   12.5189
Significance Level of F            0.00000112
Log Likelihood                     -38.61554
Durbin-Watson Statistic              2.036135

   Variable                     Coeff       Std Error      T-Stat     Signif
********************************************************************************
1.  RESIDUS{1}               -0.736821333  0.128793671     -5.72094  0.00000023
2.  Constant                  1.543745518  0.283734941      5.44080  0.00000069
3.  TENDANCE                 -0.000486168  0.002160736     -0.22500  0.82261566
4.  dRESIDUS{1}               0.160490997  0.114906534      1.39671  0.16679165

valeur de la statistique de Durbin   h=      NA

dans le modele residu en fonction de residu{1} et des variables explicatives du
modele on regarde le t de student de residu{1}      t=      -0.23366
```

```
 statistique Q( 17 )=       12.67608   niveau de significativite   0.7576
 stat. modifiee  Q( 17 - 1  12.67608   niveau de significativite   0.6963

   calcul de phi3 avec H0 (a,0,1) :      16.40542

*****modele sans le tendance avec la constante

Linear Regression - Estimation by Least Squares
Dependent Variable dRESIDUS
Quarterly Data From 71:03 To 90:02
Usable Observations     76      Degrees of Freedom    73
Centered R**2     0.342344      R Bar **2   0.324326
Uncentered R**2   0.342533      T x R**2      26.033
Mean of Dependent Variable      0.0084139118
Std Error of Dependent Variable 0.4994097701
Standard Error of Estimate      0.4105116651
Sum of Squared Residuals        12.301947383
Regression F(2,73)                   19.0002
Significance Level of F           0.00000023
Log Likelihood                     -38.64225
Durbin-Watson Statistic             2.034527

   Variable                     Coeff       Std Error      T-Stat     Signif
********************************************************************************
1.  RESIDUS{1}               -0.737128964  0.127946231     -5.76124  0.00000019
2.  Constant                  1.523228639  0.266930423      5.70646  0.00000023
3.  dRESIDUS{1}               0.160699668  0.114153184      1.40775  0.16344794


 statistique Q( 17 )=       12.18732   niveau de significativite   0.7887
 stat. modifiee Q( 17 - 1 ) 12.18732   niveau de significativite   0.7310

 calcul de phi1 avec H0 (0,0,1) :      16.61629

 ******** sans tendance ni constante

Linear Regression - Estimation by Least Squares
Dependent Variable dRESIDUS
Quarterly Data From 71:03 To 90:02
Usable Observations     76      Degrees of Freedom    74
Centered R**2     0.048978      R Bar **2   0.036127
Uncentered R**2   0.049252      T x R**2       3.743
Mean of Dependent Variable      0.0084139118
Std Error of Dependent Variable 0.4994097701
Standard Error of Estimate      0.4903057546
Sum of Squared Residuals        17.789580240
Log Likelihood                    -52.65875
Durbin-Watson Statistic             2.084536

   Variable                     Coeff       Std Error      T-Stat     Signif
********************************************************************************
1.  RESIDUS{1}               -0.018460285  0.026959610     -0.68474  0.49564803
2.  dRESIDUS{1}              -0.197208103  0.113918702     -1.73113  0.08759616


 statistique Q( 17 )=       21.92302   niveau de significativite   0.1877
 stat. modifiee Q( 17 - 1 ) 21.92302   niveau de significativite   0.1457
```

3 Exercice V-3

Toujours sur le même modèle
Etudier la cointégration entre TW et TCHO

```
Linear Regression - Estimation by Least Squares
Dependent Variable TW
```

```
Quarterly Data From 71:01 To 90:02
Usable Observations     78      Degrees of Freedom    75
Centered R**2     0.608131      R Bar **2   0.597681
Uncentered R**2   0.936528      T x R**2      73.049
Mean of Dependent Variable      2.7127431308
Std Error of Dependent Variable 1.2003302451
Standard Error of Estimate      0.7613528934
Sum of Squared Residuals        43.474367117
Regression F(2,75)                   58.1952
Significance Level of F           0.00000000
Log Likelihood                     -87.88025
Durbin-Watson Statistic             0.488250

   Variable                     Coeff       Std Error      T-Stat     Signif
********************************************************************************
1.  Constant                 4.474930275  0.194930839     22.95650  0.00000000
2.  TCHO                    -0.276800196  0.026927377    -10.27951  0.00000000
3.  DU821                    2.974310208  0.767615674      3.87474  0.00022668


**************************************************
ETUDE DE L INTEGRATION DE LA SERIE  RESIDUS =RES+4.4749+2,974*DU821
**************************************************
********* avec tendance et constante

Linear Regression - Estimation by Least Squares
Dependent Variable dRESIDUS
Quarterly Data From 71:04 To 90:02
Usable Observations     75      Degrees of Freedom    70
Centered R**2     0.242119      R Bar **2   0.198811
Uncentered R**2   0.243119      T x R**2      18.234
Mean of Dependent Variable      0.0168119134
Std Error of Dependent Variable 0.4657092179
Standard Error of Estimate      0.4168522891
Sum of Squared Residuals        12.163608165
Regression F(4,70)                   5.5907
Significance Level of F           0.00057886
Log Likelihood                     -38.20641
Durbin-Watson Statistic             1.921392

   Variable                     Coeff       Std Error      T-Stat     Signif
********************************************************************************
1.  RESIDUS{1}              -0.168080192  0.065360281     -2.57160  0.01224900
2.  Constant                 0.891235301  0.320493340      2.78082  0.00696041
3.  TENDANCE                -0.002493612  0.002240946     -1.11275  0.26962269
4.  dRESIDUS{1}              0.215029768  0.107941075      1.99210  0.05026141
5.  dRESIDUS{2}             -0.292567930  0.109877000     -2.66269  0.00961046

valeur de la statistique de Durbin   h=       0.95834

 statistique Q( 17 )=       12.02062   niveau de significativite   0.7989
 stat. modifiee  Q( 17 - 2  12.02062   niveau de significativite   0.6775

   calcul de phi3 avec H0 (a,0,1) :       3.80777

*****modele sans le tendance avec la constante

Linear Regression - Estimation by Least Squares
Dependent Variable dRESIDUS
Quarterly Data From 71:04 To 90:02
Usable Observations     75      Degrees of Freedom    71
Centered R**2     0.228713      R Bar **2   0.196123
Uncentered R**2   0.229730      T x R**2      17.230
Mean of Dependent Variable      0.0168119134
Std Error of Dependent Variable 0.4657092179
Standard Error of Estimate      0.4175509941
Sum of Squared Residuals        12.378767117
Regression F(3,71)                   7.0180
Significance Level of F           0.00033634
Log Likelihood                     -38.86394
```

```
Durbin-Watson Statistic             1.916220

   Variable                      Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  RESIDUS{1}               -0.164898638  0.065407162     -2.52111  0.01394572
2.  Constant                  0.766843937  0.300869178      2.54876  0.01297387
3.  dRESIDUS{1}               0.225925894  0.107676183      2.09820  0.03944699
4.  dRESIDUS{2}              -0.289194299  0.110019264     -2.62858  0.01050226


 statistique Q( 17 )=       11.10798   niveau de significativite   0.8509
 stat. modifiee Q( 17 - 2 ) 11.10798   niveau de significativite   0.7449

 calcul de phi1 avec H0 (0,0,1) :       3.24865

 ******** sans tendance ni constante

Linear Regression - Estimation by Least Squares
Dependent Variable dRESIDUS
Quarterly Data From 71:04 To 90:02
Usable Observations     75      Degrees of Freedom    72
Centered R**2     0.158144      R Bar **2   0.134759
Uncentered R**2   0.159254      T x R**2      11.944
Mean of Dependent Variable      0.0168119134
Std Error of Dependent Variable 0.4657092179
Standard Error of Estimate      0.4331950082
Sum of Squared Residuals        13.511369889
Log Likelihood                     -42.14702
Durbin-Watson Statistic             1.939634

   Variable                      Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  RESIDUS{1}               -0.000348662  0.010881382     -0.03204  0.97452716
2.  dRESIDUS{1}               0.168326085  0.109222271      1.54113  0.12766816
3.  dRESIDUS{2}              -0.379175408  0.108105148     -3.50747  0.00078348


 statistique Q( 17 )=       13.15625   niveau de significativite   0.7257
 stat. modifiee Q( 17 - 2 ) 13.15625   niveau de significativite   0.5902
```