```
--------------------------------------------------------------------------------
---------
       log:
C:\Documenti\TOMMASO\lezioni\bocconi\econometria\esercitazione_emp_3\Lezione
> _info_3.log
  log type:  text
 opened on:   4 Dec 2008, 10:55:25

.
.
. /* 2.   Un primo sguardo ai dati e stima della funzione di domanda di gelato
*/
.
. use icecream, clear

. des

Contains data from icecream.dta
  obs:            30
 vars:             5                          28 Nov 2008 13:09
 size:           720 (99.9% of memory free)
--------------------------------------------------------------------------------
---------
              storage  display     value
variable name   type   format      label      variable label
--------------------------------------------------------------------------------
---------
time            float  %9.0g
cons            float  %9.0g                  consumption of ice cream per head
(in
                                                pints)
price           float  %9.0g                  price of ice cream (per pint)
income          float  %9.0g                  average family income per week (in
US $)
temp            float  %9.0g                  average temperature (in
Fahrenheit)
--------------------------------------------------------------------------------
---------
Sorted by:

. sum

    Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
        time |        30        15.5    8.803408          1         30
        cons |        30    .3594333    .0657905       .256       .548
       price |        30       .2753    .0083425        .26       .292
      income |        30        84.6     6.24555         76         96
        temp |        30        49.1    16.42192         24         72

. tsset time
        time variable:  time, 1 to 30
                delta:  1 unit

. reg cons price income

      Source |       SS       df       MS              Number of obs =      30
-------------+------------------------------           F(  2,    27) =    0.98
       Model |  .008509865     2  .004254932           Prob > F      =  0.3876
    Residual |  .117013493    27  .004333833           R-squared     =  0.0678
-------------+------------------------------           Adj R-squared = -0.0013
       Total |  .125523358    29  .004328392           Root MSE      =  .06583
```

```
------------------------------------------------------------------------------
        cons |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       price |  -2.030037   1.473893    -1.38   0.180    -5.054216     .994143
      income |   .0002135   .0019687     0.11   0.914     -.003826     .004253
       _cons |   .9002396   .4550343     1.98   0.058    -.0334136    1.833893
------------------------------------------------------------------------------

.
.
. /* 3.   Test di autocorrelazione */
.
. predict consf
(option xb assumed; fitted values)

. predict resid, resid

. gen resid_1=l1.resid
(1 missing value generated)

. twoway (scatter cons time) (line consf time)

. twoway (scatter resid time)

. twoway (scatter resid resid_1) (lfit resid resid_1)

. estat dwatson

Durbin-Watson d-statistic(  3,    30) =  .4235142

. estat bgodfrey, lags(1)

Breusch-Godfrey LM test for autocorrelation
---------------------------------------------------------------------------
    lags(p)  |          chi2               df                 Prob > chi2
-------------+-------------------------------------------------------------
       1     |         18.468               1                   0.0000
---------------------------------------------------------------------------
                        H0: no serial correlation

. reg resid price income resid_1

      Source |       SS       df       MS              Number of obs =      29
-------------+------------------------------           F(  3,    25) =   13.61
       Model |   .07239423     3   .02413141           Prob > F      =  0.0000
    Residual |  .044312629    25  .001772505           R-squared     =  0.6203
-------------+------------------------------           Adj R-squared =  0.5747
       Total |  .116706859    28  .004168102           Root MSE      =   .0421

------------------------------------------------------------------------------
       resid |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       price |   .5536632   .9558221     0.58   0.568    -1.414889    2.522216
      income |   .0016279   .0013107     1.24   0.226    -.0010716    .0043274
     resid_1 |   .9044749   .1415458     6.39   0.000     .6129558    1.195994
       _cons |  -.2863295   .3005063    -0.95   0.350    -.9052337    .3325748
------------------------------------------------------------------------------

.
.
. /* 4.   Correzione della specificazione */
.
. gen temp100=temp/100
```

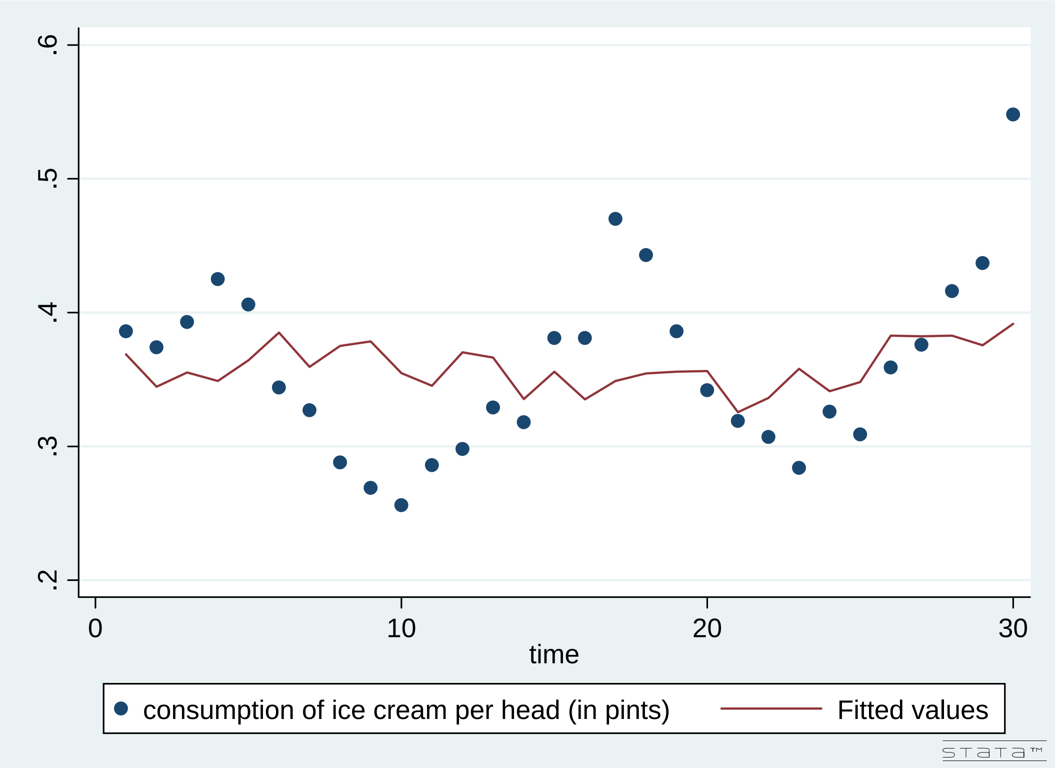
```
. twoway (connected cons price temp100 time)

. reg cons price income temp

      Source |       SS       df       MS              Number of obs =      30
-------------+------------------------------           F(  3,    26) =   22.17
       Model |  .090250523     3  .030083508           Prob > F      =  0.0000
    Residual |  .035272835    26  .001356647           R-squared     =  0.7190
-------------+------------------------------           Adj R-squared =  0.6866
       Total |  .125523358    29  .004328392           Root MSE      =  .03683

------------------------------------------------------------------------------
        cons |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       price |  -1.044413    .834357    -1.25   0.222    -2.759458    .6706322
      income |   .0033078   .0011714     2.82   0.009     .0008999    .0057156
        temp |   .0034584   .0004455     7.76   0.000     .0025426    .0043743
       _cons |   .1973149   .2702161     0.73   0.472    -.3581223     .752752
------------------------------------------------------------------------------

. corr price income temp
(obs=30)

             |    price   income     temp
-------------+---------------------------
       price |   1.0000
      income |  -0.1075   1.0000
        temp |  -0.1082  -0.3247   1.0000


. drop consf resid resid_1

. predict consf
(option xb assumed; fitted values)

. predict resid, resid

. gen resid_1=l1.resid
(1 missing value generated)

. twoway (scatter cons time) (line consf time)

. twoway (scatter resid time)

. twoway (scatter resid resid_1) (lfit resid resid_1)

. estat dwatson

Durbin-Watson d-statistic(  4,    30) =  1.021169

. estat bgodfrey, lags(1)

Breusch-Godfrey LM test for autocorrelation
---------------------------------------------------------------------------
    lags(p)  |          chi2               df                 Prob > chi2
-------------+-------------------------------------------------------------
       1     |          4.237               1                   0.0396
---------------------------------------------------------------------------
                        H0: no serial correlation

. reg resid price income temp resid_1
```

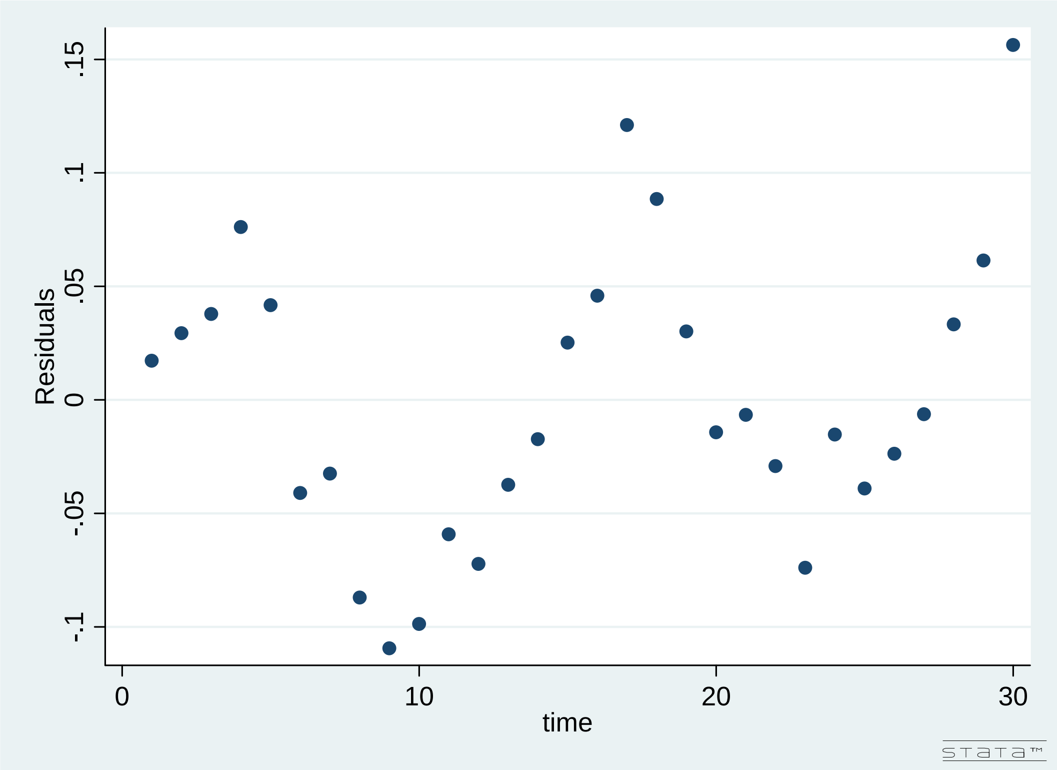
```
      Source |       SS       df       MS              Number of obs =      29
-------------+------------------------------           F(  4,    24) =    1.16
       Model |  .004878776     4  .001219694           Prob > F      =  0.3523
    Residual |  .025197461    24  .001049894           R-squared     =  0.1622
-------------+------------------------------           Adj R-squared =  0.0226
       Total |  .030076237    28  .001074151           Root MSE      =   .0324

------------------------------------------------------------------------------
       resid |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       price |   .1513481   .7495091     0.20   0.842    -1.395563    1.698259
      income |   .0005283   .0010725     0.49   0.627    -.0016853    .0027418
        temp |  -.0000161   .0004118    -0.04   0.969     -.000866    .0008338
     resid_1 |   .3998496   .1970353     2.03   0.054    -.0068114    .8065105
       _cons |  -.0870681    .248713    -0.35   0.729    -.6003866    .4262503
------------------------------------------------------------------------------

.
.
. /* 5.   Stima FGLS o nuova specificazione dinamica del modello */
.
. prais cons price income temp, corc

Iteration 0:  rho = 0.0000
Iteration 1:  rho = 0.4006
Iteration 2:  rho = 0.4008
Iteration 3:  rho = 0.4009
Iteration 4:  rho = 0.4009
Iteration 5:  rho = 0.4009
Iteration 6:  rho = 0.4009
Iteration 7:  rho = 0.4009

Cochrane-Orcutt AR(1) regression -- iterated estimates

      Source |       SS       df       MS              Number of obs =      29
-------------+------------------------------           F(  3,    25) =   15.40
       Model |  .047040596     3  .015680199           Prob > F      =  0.0000
    Residual |  .025451894    25  .001018076           R-squared     =  0.6489
-------------+------------------------------           Adj R-squared =  0.6068
       Total |  .072492491    28  .002589018           Root MSE      =  .03191

------------------------------------------------------------------------------
        cons |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       price |  -.8923963   .8108501    -1.10   0.282    -2.562373    .7775807
      income |   .0032027   .0015461     2.07   0.049     .0000186    .0063869
        temp |   .0035584   .0005547     6.42   0.000      .002416    .0047008
       _cons |   .1571479   .2896292     0.54   0.592    -.4393546    .7536504
-------------+----------------------------------------------------------------
         rho |   .4009256
------------------------------------------------------------------------------
Durbin-Watson statistic (original)    1.021169
Durbin-Watson statistic (transformed) 1.548837

. prais cons price income temp

Iteration 0:  rho = 0.0000
Iteration 1:  rho = 0.4006
Iteration 2:  rho = 0.4982
Iteration 3:  rho = 0.5553
Iteration 4:  rho = 0.5972
Iteration 5:  rho = 0.6315
Iteration 6:  rho = 0.6610
```

```
Iteration 7:  rho = 0.6867
Iteration 8:  rho = 0.7092
Iteration 9:  rho = 0.7286
Iteration 10:  rho = 0.7448
Iteration 11:  rho = 0.7581
Iteration 12:  rho = 0.7686
Iteration 13:  rho = 0.7768
Iteration 14:  rho = 0.7830
Iteration 15:  rho = 0.7877
Iteration 16:  rho = 0.7911
Iteration 17:  rho = 0.7936
Iteration 18:  rho = 0.7955
Iteration 19:  rho = 0.7968
Iteration 20:  rho = 0.7978
Iteration 21:  rho = 0.7985
Iteration 22:  rho = 0.7990
Iteration 23:  rho = 0.7993
Iteration 24:  rho = 0.7996
Iteration 25:  rho = 0.7998
Iteration 26:  rho = 0.7999
Iteration 27:  rho = 0.8000
Iteration 28:  rho = 0.8001
Iteration 29:  rho = 0.8001
Iteration 30:  rho = 0.8001
Iteration 31:  rho = 0.8002
Iteration 32:  rho = 0.8002
Iteration 33:  rho = 0.8002
Iteration 34:  rho = 0.8002
Iteration 35:  rho = 0.8002
Iteration 36:  rho = 0.8002
Iteration 37:  rho = 0.8002
Iteration 38:  rho = 0.8002
Iteration 39:  rho = 0.8002
Iteration 40:  rho = 0.8002
Iteration 41:  rho = 0.8002

Prais-Winsten AR(1) regression -- iterated estimates

      Source |       SS       df       MS              Number of obs =      30
-------------+------------------------------           F(  3,    26) =   14.35
       Model |   .04494596     3  .014981987           Prob > F      =  0.0000
    Residual |  .027154354    26  .001044398           R-squared     =  0.6234
-------------+------------------------------           Adj R-squared =  0.5799
       Total |  .072100315    29  .002486218           Root MSE      =  .03232

------------------------------------------------------------------------------
        cons |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       price |  -1.048854    .759751    -1.38   0.179    -2.610545    .5128361
      income |  -.0008022   .0020458    -0.39   0.698    -.0050074    .0034029
        temp |   .0029541   .0007109     4.16   0.000     .0014929    .0044152
       _cons |   .5870049   .2952699     1.99   0.057    -.0199311    1.193941
-------------+----------------------------------------------------------------
         rho |   .8002264
------------------------------------------------------------------------------
Durbin-Watson statistic (original)    1.021169
Durbin-Watson statistic (transformed) 1.846795

.
. reg cons price income temp l1.temp

      Source |       SS       df       MS              Number of obs =      29
-------------+------------------------------           F(  4,    24) =   28.98
```

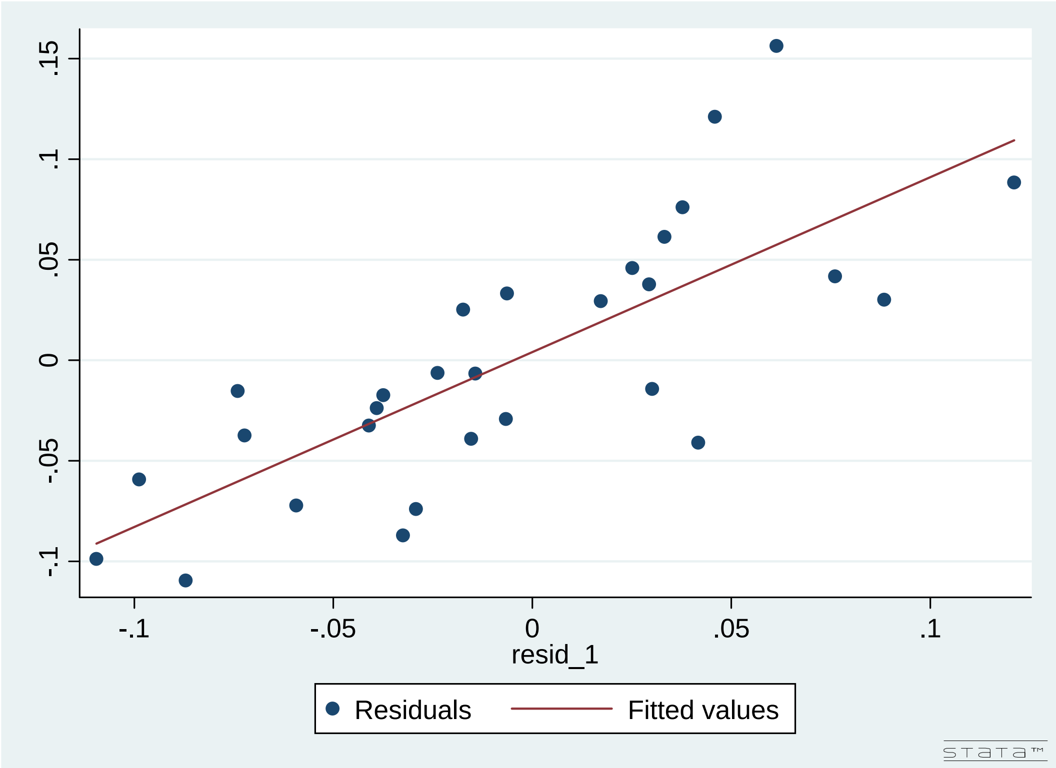
```
       Model |  .103387183     4  .025846796           Prob > F      =  0.0000
    Residual |  .021406049    24  .000891919           R-squared     =  0.8285
-------------+------------------------------           Adj R-squared =  0.7999
       Total |  .124793232    28  .004456901           Root MSE      =  .02987

------------------------------------------------------------------------------
        cons |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       price |  -.8383021   .6880205    -1.22   0.235    -2.258307    .5817025
      income |   .0028673   .0010533     2.72   0.012     .0006934    .0050413
        temp |
         --. |   .0053321   .0006704     7.95   0.000     .0039484    .0067158
         L1. |  -.0022039   .0007307    -3.02   0.006    -.0037119   -.0006959
       _cons |   .1894822   .2323169     0.82   0.423    -.2899963    .6689607
------------------------------------------------------------------------------

. estat dwatson

Durbin-Watson d-statistic(  5,    29) =  1.582166

. estat bgodfrey, lags(1)

Breusch-Godfrey LM test for autocorrelation
---------------------------------------------------------------------------
    lags(p)  |          chi2               df                 Prob > chi2
-------------+-------------------------------------------------------------
       1     |          0.120               1                   0.7292
---------------------------------------------------------------------------
                        H0: no serial correlation

. reg resid price income temp l1.temp resid_1

      Source |       SS       df       MS              Number of obs =      29
-------------+------------------------------           F(  5,    23) =    1.89
       Model |  .008746675     5  .001749335           Prob > F      =  0.1359
    Residual |  .021329562    23  .000927372           R-squared     =  0.2908
-------------+------------------------------           Adj R-squared =  0.1366
       Total |  .030076237    28  .001074151           Root MSE      =  .03045

------------------------------------------------------------------------------
       resid |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       price |   .1872213   .7046382     0.27   0.793    -1.270434    1.644876
      income |   -.000372   .0011002    -0.34   0.738    -.0026479    .0019039
        temp |
         --. |   .0016955   .0009231     1.84   0.079    -.0002141    .0036051
         L1. |  -.0020176   .0009879    -2.04   0.053    -.0040613    .0000261
     resid_1 |     .07052   .2455531     0.29   0.777    -.4374453    .5784853
       _cons |  -.0084534    .236899    -0.04   0.972    -.4985164    .4816096
------------------------------------------------------------------------------

.
.
. /* 6.   Operazioni di chiusura */
.
. save icecream_new.dta,replace
file icecream_new.dta saved

. log close
       log:
C:\Documenti\TOMMASO\lezioni\bocconi\econometria\esercitazione_emp_3\Lezione
> _info_3.log
  log type:  text
```

 closed on: 4 Dec 2008, 10:55:48
```
--------------------------------------------------------------------------------
---------
```

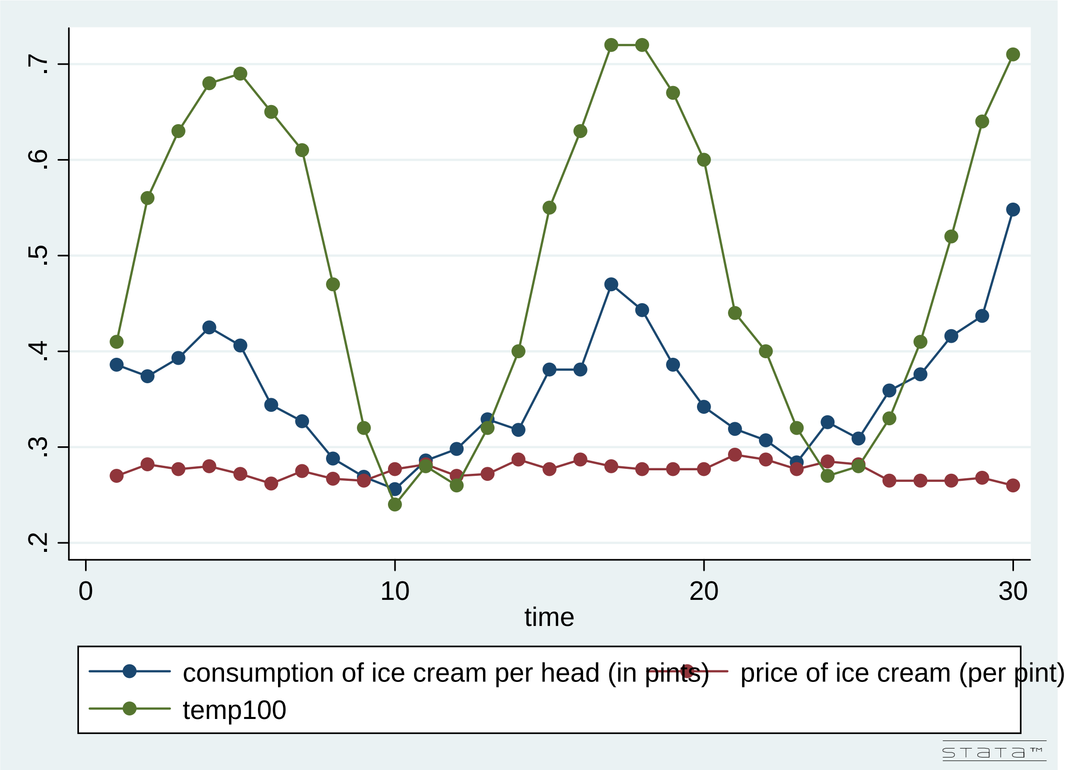

.6
.5
.4
.3
.2
0
10
20
30
time
consumption of ice cream per head (in pints)
Fitted values



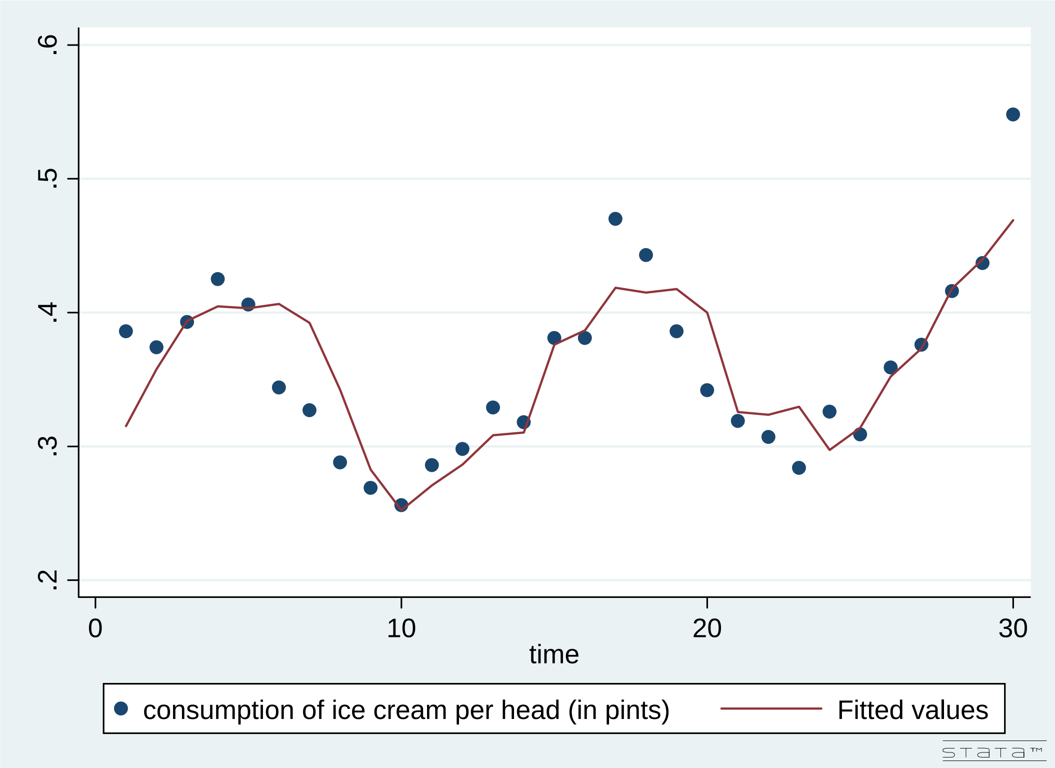
Residuals
.15
.1
.05
0
-.05
-.1
0
10
20
30
time
stata™



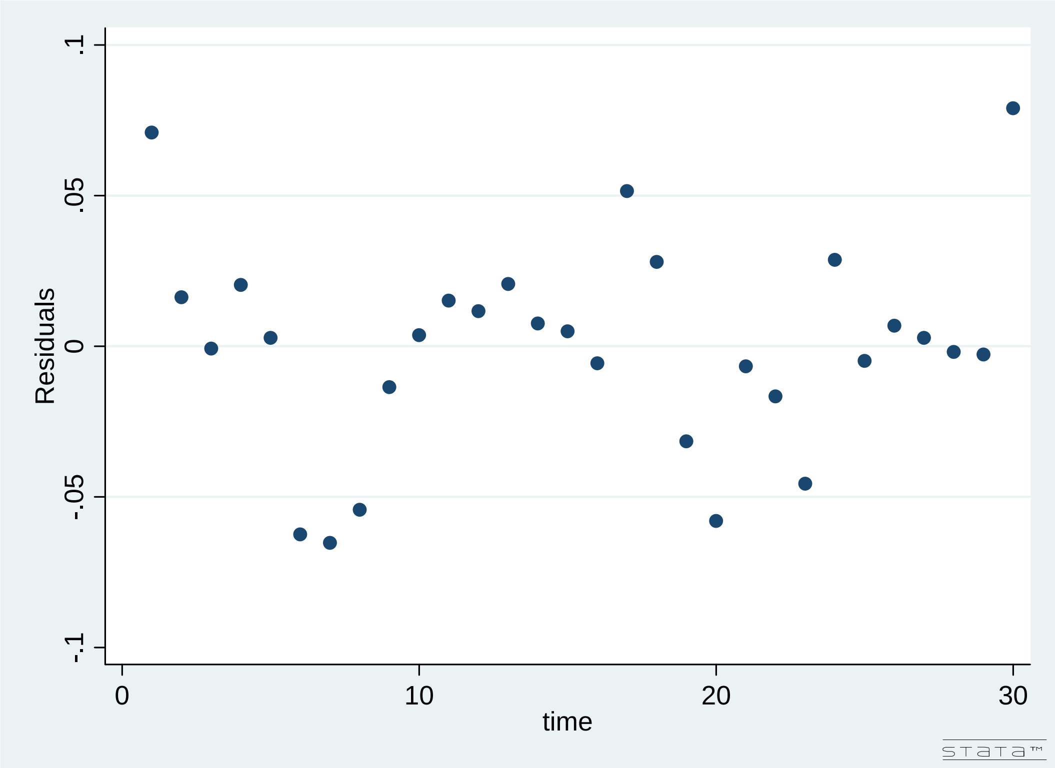
.15
.1
.05
0
-.05
-.1
-.1
-.05
0
.05
.1
resid_1
Residuals
Fitted values



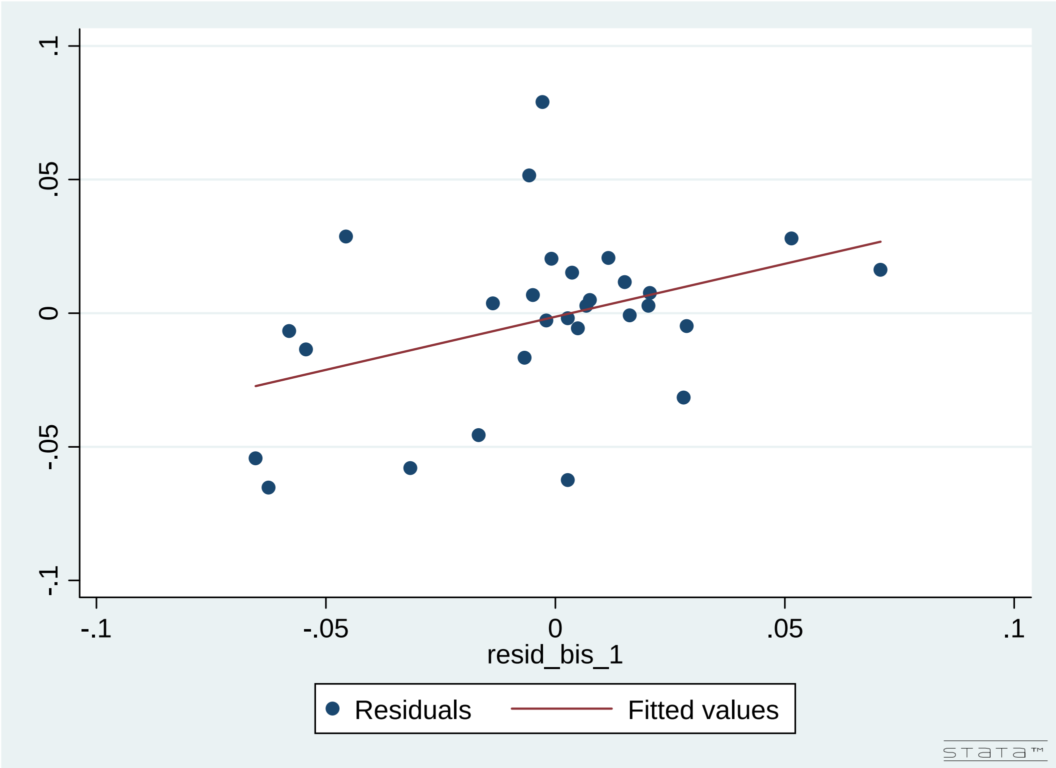
.2
.3
.4
.5
.6
.7
0
10
20
30
time
consumption of ice cream per head (in pints)
price of ice cream (per pint)
temp100



.2
.3
.4
.5
.6
0
10
20
30
time
consumption of ice cream per head (in pints)
Fitted values
stata™



Residuals
.1
.05
0
-.05
-.1
0
10
20
30
time


.1
.05
0
-.05
-.1
-.1
-.05
0
.05
.1
resid_bis_1
Residuals
Fitted values
stata™