FOIA Number: 2017-1095-F

FOIA MARKER

This is not a textual record. This is used as an administrative marker by the William J. Clinton Presidential Library Staff.

Collection/Record Group: Clinton Presidential Records

Subgroup/Office of Origin: Council of Economic Advisers

Series/Staff Member: Judson Jaffe

Subseries:

OA/ID Number: 20746

FolderID:

Folder Title:
CO2 [Carbon Dioxide] Emmissions - Technical Paper

Stack:	Row:	Section:	Shelf:	Position:
S	20	6	3	3

```
.
. /********
> *** Detrend the series
> ********/
.
. sort year

. gen dntek = nonhitek[_n] - 1.02808*nonhitek[_n - 1]
(1 missing value generated)

. gen dco2 = co2[_n] - 1.007727*co2[_n - 1]
(1 missing value generated)

.
. gen tntek = 1.02808*nonhitek[_n-1]
(1 missing value generated)

. gen tco2 = 1.007727*co2[_n-1]
(1 missing value generated)

.
. gen cheat = htdgyear[_n] - htdgyear[_n-1]
(1 missing value generated)

. gen ccool = cldgyear[_n] - cldgyear[_n-1]
(1 missing value generated)

. gen cfoss = ffppcomr[_n] - ffppcomr[_n-1]
(1 missing value generated)

. gen cres = eleprrer[_n] - eleprrer[_n-1]
(1 missing value generated)

. gen ccom = eleprcor[_n] - eleprcor[_n-1]
(1 missing value generated)

. gen ccoal = ffppcoar[_n] - ffppcoar[_n-1]
(1 missing value generated)

. gen cgas = ffppngr[_n] - ffppngr[_n-1]
(1 missing value generated)

. gen coil = ffppoilr[_n] - ffppoilr[_n-1]
(1 missing value generated)

. gen cnumref = numrefin[_n] - numrefin[_n-1]
(1 missing value generated)

. gen crefcap = refincap[_n] - refincap[_n-1]
(1 missing value generated)

. gen cnetsum = netsumca[_n] - netsumca[_n-1]
(1 missing value generated)

. gen cextra = extralos[_n] - extralos[_n-1]
(1 missing value generated)
```

```
. gen cpdctu = cpvtyund[_n] - cpvtyund[_n-1]
(2 missing values generated)

. gen cpdcts = cpvtysur[_n] - cpvtysur[_n-1]
(2 missing values generated)

. gen cnumele = numeleut[_n] - numeleut[_n-1]
(1 missing value generated)

. gen propcoal = hrscoal/hrstotal

. gen cprpcoal = propcoal[_n] - propcoal[_n-1]
(1 missing value generated)

. gen cres1 = cres[_n-1]
(2 missing values generated)

. gen ccom1 = ccom[_n-1]
(2 missing values generated)

. gen cfoss1 = cfoss[_n-1]
(2 missing values generated)

. gen ccoal1 = ccoal[_n-1]
(2 missing values generated)

. gen cgas1 = cgas[_n-1]
(2 missing values generated)

. gen coil1 = coil[_n-1]
(2 missing values generated)

.
. /*******
> *** Fossil Index
> *******/
.
. /* Current Foss Only */
.
. reg dco2 dntek cheat ccool cfoss if year < 1998

  Source |       SS       df       MS              Number of obs =      37
---------+------------------------------           F(  4,    32) =   13.65
   Model |  27064.2851     4  6766.07127            Prob > F      =  0.0000
Residual |  15857.0642    32  495.533256            R-squared     =  0.6306
---------+------------------------------           Adj R-squared =  0.5844
   Total |  42921.3493    36   1192.2597            Root MSE      =  22.261

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2737161   .0402009      6.809   0.000       .1918295    .3556026
   cheat |   .0270028   .0178131      1.516   0.139      -.0092813     .063287
   ccool |   .0193422   .0370667      0.522   0.605      -.0561601    .0948445
   cfoss |  -10.13689   11.87851     -0.853   0.400      -34.33263    14.05884
   _cons |   9.628127   3.663471      2.628   0.013       2.165881    17.09037
```

```
. reg dco2 dntek cheat ccool cfoss (dntek cheat ccool cnumre crefcap) if year <
> 1998
                                                                      (2SLS)
  Source |       SS       df       MS                  Number of obs =      37
---------+------------------------------                F(  4,    32) =   11.44
   Model |  24009.4166     4  6002.35414                Prob > F      =  0.0000
Residual |  18911.9327    32  590.997897                R-squared     =  0.5594
---------+------------------------------                Adj R-squared =  0.5043
   Total |  42921.3493    36   1192.2597                Root MSE      =   24.31

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   cfoss |     19.3563   25.19825      0.768   0.448      -31.97085    70.68345
   dntek |    .2950022   .0465891      6.332   0.000       .2001033    .3899012
   cheat |    .0278568   .0194635      1.431   0.162      -.0117891    .0675026
   ccool |    .0300333   .0412304      0.728   0.472      -.0539503    .1140169
   _cons |    9.317951   4.007268      2.325   0.027       1.155413    17.48049
------------------------------------------------------------------------------

. predict pdco2                                          HT = 142.71
(1 missing value generated)

. gen pco2 = tco2 + pdco2
(1 missing value generated)

.
. list year co2 pco2 if year == 1998

        year        co2       pco2
 39.    1998       1484   1475.818

.
. /* Lagged foss only */
.
. drop pdco2 pco2

. reg dco2 dntek cheat ccool cfoss1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   15.24
   Model |  28388.0878     4  7097.02194                Prob > F      =  0.0000
Residual |  14435.0364    31  465.646336                R-squared     =  0.6629
---------+------------------------------                Adj R-squared =  0.6194
   Total |  42823.1242    35  1223.51783                Root MSE      =  21.579

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |    .2498562   .0412819      6.052   0.000       .1656612    .3340513
   cheat |    .0251607   .0175264      1.436   0.161      -.0105847    .0609061
   ccool |    .0179313   .0359694      0.499   0.622      -.0554288    .0912913
  cfoss1 |   -23.79871   12.16326     -1.957   0.059      -48.60584    1.008411
   _cons |    9.850245   3.600215      2.736   0.010       2.507557    17.19293
------------------------------------------------------------------------------
```

```
. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
. list year co2 pco2 if year == 1998

        year        co2       pco2
 39.    1998       1484   1484.811

.
. /* Current and lagged foss */
.
. drop pdco2 pco2

. reg dco2 dntek cheat ccool cfoss1 cfoss if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  5,    30) =   11.83
   Model |  28412.9204     5  5682.58407                Prob > F      =  0.0000
Residual |  14410.2038    30  480.340127                R-squared     =  0.6635
---------+------------------------------                Adj R-squared =  0.6074
   Total |  42823.1242    35  1223.51783                Root MSE      =  21.917

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |    .249136   .0420477      5.925   0.000       .1632632    .3350088
   cheat |   .0251523   .0178009      1.413   0.168      -.0112019    .0615064
   ccool |      .0171    .036715      0.466   0.645      -.0578821     .092082
  cfoss1 |  -22.78568   13.13255     -1.735   0.093      -49.60593    4.034561
   cfoss |  -2.827392    12.4351     -0.227   0.822      -28.22326    22.56848
   _cons |   9.869592   3.657568      2.698   0.011       2.399842    17.33934
------------------------------------------------------------------------------

. reg dco2 dntek cheat ccool cfoss1 cfoss (dntek cheat ccool cfoss1 cnumre cref
> cap) if year < 1998
                                                                      (2SLS)
  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  5,    30) =    9.69
   Model |  24795.5748     5  4959.11496                Prob > F      =  0.0000
Residual |  18027.5494    30  600.918312                R-squared     =  0.5790
---------+------------------------------                Adj R-squared =  0.5089
   Total |  42823.1242    35  1223.51783                Root MSE      =  24.514

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   cfoss |    31.2974   28.41318      1.102   0.279      -26.73006    89.32486
   dntek |   .2578286   .0474516      5.434   0.000       .1609195    .3547378
   cheat |   .0252546   .0199103      1.268   0.214      -.0154076    .0659168
   ccool |   .0271332   .0417066      0.651   0.520       -.058043    .1123094
  cfoss1 |  -35.01231   17.16275     -2.040   0.050      -70.06333    .0386982
   _cons |   9.636083   4.094475      2.353   0.025       1.274049    17.99812
```

```
. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
. list year co2 pco2 if year == 1998

        year        co2       pco2
 39.    1998       1484   1475.143

.
. /*******
> *** Coal Prices
> *******/
.
. /* Current Coal Only */
.
. drop pdco2 pco2

. reg dco2 dntek cheat ccool ccoal if year < 1998

  Source |       SS       df       MS                  Number of obs =      37
---------+------------------------------                F(  4,    32) =   13.61
   Model |  27030.0231     4  6757.50577                Prob > F      =  0.0000
Residual |  15891.3262    32  496.603943                R-squared     =  0.6298
---------+------------------------------                Adj R-squared =  0.5835
   Total |  42921.3493    36   1192.2597                Root MSE      =  22.285

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2716014   .0410022      6.624   0.000       .1880827    .3551201
   cheat |   .0276114   .0178333      1.548   0.131      -.0087138    .0639365
   ccool |   .0161517   .0378151      0.427   0.672      -.0608751    .0931786
   ccoal |  -22.30923   27.50882     -0.811   0.423      -78.34287     33.7244
   _cons |   9.476006   3.665723      2.585   0.015       2.009172    16.94284
------------------------------------------------------------------------------

. reg dco2 dntek cheat ccool ccoal (dntek cheat ccool cpdctu cpdcts) if year <
> 1998
                                                                      (2SLS)
  Source |       SS       df       MS                  Number of obs =      37
---------+------------------------------                F(  4,    32) =    5.16
   Model | -646.664551     4 -161.666138                Prob > F      =  0.0025
Residual |  43568.0138    32  1361.50043                R-squared     =       .
---------+------------------------------                Adj R-squared =       .
   Total |  42921.3493    36   1192.2597                Root MSE      =  36.899

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   ccoal |  -227.6731   226.4482     -1.005   0.322      -688.9329    233.5868
   dntek |   .1847882   .1157666      1.596   0.120      -.0510207    .4205971
```

```
------------------------------------------------------------------------------
      cheat |   .0305115   .0296937     1.028   0.312     -.0299726    .0909957
      ccool |  -.0470433   .0926269    -0.508   0.615     -.2357182    .1416316
      _cons |   9.057044   6.086494     1.488   0.147     -3.340738    21.45483
------------------------------------------------------------------------------

. predict pdco2
(1 missing value generated)

. gen pco2 = tco2 + pdco2
(1 missing value generated)

.
. list year co2 pco2 if year == 1998

        year        co2       pco2
 39.    1998       1484   1477.428

.
. /* Lagged foss only */
.
. drop pdco2 pco2

. reg dco2 dntek cheat ccool ccoal1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   12.76
   Model |  26645.4082     4  6661.35205                Prob > F      =  0.0000
Residual |   16177.716    31  521.861806                R-squared     =  0.6222
---------+------------------------------                Adj R-squared =  0.5735
   Total |  42823.1242    35  1223.51783                Root MSE      =  22.844

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2789835   .0409795      6.808   0.000       .1954053    .3625618
   cheat |   .0275711   .0185617      1.485   0.148      -.0102858     .065428
   ccool |   .0225673   .0380051      0.594   0.557      -.0549445    .1000792
  ccoal1 |  -7.471242   26.99979     -0.277   0.784      -62.53767    47.59519
   _cons |   9.528624   3.807614      2.503   0.018       1.762943     17.2943
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
. list year co2 pco2 if year == 1998

        year        co2       pco2
 39.    1998       1484   1482.501

.
. /* Current and lagged foss */
.
. drop pdco2 pco2
```

```
. reg dco2 dntek cheat ccool ccoal1 ccoal if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  5,    30) =   10.17
   Model |  26933.3741     5  5386.67483                Prob > F      =  0.0000
Residual |    15889.75    30  529.658334                R-squared     =  0.6289
---------+------------------------------                Adj R-squared =  0.5671
   Total |  42823.1242    35  1223.51783                Root MSE      =  23.014

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2715152   .0425088      6.387   0.000       .1847007    .3583297
   cheat |   .0274464   .0187006      1.468   0.153      -.0107453    .0656382
   ccool |   .0159155   .0393364      0.405   0.689      -.0644201    .0962511
  ccoal1 |   .0277121   29.03983      0.001   0.999      -59.27954    59.33496
   ccoal |  -22.38282   30.35583     -0.737   0.467      -84.37768    39.61205
   _cons |   9.509775   3.836036      2.479   0.019       1.675544    17.34401
------------------------------------------------------------------------------

. reg dco2 dntek cheat ccool ccoal1 ccoal (dntek cheat ccool ccoal1 cpdctu cpdc
> ts) if year < 1998
                                                                      (2SLS)
  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  5,    30) =    1.87
   Model | -46578.2366     5 -9315.64733                Prob > F      =  0.1293
Residual |  89401.3608    30  2980.04536                R-squared     =       .
---------+------------------------------                Adj R-squared =       .
   Total |  42823.1242    35  1223.51783                Root MSE      =   54.59

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   ccoal |   335.2374   522.3383      0.642   0.526      -731.5198    1401.995
   dntek |   .3908402   .1999126      1.955   0.060      -.0174357    .7991161
   cheat |   .0294381   .0444512      0.662   0.513      -.0613435    .1202196
   ccool |   .1221956   .1798474      0.679   0.502      -.2451018    .4894931
  ccoal1 |  -119.7864   186.5149     -0.642   0.526      -500.7006    261.1278
   _cons |   9.810921   9.109477      1.077   0.290      -8.793114    28.41496
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
. list year co2 pco2 if year == 1998

        year        co2       pco2
 39.    1998       1484   1489.691

.
. /*******
> *** Oil Prices
```

```
> *******/
.
. /* Current Coal Only */
.
. drop pdco2 pco2

. reg dco2 dntek cheat ccool coil if year < 1998

  Source |       SS       df       MS                  Number of obs =      37
---------+------------------------------                F(  4,    32) =   13.36
   Model |  26847.0568     4  6711.76421                Prob > F      =  0.0000
Residual |  16074.2924    32  502.321639                R-squared     =  0.6255
---------+------------------------------                Adj R-squared =  0.5787
   Total |  42921.3493    36   1192.2597                Root MSE      =  22.413

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2782483   .0398855      6.976   0.000       .1970042    .3594923
   cheat |   .0260073   .0180927      1.437   0.160      -.0108462    .0628609
   ccool |   .0204306   .0373812      0.547   0.588      -.0557123    .0965736
    coil |  -2.499771   4.674564     -0.535   0.597      -12.02155    7.022004
   _cons |   9.548796   3.686687      2.590   0.014       2.039262    17.05833
------------------------------------------------------------------------------

. reg dco2 dntek cheat ccool coil (dntek cheat ccool cnumre crefcap) if year <
> 1998
                                                                      (2SLS)
  Source |       SS       df       MS                  Number of obs =      37
---------+------------------------------                F(  4,    32) =   11.73
   Model |  24454.7477     4  6113.68693                Prob > F      =  0.0000
Residual |  18466.6015    32  577.081298                R-squared     =  0.5698
---------+------------------------------                Adj R-squared =  0.5160
   Total |  42921.3493    36   1192.2597                Root MSE      =  24.023

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
    coil |   7.701606   9.589022      0.803   0.428      -11.83059     27.2338
   dntek |   .2896092   .0437095      6.626   0.000       .2005759    .3786425
   cheat |   .0312676   .0198453      1.576   0.125      -.0091559    .0716911
   ccool |   .0309845   .0409495      0.757   0.455      -.0524269    .1143959
   _cons |   9.437479   3.952523      2.388   0.023       1.386453    17.48851
------------------------------------------------------------------------------

. predict pdco2
(1 missing value generated)

. gen pco2 = tco2 + pdco2
(1 missing value generated)

.
. list year co2 pco2 if year == 1998

        year        co2       pco2
 39.    1998       1484   1473.783
```

```
.
. /* Lagged foss only */
.
. drop pdco2 pco2

. reg dco2 dntek cheat ccool coil1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   13.70
   Model |  27354.4663     4  6838.61657                Prob > F      =  0.0000
Residual |  15468.6579    31  498.988964                R-squared     =  0.6388
---------+------------------------------                Adj R-squared =  0.5922
   Total |  42823.1242    35  1223.51783                Root MSE      =  22.338

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2550741   .0447506      5.700   0.000       .1638046    .3463436
   cheat |   .0256393   .0181565      1.412   0.168      -.0113911    .0626696
   ccool |   .0192192   .0372641      0.516   0.610      -.0567815      .09522
   coil1 |  -6.366348   5.196248     -1.225   0.230      -16.96416    4.231469
   _cons |   9.693438   3.725393      2.602   0.014       2.095449    17.29143
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
. list year co2 pco2 if year == 1998

        year        co2       pco2
 39.    1998       1484   1485.126

.
. /* Current and lagged foss */
.
. drop pdco2 pco2

. reg dco2 dntek cheat ccool coil1 coil if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  5,    30) =   10.67
   Model |  27411.2483     5  5482.24966                Prob > F      =  0.0000
Residual |  15411.8759    30  513.729195                R-squared     =  0.6401
---------+------------------------------                Adj R-squared =  0.5801
   Total |  42823.1242    35  1223.51783                Root MSE      =  22.666

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2544965     .04544      5.601   0.000       .1616956    .3472974
   cheat |   .0248547   .0185732      1.338   0.191      -.0130768    .0627863
   ccool |    .017695   .0380875      0.465   0.646        -.06009      .09548
   coil1 |  -6.068622    5.34795     -1.135   0.265      -16.99059    4.853349
```

```
       coil |  -1.595205   4.798197    -0.332   0.742    -11.39443    8.20402
      _cons |   9.710924   3.780383     2.569   0.015     1.990352    17.4315
------------------------------------------------------------------------------

. reg dco2 dntek cheat ccool coil1 coil (dntek cheat ccool coil1 cnumre crefcap
> ) if year < 1998
                                                                      (2SLS)
  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  5,    30) =    9.00
   Model |   24176.381     5  4835.27619                Prob > F      =  0.0000
Residual |  18646.7432    30  621.558107                R-squared     =  0.5646
---------+------------------------------                Adj R-squared =  0.4920
   Total |  42823.1242    35  1223.51783                Root MSE      =  24.931

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
    coil |   10.44515   10.37356      1.007   0.322      -10.74049    31.63079
   dntek |    .258856   .0500863      5.168   0.000       .1565661    .3611459
   cheat |   .0307761   .0208964      1.473   0.151         -.0119    .0734523
   ccool |   .0291996   .0427546      0.683   0.500      -.0581169    .1165161
   coil1 |  -8.315811   6.114072     -1.360   0.184      -20.80241    4.170788
   _cons |   9.578943   4.159392      2.303   0.028       1.084331    18.07355
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
. list year co2 pco2 if year == 1998

        year        co2       pco2
 39.    1998       1484   1474.094

.
. /*******
> *** Residential Electricity
> *******/
.
. /* Current only */
.
. drop pdco2 pco2

. reg dco2 dntek cheat ccool cres if year < 1998

  Source |       SS       df       MS                  Number of obs =      37
---------+------------------------------                F(  4,    32) =   22.48
   Model |  31654.7076     4  7913.67691                Prob > F      =  0.0000
Residual |  11266.6416    32  352.082551                R-squared     =  0.7375
---------+------------------------------                Adj R-squared =  0.7047
   Total |  42921.3493    36   1192.2597                Root MSE      =  18.764

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
```

```
---------+--------------------------------------------------------------------
   dntek |   .2120832   .0378695     5.600   0.000      .1349455    .2892208
   cheat |   .0254613   .0150202     1.695   0.100     -.0051338    .0560565
   ccool |   .0124035   .0311614     0.398   0.693     -.0510703    .0758773
    cres |  -39.59006    10.5572    -3.750   0.001     -61.09438   -18.08574
   _cons |   5.571467   3.261015     1.709   0.097     -1.071004    12.21394
------------------------------------------------------------------------------

. reg dco2 dntek cheat ccool cres (dntek cheat ccool cnetsum cnumele cprpcoal)
> if year < 1998
                                                                      (2SLS)
  Source |       SS       df       MS                  Number of obs =      37
---------+------------------------------                F(  4,    32) =   19.47
   Model |  30490.9378     4  7622.73445                Prob > F      =  0.0000
Residual |  12430.4115    32  388.450359                R-squared     =  0.7104
---------+------------------------------                Adj R-squared =  0.6742
   Total |  42921.3493    36   1192.2597                Root MSE      =  19.709

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
    cres |  -58.78383   19.43911    -3.024   0.005      -98.37999   -19.18766
   dntek |   .1786558   .0485325     3.681   0.001       .0797984    .2775132
   cheat |   .0245717   .0157942     1.556   0.130      -.0076001    .0567435
   ccool |   .0072581     .03301     0.220   0.827       -.059981    .0744971
   _cons |   3.656433   3.777601     0.968   0.340      -4.038288    11.35115
------------------------------------------------------------------------------

. predict pdco2
(1 missing value generated)

. gen pco2 = tco2 + pdco2
(1 missing value generated)

.
. list year co2 pco2 if year == 1998

        year        co2       pco2
 39.    1998       1484   1484.023

.
. /* Lagged only */
. drop pdco2 pco2

. reg dco2 dntek cheat ccool cres1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   22.59
   Model |  31883.8434     4  7970.96085                Prob > F      =  0.0000
Residual |  10939.2808    31  352.880025                R-squared     =  0.7445
---------+------------------------------                Adj R-squared =  0.7116
   Total |  42823.1242    35  1223.51783                Root MSE      =  18.785

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2618714   .0335244     7.811   0.000       .1934979    .3302448
```

```
------------------------------------------------------------------------------
      cheat |   .0329325   .0153008     2.152   0.039      .0017263    .0641387
      ccool |   .0250683   .0312384     0.802   0.428     -.0386428    .0887795
      cres1 |  -36.31314   9.389152    -3.868   0.001     -55.46244   -17.16384
      _cons |   6.021033    3.26017     1.847   0.074     -.6281266    12.67019
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
. list year co2 pco2 if year == 1998

         year        co2       pco2
 39.     1998       1484   1484.231

.
. /* current and lagged prices */
.
. drop pdco2 pco2

. reg dco2 dntek cheat ccool cres1 cres if year < 1998

  Source |       SS       df       MS              Number of obs =      36
---------+------------------------------           F(  5,    30) =   21.74
   Model |  33560.9051     5  6712.18101            Prob > F      =  0.0000
Residual |  9262.21912    30  308.740637            R-squared     =  0.7837
---------+------------------------------           Adj R-squared =  0.7477
   Total |  42823.1242    35  1223.51783            Root MSE      =  17.571

------------------------------------------------------------------------------
       dco2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
------------+-----------------------------------------------------------------
      dntek |   .2220629   .0357078     6.219   0.000      .1491379    .2949879
      cheat |    .029858   .0143726     2.077   0.046      .0005052    .0592107
      ccool |   .0172297   .0294124     0.586   0.562     -.0428385    .0772978
      cres1 |  -25.35373    9.96197    -2.545   0.016     -45.69879   -5.008675
       cres |   -26.1429   11.21698    -2.331   0.027     -49.05104    -3.23476
      _cons |   4.502406   3.118301     1.444   0.159     -1.866014    10.87083
------------------------------------------------------------------------------

. reg dco2 dntek cheat ccool cres1 cres (dntek cheat ccool cres1 cnetsum cnumel
> e cprpcoal) if year < 1998
                                                                      (2SLS)
  Source |       SS       df       MS              Number of obs =      36
---------+------------------------------           F(  5,    30) =   20.35
   Model |  33204.5064     5  6640.90127            Prob > F      =  0.0000
Residual |  9618.61781    30  320.620594            R-squared     =  0.7754
---------+------------------------------           Adj R-squared =  0.7380
   Total |  42823.1242    35  1223.51783            Root MSE      =  17.906

------------------------------------------------------------------------------
       dco2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
------------+-----------------------------------------------------------------
       cres |  -38.19457    25.0231    -1.526   0.137     -89.29855    12.90941
```

```
------------------------------------------------------------------------------
   dntek |   .2037115   .0497293     4.096   0.000      .1021506    .3052723
   cheat |   .0284406   .0148786     1.912   0.066     -.0019455    .0588268
   ccool |   .0136161   .0307071     0.443   0.661     -.0490961    .0763283
   cres1 |  -20.30153   13.78901    -1.472   0.151     -48.46244    7.859374
   _cons |   3.802331   3.430736     1.108   0.277     -3.204166    10.80883
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
. list year co2 pco2 if year == 1998

         year        co2       pco2
 39.     1998       1484   1484.589

.
. /*******
> *** Commercial Electricity
> *******/
.
. /* Current only */
.
. drop pdco2 pco2

. reg dco2 dntek cheat ccool ccom if year < 1998

  Source |       SS       df       MS              Number of obs =      37
---------+------------------------------           F(  4,    32) =   24.44
   Model |  32337.9362     4  8084.48405           Prob > F      =  0.0000
Residual |  10583.4131    32  330.731659           R-squared     =  0.7534
---------+------------------------------           Adj R-squared =  0.7226
   Total |  42921.3493    36   1192.2597           Root MSE      =  18.186

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2143291   .0359269     5.966   0.000       .1411484    .2875098
   cheat |   .0296766   .0145613     2.038   0.050       .0000161    .0593371
   ccool |   .0113524   .0302095     0.376   0.710      -.0501823    .0728871
    ccom |  -42.53594   10.30541    -4.128   0.000      -63.52737   -21.54451
   _cons |   5.525065    3.14398     1.757   0.088       -.879013    11.92914
------------------------------------------------------------------------------

. reg dco2 dntek cheat ccool ccom (dntek cheat ccool cnetsum cnumele cprpcoal)
> if year < 1998
                                                                      (2SLS)
  Source |       SS       df       MS              Number of obs =      37
---------+------------------------------           F(  4,    32) =   21.64
   Model |  31884.1979     4  7971.04947           Prob > F      =  0.0000
Residual |  11037.1514    32  344.910981           R-squared     =  0.7429
---------+------------------------------           Adj R-squared =  0.7107
   Total |  42921.3493    36   1192.2597           Root MSE      =  18.572
```

```
------------------------------------------------------------------------------
        dco2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        ccom |  -54.60657   18.05595    -3.024   0.005    -91.38535   -17.82779
       dntek |   .1954005   .0433063     4.512   0.000     .1071884    .2836126
       cheat |   .0303521   .0148929     2.038   0.050     .0000163    .0606878
       ccool |   .0080423   .0311115     0.259   0.798    -.0553297    .0714144
       _cons |   4.390971   3.494084     1.257   0.218    -2.726245    11.50819
------------------------------------------------------------------------------

. predict pdco2
(1 missing value generated)

. gen pco2 = tco2 + pdco2
(1 missing value generated)

.
. list year co2 pco2 if year == 1998

        year        co2       pco2
 39.    1998       1484   1486.484

.
. /* Lagged only */
. drop pdco2 pco2

. reg dco2 dntek cheat ccool ccom1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   18.32
   Model |  30094.7825     4  7523.69563                Prob > F      =  0.0000
Residual |  12728.3417    31  410.591667                R-squared     =  0.7028
---------+------------------------------                Adj R-squared =  0.6644
   Total |  42823.1242    35  1223.51783                Root MSE      =  20.263

------------------------------------------------------------------------------
        dco2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       dntek |   .2595669   .0365143     7.109   0.000      .1850955    .3340384
       cheat |   .0333822   .0165628     2.015   0.053     -.0003979    .0671624
       ccool |   .0235372   .0336915     0.699   0.490     -.0451772    .0922515
       ccom1 |  -30.70544   10.53293    -2.915   0.007     -52.18749   -9.223391
       _cons |   6.652871   3.519086     1.891   0.068     -.5243513    13.83009
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
. list year co2 pco2 if year == 1998

        year        co2       pco2
 39.    1998       1484   1480.233
```

```
. /* current and lagged prices */
.
. drop pdco2 pco2

. reg dco2 dntek cheat ccool ccom1 ccom if year < 1998

  Source |       SS       df       MS              Number of obs =      36
---------+------------------------------           F(  5,    30) =   19.95
   Model |  32921.1425     5   6584.2285           Prob > F      =  0.0000
Residual |  9901.98166    30  330.066055           R-squared     =  0.7688
---------+------------------------------           Adj R-squared =  0.7302
   Total |  42823.1242    35  1223.51783           Root MSE      =  18.168

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2162079   .0359355      6.017   0.000       .1428178    .2895979
   cheat |   .0321365   .0148562      2.163   0.039        .001796     .062477
   ccool |   .0136472   .0303961      0.449   0.657      -.0484298    .0757243
   ccom1 |  -15.46589   10.78453     -1.434   0.162      -37.49085    6.559061
    ccom |  -34.40684   11.75795     -2.926   0.006      -58.41978   -10.39391
   _cons |   4.874915   3.213156      1.517   0.140      -1.687225    11.43705
------------------------------------------------------------------------------

. reg dco2 dntek cheat ccool ccom1 ccom (dntek cheat ccool ccom1 cnetsum cnumel
> e cprpcoal) if year < 1998
                                                                      (2SLS)
  Source |       SS       df       MS              Number of obs =      36
---------+------------------------------           F(  5,    30) =   18.50
   Model |   32785.008     5   6557.0016           Prob > F      =  0.0000
Residual |  10038.1162    30  334.603873           R-squared     =  0.7656
---------+------------------------------           Adj R-squared =  0.7265
   Total |  42823.1242    35  1223.51783           Root MSE      =  18.292

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
    ccom |  -41.95803    26.2134     -1.601   0.120      -95.49294    11.57688
   dntek |   .2066919   .0466667      4.429   0.000       .1113859     .301998
   cheat |   .0318631    .014982      2.127   0.042       .0012659    .0624604
   ccool |   .0114767    .031334      0.366   0.717      -.0525158    .0754692
   ccom1 |  -12.12131   15.00713     -0.808   0.426      -42.76996    18.52735
   _cons |   4.484711   3.453538      1.299   0.204      -2.568353    11.53778
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
. list year co2 pco2 if year == 1998

        year        co2       pco2
 39.    1998       1484   1484.769
```

```
. log close
```

	Hitech V-A (Billions)	Non-Hitech (Billion 1992)	Growth
~~Hitech~~			
1953:3			
1957:3			
1960:2			
1969:4	7.269	3385.3	
1973:4	9.556	3937.5	3.850 (69-73)
1980:1	22.15	4666.85	2.378 (73-81)
1981:3	28.73	4724.3	2.808 (81-90)
1990:3	80.71	6061.39	

	CO_2	
1953	684.9	
		2.180
1957	746.6	
		1.811
1960	787.9	
		3.940
1969	1115.6	
		3.454
1973	1277.9	
		-0.216
1981	1256	
		0.773
1990	1346.1	

1953 - 1990 ⇒ 1.843% /year

Possible CO_2 Growth rates:

1951 - 1990 0.773 %

1953 - 1990 1.843%

75% GDP (81-90) 2.179%

75% NH-GDP 2.119%

Dates of Peaks

Jul	1953
Aug	1957
Apr	1960
Dec	1969
Nov	1973
Jan	1980
Jul	1981
Jul	1990

Chained $1992 real GDP (billions)

Quarter	Value	Growth Rate
1953:3	1887.4	2.631
1957:3	2094.0	2.904
1960:2	2265.5	4.342
1969:4	3392.6	3.857
1973:4	3947.1	
1980:1	4679.0	2.426
1981:3	4753.0	2.820
1990:3	6142.1	

```
.
. /********
> *** Detrend the series
> ********/
.
. sort year

. gen dntek = nonhitek[_n] - 1.02808*nonhitek[_n - 1]
(1 missing value generated)

. gen tntek = 1.02808*nonhitek[_n-1]
(1 missing value generated)

.
. gen cheat = htdgyear[_n] - htdgyear[_n-1]
(1 missing value generated)

. gen ccool = cldgyear[_n] - cldgyear[_n-1]
(1 missing value generated)

. gen cfoss = ffppcomr[_n] - ffppcomr[_n-1]
(1 missing value generated)

. gen celec = eleprrer[_n] - eleprrer[_n-1]
(12 missing values generated)

. gen cnumref = numrefin[_n] - numrefin[_n-1]
(1 missing value generated)

. gen crefcap = refincap[_n] - refincap[_n-1]
(1 missing value generated)

. gen cnetsum = netsumca[_n] - netsumca[_n-1]
(1 missing value generated)

. gen cextra = extralos[_n] - extralos[_n-1]
(1 missing value generated)

. gen cpdctu = cpvtyund[_n] - cpvtyund[_n-1]
(2 missing values generated)

. gen cpdcts = cpvtysur[_n] - cpvtysur[_n-1]
(2 missing values generated)

. gen cnumele = numeleut[_n] - numeleut[_n-1]
(1 missing value generated)

. gen propcoal = hrscoal/hrstotal

. gen cprpcoal = propcoal[_n] - propcoal[_n-1]
(1 missing value generated)

. gen celec1 = celec[_n-1]
(13 missing values generated)

. gen cfoss1 = cfoss[_n-1]
```

```
(2 missing values generated)

.
.
.
. /* 1 */
. gen tco2 = co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   21.19
   Model |  30487.8661     4  7621.96653                Prob > F      =  0.0000
Residual |  11148.4168    31   359.62635                R-squared     =  0.7322
---------+------------------------------                Adj R-squared =  0.6977
   Total |  41636.2829    35  1189.60808                Root MSE      =  18.964

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2565274   .0338437      7.580   0.000       .1875027     .325552
   cheat |   .0323265   .0154464      2.093   0.045       .0008234    .0638296
   ccool |   .0240597   .0315356      0.763   0.451      -.0402575     .088377
  celec1 |  -35.23996   9.478494     -3.718   0.001      -54.57148   -15.90844
   _cons |   15.42274   3.291186      4.686   0.000       8.710317    22.13515
------------------------------------------------------------------------------

. predict pdco2
(13 missing values generated)

. gen pco2 = tco2 + pdco2
(13 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

        year        co2       pco2      pdco2       tco2
 50.    1998       1484   1482.271   2.670949     1479.6

.
. /* 1.0025 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.0025*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998
```

```
  Source |       SS       df       MS              Number of obs =      36
---------+------------------------------           F(  4,    31) =   21.66
   Model |  30935.9298     4  7733.98246            Prob > F      =  0.0000
Residual |  11070.3422    31  357.107812            R-squared     =  0.7365
---------+------------------------------           Adj R-squared =  0.7025
   Total |   42006.272    35   1200.1792            Root MSE      =  18.897

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2582568    .033725      7.658   0.000       .1894743    .3270393
   cheat |   .0325223   .0153922      2.113   0.043       .0011297    .0639148
   ccool |   .0243854    .031425      0.776   0.444      -.0397063     .088477
  celec1 |  -35.58695   9.445245     -3.768   0.001      -54.85065   -16.32324
   _cons |   12.38091   3.279642      3.775   0.001       5.692039    19.06979
------------------------------------------------------------------------------

. predict pdco2
(13 missing values generated)

. gen pco2 = tco2 + pdco2
(13 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

         year        co2       pco2      pdco2       tco2
 50.     1998       1484   1482.905  -.3943477   1483.299

.
. /* 1.005 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.005*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS              Number of obs =      36
---------+------------------------------           F(  4,    31) =   22.11
   Model |  31387.3978     4  7846.84945            Prob > F      =  0.0000
Residual |   11002.282    31  354.912323            R-squared     =  0.7404
---------+------------------------------           Adj R-squared =  0.7070
   Total |  42389.6798    35  1211.13371            Root MSE      =  18.839

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2599864   .0336211      7.733   0.000       .1914157    .3285572
   cheat |   .0327182   .0153448      2.132   0.041       .0014222    .0640141
   ccool |   .0247109   .0313282      0.789   0.436      -.0391834    .0886052
```

```
------------------------------------------------------------------------------
  celec1 |   -35.9339   9.416166    -3.816   0.001      -55.1383   -16.72951
   _cons |   9.339088   3.269544     2.856   0.008      2.670808    16.00737
------------------------------------------------------------------------------

. predict pdco2
(13 missing values generated)

. gen pco2 = tco2 + pdco2
(13 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

         year        co2       pco2      pdco2       tco2
 50.     1998       1484   1483.538  -3.459741   1486.998

.
. /* 1.0075 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.0075*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   22.55
   Model |  31842.2195     4  7960.55487                Prob > F      =  0.0000
Residual |  10944.2143    31  353.039172                R-squared     =  0.7442
---------+------------------------------                Adj R-squared =  0.7112
   Total |  42786.4338    35  1222.46954                Root MSE      =  18.789

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |    .261716   .0335323      7.805   0.000       .1933264    .3301055
   cheat |    .032914   .0153043      2.151   0.039       .0017008    .0641273
   ccool |   .0250365   .0312454      0.801   0.429       -.038689     .088762
  celec1 |  -36.28086   9.391285     -3.863   0.001      -55.43451   -17.12721
   _cons |   6.297263   3.260905      1.931   0.063      -.3533966    12.94792
------------------------------------------------------------------------------

. predict pdco2
(13 missing values generated)

. gen pco2 = tco2 + pdco2
(13 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998
```

```
        year        co2       pco2      pdco2       tco2
 50.    1998       1484   1484.172  -6.525086   1490.697

.
. /* 1.01 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.01*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   22.97
   Model |  32300.4537     4  8075.11342                Prob > F      =  0.0000
Residual |  10896.1744    31  351.489496                R-squared     =  0.7478
---------+------------------------------                Adj R-squared =  0.7152
   Total |  43196.6281    35  1234.18937                Root MSE      =  18.748

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2634457   .0334586      7.874   0.000       .1952064     .331685
   cheat |   .0331099   .0152706      2.168   0.038       .0019652    .0642546
   ccool |    .025362   .0311768      0.813   0.422      -.0382235    .0889475
  celec1 |  -36.62782   9.370651     -3.909   0.000      -55.73939   -17.51625
   _cons |   3.255445    3.25374      1.001   0.325      -3.380602    9.891492
------------------------------------------------------------------------------

. predict pdco2
(13 missing values generated)

. gen pco2 = tco2 + pdco2
(13 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

        year        co2       pco2      pdco2       tco2
 50.    1998       1484   1484.806  -9.590449   1494.396

.
. /* 1.015 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.015*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
```

```
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   23.78
   Model |  33226.9219     4  8306.73046                Prob > F      =  0.0000
Residual |  10830.1123    31  349.358461                R-squared     =  0.7542
---------+------------------------------                Adj R-squared =  0.7225
   Total |  44057.0341    35   1258.7724                Root MSE      =  18.691

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2669046    .033357      8.001   0.000       .1988725    .3349367
   cheat |   .0335016   .0152243      2.201   0.035       .0024515    .0645517
   ccool |   .0260131   .0310821      0.837   0.409      -.0373793    .0894056
  celec1 |  -37.32168   9.342201     -3.995   0.000      -56.37523   -18.26814
   _cons |  -2.828188   3.243862     -0.872   0.390      -9.444088    3.787711
------------------------------------------------------------------------------

. predict pdco2
(13 missing values generated)

. gen pco2 = tco2 + pdco2
(13 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

        year        co2       pco2      pdco2       tco2
 50.    1998       1484   1486.073  -15.72112   1501.794

.
. /* 1.02 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.02*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   24.51
   Model |  34166.9319     4  8541.73298                Prob > F      =  0.0000
Residual |  10804.0909    31   348.51906                R-squared     =  0.7598
---------+------------------------------                Adj R-squared =  0.7288
   Total |  44971.0228    35  1284.88637                Root MSE      =  18.669

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2703637   .0333169      8.115   0.000       .2024134    .3383141
   cheat |   .0338932    .015206      2.229   0.033       .0028804     .064906
```

```
------------------------------------------------------------------------------
       ccool |   .0266642   .0310448     0.859   0.397      -.036652    .0899804
      celec1 |   -38.0156   9.330971    -4.074   0.000     -57.04624   -18.98496
       _cons |  -8.911834   3.239962    -2.751   0.010     -15.51978   -2.303887
------------------------------------------------------------------------------

. predict pdco2
(13 missing values generated)

. gen pco2 = tco2 + pdco2
(13 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

         year        co2       pco2      pdco2       tco2
 50.     1998       1484    1487.34   -21.8518   1509.192

.
. /* 1.025 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.025*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   25.16
   Model |  35120.4497     4  8780.11243                Prob > F      =  0.0000
Residual |  10818.1052    31  348.971134                R-squared     =  0.7645
---------+------------------------------                Adj R-squared =  0.7341
   Total |  45938.5549    35  1312.53014                Root MSE      =  18.681

------------------------------------------------------------------------------
       dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
------------+-----------------------------------------------------------------
      dntek |   .2738227   .0333385      8.213   0.000       .2058283    .3418171
      cheat |   .0342849   .0152158      2.253   0.031       .0032521    .0653178
      ccool |   .0273154   .0310649      0.879   0.386      -.0360419    .0906727
     celec1 |  -38.70957   9.337021     -4.146   0.000      -57.75255   -19.66659
      _cons |  -14.99549   3.242063     -4.625   0.000      -21.60772    -8.38326
------------------------------------------------------------------------------

. predict pdco2
(13 missing values generated)

. gen pco2 = tco2 + pdco2
(13 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998
```

```
        year        co2       pco2      pdco2       tco2
 50.    1998       1484   1488.607   -27.9825    1516.59

.
. /* 1.03 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.03*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   25.72
   Model |    36087.49     4   9021.8725                Prob > F      =  0.0000
Residual |  10872.1551    31   350.71468                R-squared     =  0.7685
---------+------------------------------                Adj R-squared =  0.7386
   Total |  46959.6451    35  1341.70415                Root MSE      =  18.727

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |    .277282   .0334217      8.296   0.000        .209118    .3454461
   cheat |   .0346766   .0152538      2.273   0.030       .0035663    .0657869
   ccool |   .0279666   .0311424      0.898   0.376      -.0355488    .0914819
  celec1 |  -39.40348   9.360317     -4.210   0.000      -58.49397   -20.31299
   _cons |  -21.07913   3.250152     -6.486   0.000      -27.70786    -14.4504
------------------------------------------------------------------------------

. predict pdco2
(13 missing values generated)

. gen pco2 = tco2 + pdco2
(13 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

        year        co2       pco2      pdco2       tco2
 50.    1998       1484   1489.875  -34.11317   1523.988

.
. /* 1.035 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.035*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)
```

```
.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   26.20
   Model |  37067.9516     4  9266.98789                Prob > F      =  0.0000
Residual |  10966.2552    31  353.750167                R-squared     =  0.7717
---------+------------------------------                Adj R-squared =  0.7422
   Total |  48034.2067    35  1372.40591                Root MSE      =  18.808

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |    .280741    .033566      8.364   0.000       .2122826    .3491993
   cheat |   .0350684   .0153197      2.289   0.029       .0038237     .066313
   ccool |   .0286177   .0312769      0.915   0.367      -.0351719    .0924074
  celec1 |  -40.09737   9.400737     -4.265   0.000       -59.2703   -20.92444
   _cons |  -27.16277   3.264187     -8.321   0.000      -33.82012   -20.50541
------------------------------------------------------------------------------

. predict pdco2
(13 missing values generated)

. gen pco2 = tco2 + pdco2
(13 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

         year        co2       pco2      pdco2       tco2
 50.     1998       1484   1491.142  -40.24387   1531.386

.
. /* 1.04 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.04*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   26.57
   Model |  38061.9623     4  9515.49057                Prob > F      =  0.0000
Residual |  11100.3842    31  358.076911                R-squared     =  0.7742
---------+------------------------------                Adj R-squared =  0.7451
   Total |  49162.3465    35  1404.63847                Root MSE      =  18.923

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2842001   .0337707      8.416   0.000       .2153243    .3530758
```

```
------------------------------------------------------------------------------
       cheat |   .0354601   .0154131     2.301   0.028      .0040249    .0668952
       ccool |   .0292689   .0314676     0.930   0.359     -.0349097    .0934474
      celec1 |   -40.7913   9.458053    -4.313   0.000     -60.08112   -21.50147
       _cons |  -33.24643   3.284089   -10.123   0.000     -39.94437   -26.54848
------------------------------------------------------------------------------

. predict pdco2
(13 missing values generated)

. gen pco2 = tco2 + pdco2
(13 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

         year        co2       pco2      pdco2       tco2
 50.     1998       1484   1492.409  -46.37459   1538.784

.
. /* 1.045 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.045*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   26.86
   Model |  39069.4451     4  9767.36128                Prob > F      =  0.0000
Residual |  11274.5624    31  363.695561                R-squared     =  0.7760
---------+------------------------------                Adj R-squared =  0.7472
   Total |  50344.0075    35  1438.40022                Root MSE      =  19.071

------------------------------------------------------------------------------
        dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
-------------+----------------------------------------------------------------
       dntek |   .2876592   .0340346     8.452   0.000       .2182451    .3570732
       cheat |   .0358517   .0155335     2.308   0.028       .0041709    .0675326
       ccool |     .02992   .0317135     0.943   0.353      -.0347601    .0946001
      celec1 |  -41.48521   9.531968    -4.352   0.000      -60.92578   -22.04463
       _cons |  -39.33006   3.309754   -11.883   0.000      -46.08035   -32.57977
------------------------------------------------------------------------------

. predict pdco2
(13 missing values generated)

. gen pco2 = tco2 + pdco2
(13 missing values generated)

. sort year
```

```
. list year co2 pco2 pdco2 tco2 if year == 1998

        year        co2       pco2      pdco2       tco2
 50.    1998       1484   1493.677  -52.50525   1546.182

.
. /* 1.05 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.05*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   27.04
   Model |  40090.4755     4  10022.6189                Prob > F      =  0.0000
Residual |  11488.7676    31  370.605405                R-squared     =  0.7773
---------+------------------------------                Adj R-squared =  0.7485
   Total |   51579.243    35  1473.69266                Root MSE      =  19.251

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2911184   .0343564      8.473   0.000       .2210481    .3611887
   cheat |   .0362435   .0156804      2.311   0.028       .0042631    .0682238
   ccool |   .0305712   .0320133      0.955   0.347      -.0347205    .0958628
  celec1 |  -42.17914   9.622091     -4.384   0.000      -61.80352   -22.55475
   _cons |  -45.41371   3.341047    -13.593   0.000      -52.22782    -38.5996
------------------------------------------------------------------------------

. predict pdco2
(13 missing values generated)

. gen pco2 = tco2 + pdco2
(13 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

        year        co2       pco2      pdco2       tco2
 50.    1998       1484   1494.944  -58.63597    1553.58

.
. /* 1.055 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.055*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)
```

```
.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   27.14
   Model |  41124.9411     4  10281.2353                Prob > F      =  0.0000
Residual |  11743.0141    31  378.806907                R-squared     =  0.7779
---------+------------------------------                Adj R-squared =  0.7492
   Total |  52867.9552    35  1510.51301                Root MSE      =  19.463

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2945774   .0347345      8.481   0.000        .223736    .3654188
   cheat |   .0366352   .0158529      2.311   0.028        .0043029   .0689674
   ccool |   .0312222   .0323656      0.965   0.342       -.0347879   .0972324
  celec1 |  -42.87306   9.727977     -4.407   0.000       -62.7134   -23.03272
   _cons |  -51.49735   3.377813    -15.246   0.000      -58.38645   -44.60826
------------------------------------------------------------------------------

. predict pdco2
(13 missing values generated)

. gen pco2 = tco2 + pdco2
(13 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

        year        co2       pco2      pdco2       tco2
 50.    1998       1484   1496.211  -64.76665   1560.978

.
. /* 1.06 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.06*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   27.15
   Model |  42172.8941     4  10543.2235                Prob > F      =  0.0000
Residual |  12037.3103    31  388.300331                R-squared     =  0.7780
---------+------------------------------                Adj R-squared =  0.7493
   Total |  54210.2044    35  1548.86298                Root MSE      =  19.705

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
```

```
------------------------------------------------------------------------------
   dntek |   .2980364    .035167     8.475   0.000     .2263128    .3697601
   cheat |   .0370268   .0160504     2.307   0.028     .0042919    .0697617
   ccool |   .0318734   .0327687     0.973   0.338    -.0349588    .0987056
  celec1 |  -43.56694   9.849121    -4.423   0.000    -63.65435   -23.47952
   _cons |  -57.58099   3.419878   -16.837   0.000    -64.55587    -50.6061
------------------------------------------------------------------------------

. predict pdco2
(13 missing values generated)

. gen pco2 = tco2 + pdco2
(13 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

         year        co2       pco2      pdco2       tco2
 50.     1998       1484   1497.479  -70.89732   1568.376

.
. /* 1.065 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.065*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   27.08
   Model |  43234.3634     4  10808.5908                Prob > F      =  0.0000
Residual |  12371.6276    31  399.084762                R-squared     =  0.7775
---------+------------------------------                Adj R-squared =  0.7488
   Total |   55605.991    35   1588.7426                Root MSE      =  19.977

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .3014954    .035652     8.457   0.000       .2287826    .3742082
   cheat |   .0374186   .0162717     2.300   0.028       .0042322     .070605
   ccool |   .0325246   .0332206     0.979   0.335      -.0352293    .1002785
  celec1 |  -44.26088   9.984956    -4.433   0.000      -64.62533   -23.89643
   _cons |  -63.66465   3.467043   -18.363   0.000      -70.73573   -56.59357
------------------------------------------------------------------------------

. predict pdco2
(13 missing values generated)

. gen pco2 = tco2 + pdco2
(13 missing values generated)

. sort year
```

```
. list year co2 pco2 pdco2 tco2 if year == 1998

        year        co2       pco2      pdco2       tco2
 50.    1998       1484   1498.746  -77.02805   1575.774

.
. /* 1.07 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.07*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   26.94
   Model |  44309.3824     4  11077.3456                Prob > F      =  0.0000
Residual |  12745.9942    31  411.161103                R-squared     =  0.7766
---------+------------------------------                Adj R-squared =  0.7478
   Total |  57055.3766    35  1630.15362                Root MSE      =  20.277

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .3049547   .0361874      8.427   0.000         .23115    .3787595
   cheat |   .0378102   .0165161      2.289   0.029       .0041255     .071495
   ccool |   .0331757   .0337195      0.984   0.333      -.0355957    .1019471
  celec1 |  -44.95481    10.1349     -4.436   0.000      -65.62508   -24.28454
   _cons |  -69.74829   3.519109    -19.820   0.000      -76.92556   -62.57102
------------------------------------------------------------------------------

. predict pdco2
(13 missing values generated)

. gen pco2 = tco2 + pdco2
(13 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

        year        co2       pco2      pdco2       tco2
 50.    1998       1484   1500.013  -83.15871   1583.172

.
. /* 1.075 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.075*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
```

```
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   26.73
   Model |  45397.8136     4  11349.4534                Prob > F      =  0.0000
Residual |  13160.4247    31  424.529828                R-squared     =  0.7753
---------+------------------------------                Adj R-squared =  0.7463
   Total |  58558.2383    35  1673.09252                Root MSE      =  20.604

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .3084137    .036771      8.387   0.000       .2334187    .3834087
   cheat |   .0382019   .0167824      2.276   0.030       .0039739    .0724299
   ccool |   .0338268   .0342633      0.987   0.331      -.0360536    .1037073
  celec1 |   -45.6487   10.29835     -4.433   0.000      -66.65233   -24.64508
   _cons |  -75.83194   3.575862    -21.207   0.000      -83.12496   -68.53892
------------------------------------------------------------------------------

. predict pdco2
(13 missing values generated)

. gen pco2 = tco2 + pdco2
(13 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

         year        co2       pco2      pdco2       tco2
 50.     1998       1484   1501.281  -89.28941    1590.57

.
. /* 1.08 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.08*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   26.47
   Model |  46499.7699     4  11624.9425                Prob > F      =  0.0000
Residual |  13614.8701    31  439.189357                R-squared     =  0.7735
---------+------------------------------                Adj R-squared =  0.7443
   Total |    60114.64    35  1717.56114                Root MSE      =  20.957

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
```

```
---------+--------------------------------------------------------------------
   dntek |   .3118727   .0374005      8.339   0.000       .2355939    .3881516
   cheat |   .0385936   .0170697      2.261   0.031       .0037797    .0734076
   ccool |   .0344779   .0348499      0.989   0.330      -.0365988    .1055547
  celec1 |  -46.34262   10.47465     -4.424   0.000      -67.70581   -24.97943
   _cons |  -81.91558   3.637078    -22.522   0.000      -89.33344   -74.49771
------------------------------------------------------------------------------

. predict pdco2
(13 missing values generated)

. gen pco2 = tco2 + pdco2
(13 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

         year        co2       pco2      pdco2       tco2
 50.     1998       1484   1502.548  -95.42011   1597.968

.
. /* 1.085 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.085*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   26.15
   Model |  47615.2361     4   11903.809                Prob > F      =  0.0000
Residual |  14109.3557    31  455.140507                R-squared     =  0.7714
---------+------------------------------                Adj R-squared =  0.7419
   Total |  61724.5918    35  1763.55977                Root MSE      =  21.334

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .3153318   .0380736      8.282   0.000       .2376801    .3929836
   cheat |   .0389853    .017377      2.244   0.032       .0035448    .0744259
   ccool |   .0351292   .0354771      0.990   0.330      -.0372268    .1074852
  celec1 |  -47.03655   10.66317     -4.411   0.000      -68.78422   -25.28887
   _cons |  -87.99921   3.702537    -23.767   0.000      -95.55059   -80.44784
------------------------------------------------------------------------------

. predict pdco2
(13 missing values generated)

. gen pco2 = tco2 + pdco2
(13 missing values generated)
```

```
. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

        year        co2       pco2      pdco2       tco2
 50.    1998       1484   1503.815  -101.5508   1605.366

.
. /* 1.09 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.09*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   25.80
   Model |  48744.2128     4  12186.0532                Prob > F      =  0.0000
Residual |   14643.879    31  472.383192                R-squared     =  0.7690
---------+------------------------------                Adj R-squared =  0.7392
   Total |  63388.0918    35  1811.08834                Root MSE      =  21.734

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .3187909   .0387881      8.219   0.000        .239682    .3978999
   cheat |   .0393771   .0177031      2.224   0.034       .0032715    .0754827
   ccool |   .0357802   .0361429      0.990   0.330      -.0379336    .1094941
  celec1 |  -47.73049   10.86328     -4.394   0.000      -69.88629    -25.5747
   _cons |  -94.08287   3.772019    -24.942   0.000       -101.776   -86.38978
------------------------------------------------------------------------------

. predict pdco2
(13 missing values generated)

. gen pco2 = tco2 + pdco2
(13 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

        year        co2       pco2      pdco2       tco2
 50.    1998       1484   1505.082  -107.6815   1612.764

.
.
.
.
. log close
```

```
.
. /********
> *** Detrend using series as a function of time and time squared
> ********/
.
. sort year

. gen t = year - 1959

. gen t2 = t^2

.
. reg nonhitek t t2 if year > 1959 & year < 1998

  Source |       SS       df       MS                  Number of obs =      38
---------+------------------------------                F(  2,    35) = 3373.05
   Model |  70241913.8     2  35120956.9                Prob > F      =  0.0000
Residual |  364428.018    35  10412.2291                R-squared     =  0.9948
---------+------------------------------                Adj R-squared =  0.9945
   Total |  70606341.9    37  1908279.51                Root MSE      =  102.04

------------------------------------------------------------------------------
nonhitek |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
       t |   108.6737   6.195223     17.542   0.000       96.09674    121.2507
      t2 |   .3910398   .1540643      2.538   0.016       .0782728    .7038069
   _cons |    2175.67   52.39272     41.526   0.000       2069.307    2282.033
------------------------------------------------------------------------------

. pred tntek

. reg co2 t t2 if year > 1959 & year < 1998

  Source |       SS       df       MS                  Number of obs =      38
---------+------------------------------                F(  2,    35) =  141.13
   Model |  1173434.20     2  586717.098                Prob > F      =  0.0000
Residual |  145503.137    35  4157.23248                R-squared     =  0.8897
---------+------------------------------                Adj R-squared =  0.8834
   Total |  1318937.33    37  35646.9549                Root MSE      =  64.477

------------------------------------------------------------------------------
     co2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
       t |   33.95598   3.914598      8.674   0.000       26.00892    41.90304
      t2 |  -.4776876   .0973492     -4.907   0.000      -.6753169   -.2800584
   _cons |     776.02   33.10558     23.441   0.000       708.8121    843.2279
------------------------------------------------------------------------------

. pred tco2

.
. gen dntek = nonhitek - tntek

. gen dco2 = co2 - tco2

.
```

```
------------------------------------------------------------------------------
       dntek |   .3249791   .1333193     2.438   0.021      .0527047    .5972535
       cheat |    .025129   .0518355     0.485   0.631     -.0807331    .1309912
       ccool |   .0122978   .1024298     0.120   0.905     -.1968917    .2214873
      celec1 |   16.67516   42.00755     0.397   0.694     -69.11569     102.466
       _cons |   3.680069    11.4322     0.322   0.750      -19.6676    27.02774
------------------------------------------------------------------------------

.
. predict pdco2
(13 missing values generated)

. gen res = dco2 - pdco2
(13 missing values generated)

. sort year

. gen res1 = res[_n-1]
(14 missing values generated)

. reg res res1, noconstant

      Source |       SS       df       MS              Number of obs =      36
-------------+------------------------------           F(  1,    35) =  170.75
       Model |  101449.498     1  101449.498           Prob > F      =  0.0000
    Residual |  20795.2708    35  594.150595           R-squared     =  0.8299
-------------+------------------------------           Adj R-squared =  0.8250
       Total |  122244.769    36  3395.68803           Root MSE      =  24.375

------------------------------------------------------------------------------
         res |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        res1 |   .9551859    .073099    13.067   0.000      .8067871    1.103585
------------------------------------------------------------------------------

. predict reshat
(14 missing values generated)

.
. gen pco2 = tco2 + pdco2
(13 missing values generated)

. gen co2hat = tco2 + pdco2 + reshat
(14 missing values generated)

.
. sort year

. list year co2 pco2 co2hat if year > 1959

     +-------------------------------------+
     | year      co2      pco2     co2hat |
     |-------------------------------------|
 12. | 1960    787.9         .          . |
 13. | 1961    793.7         .          . |
 14. | 1962    826.6  861.1526          . |
 15. | 1963    858.6  882.0838   849.0797 |
 16. | 1964    895.2  914.7574    892.326 |
 17. | 1965    934.5  969.9254   951.2444 |
 18. | 1966    985.7  1017.398   983.5597 |
```

```
 19.      1967      1011.5   1027.084   996.8068
 20.      1968      1069.2   1074.772   1059.887
 21.      1969      1115.6   1087.439   1082.116
 22.      1970        1149   1069.444   1096.343
 23.      1971      1162.5   1097.739    1173.73
 24.      1972      1223.7   1156.702   1218.561
 25.      1973      1277.9   1195.143   1259.139
 26.      1974      1233.1   1187.084   1266.132
 27.      1975        1197   1173.222   1217.176
 28.      1976      1269.5   1206.286   1228.998
 29.      1977      1307.4   1240.279    1300.66
 30.      1978      1320.9   1297.921   1362.034
 31.      1979      1337.7   1291.802   1313.752
 32.      1980      1289.4   1275.659     1319.5
 33.      1981        1256   1284.841   1297.966
 34.      1982      1189.1   1225.455   1197.907
 35.      1983      1182.5    1249.35   1214.624
 36.      1984      1245.2   1309.361   1245.507
 37.      1985      1244.6   1338.548   1277.262
 38.      1986      1245.9   1348.877    1259.14
 39.      1987      1286.6   1371.523   1273.161
 40.      1988      1348.6   1409.235   1328.117
 41.      1989      1360.8   1427.823   1369.905
 42.      1990      1346.1   1395.736   1331.717
 43.      1991      1330.8   1359.754   1312.342
 44.      1992      1352.1   1367.159   1339.503
 45.      1993      1379.8    1374.64   1360.255
 46.      1994      1398.4   1377.574   1382.504
 47.      1995      1411.7    1368.92   1388.812
 48.      1996      1460.6   1373.958   1414.821
 49.      1997      1479.6   1374.753   1457.512
 50.      1998        1484   1373.336   1473.484

.
. /* Get the standard errors correct */
.
. drop pco2 pdco2

. reg dco2 dntek cheat ccool celec1 cnetsum cnumele cprpcoal if year > 1961 & y
> ear < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  7,    28) =    2.00
   Model |  47587.6488     7  6798.23554                Prob > F      =  0.0903
Residual |  94978.2503    28  3392.08037                R-squared     =  0.3338
---------+------------------------------                Adj R-squared =  0.1672
   Total |  142565.899    35   4073.3114                Root MSE      =  58.242

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2556151    .134049      1.907   0.067      -.0189719    .5302021
   cheat |     .01618   .0569826      0.284   0.779      -.1005436    .1329035
   ccool |  -.0196871   .1108926     -0.178   0.860      -.2468403    .2074661
  celec1 |    15.9527   35.29283      0.452   0.655      -56.34137    88.24678
 cnetsum |   1.974694   1.136384      1.738   0.093      -.3530843    4.302471
 cnumele |   .2231086   .3302875      0.675   0.505      -.4534547    .8996719
```

```
cprpcoal |  -1.098215   740.5721     -0.001   0.999      -1518.091    1515.895
   _cons |  -40.90295    23.1374     -1.768   0.088      -88.29775     6.49186
------------------------------------------------------------------------------

. predict jdco2
(13 missing values generated)

.
. reg celec dntek cheat ccool celec1 cnetsum cnumele cprpcoal if year > 1961 &
> year < 1998

  Source |       SS       df       MS              Number of obs =      36
---------+------------------------------           F(  7,    28) =    3.75
   Model |  2.00272606     7  .286103723           Prob > F      =  0.0055
Residual |  2.13727558    28  .076331271           R-squared     =  0.4838
---------+------------------------------           Adj R-squared =  0.3547
   Total |  4.14000164    35  .118285761           Root MSE      =  .27628

------------------------------------------------------------------------------
   celec |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |    .000102   .0006359     0.160   0.874      -.0012006    .0014045
   cheat |   .0002875   .0002703     1.064   0.297      -.0002662    .0008412
   ccool |   .0005813    .000526     1.105   0.279      -.0004962    .0016589
  celec1 |   .2379135   .1674189     1.421   0.166      -.1050286    .5808557
 cnetsum |   .0131577   .0053907     2.441   0.021       .0021154        .0242
 cnumele |  -.0047249   .0015668    -3.016   0.005      -.0079343   -.0015154
cprpcoal |   4.046307    3.51306     1.152   0.259      -3.149869    11.24248
   _cons |   .0293055   .1097571     0.267   0.791      -.1955218    .2541327
------------------------------------------------------------------------------

. predict jcelec
(13 missing values generated)

.
. newey jdco2 dntek cheat ccool celec1 jcelec if year > 1961 & year < 1998, t(y
> ear) lag(1)

Regression with Newey-West standard errors          Number of obs =      36
maximum lag : 1                                     F(  5,    30) =   16.78
                                                    Prob > F      =  0.0000

------------------------------------------------------------------------------
             |             Newey-West
       jdco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
-------------+----------------------------------------------------------------
       dntek |   .3249791   .0651013     4.992   0.000       .1920245    .4579337
       cheat |    .025129   .0196122     1.281   0.210      -.0149243    .0651824
       ccool |   .0122978   .0312907     0.393   0.697      -.0516064     .076202
      celec1 |   16.67517   16.87041     0.988   0.331      -17.77882    51.12915
      jcelec |   10.35778   28.35256     0.365   0.717      -47.54587    68.26143
       _cons |   3.680069   6.307196     0.583   0.564      -9.200944    16.56108
------------------------------------------------------------------------------

.
. log close
```

```
.
. /********
> *** Detrend the series
> ********/
.
. sort year

. gen dntek = nonhitek[_n] - 1.02808*nonhitek[_n - 1]
(1 missing value generated)

. gen dco2 = co2[_n] - 1.007727*co2[_n - 1]
(1 missing value generated)

.
. gen tntek = 1.02808*nonhitek[_n-1]
(1 missing value generated)

. gen tco2 = 1.007727*co2[_n-1]
(1 missing value generated)

.
. gen cheat = htdgyear[_n] - htdgyear[_n-1]
(1 missing value generated)

. gen ccool = cldgyear[_n] - cldgyear[_n-1]
(1 missing value generated)

. gen cfoss = ffppcomr[_n] - ffppcomr[_n-1]
(1 missing value generated)

. gen cres = eleprrer[_n] - eleprrer[_n-1]
(1 missing value generated)

. gen ccom = eleprcor[_n] - eleprcor[_n-1]
(1 missing value generated)

. gen ccoal = ffppcoar[_n] - ffppcoar[_n-1]
(1 missing value generated)

. gen cgas = ffppngr[_n] - ffppngr[_n-1]
(1 missing value generated)

. gen coil = ffppoilr[_n] - ffppoilr[_n-1]
(1 missing value generated)

. gen cnumref = numrefin[_n] - numrefin[_n-1]
(1 missing value generated)

. gen crefcap = refincap[_n] - refincap[_n-1]
(1 missing value generated)

. gen cnetsum = netsumca[_n] - netsumca[_n-1]
(1 missing value generated)

. gen cextra = extralos[_n] - extralos[_n-1]
(1 missing value generated)
```

```
. gen cpdctu = cpvtyund[_n] - cpvtyund[_n-1]
(2 missing values generated)

. gen cpdcts = cpvtysur[_n] - cpvtysur[_n-1]
(2 missing values generated)

. gen cnumele = numeleut[_n] - numeleut[_n-1]
(1 missing value generated)

. gen propcoal = hrscoal/hrstotal

. gen cprpcoal = propcoal[_n] - propcoal[_n-1]
(1 missing value generated)

. gen cres1 = cres[_n-1]
(2 missing values generated)

. gen ccom1 = ccom[_n-1]
(2 missing values generated)

. gen cfoss1 = cfoss[_n-1]
(2 missing values generated)

. gen ccoal1 = ccoal[_n-1]
(2 missing values generated)

. gen cgas1 = cgas[_n-1]
(2 missing values generated)

. gen coil1 = coil[_n-1]
(2 missing values generated)

.
.
. /*******
> *** Residential Electricity
> *******/
.
. reg dco2 dntek cheat ccool cres1 cres (dntek cheat ccool cres1 cnetsum cnumel
> e cprpcoal) if year < 1998 & year > 1960
                                                                      (2SLS)
  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  5,    30) =   20.35
   Model |  33204.5064     5  6640.90127                Prob > F      =  0.0000
Residual |  9618.61781    30  320.620594                R-squared     =  0.7754
---------+------------------------------                Adj R-squared =  0.7380
   Total |  42823.1242    35  1223.51783                Root MSE      =  17.906

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
    cres |  -38.19457    25.0231     -1.526   0.137      -89.29855    12.90941
   dntek |   .2037115   .0497293      4.096   0.000       .1021506    .3052723
   cheat |   .0284406   .0148786      1.912   0.066      -.0019455    .0588268
   ccool |   .0136161   .0307071      0.443   0.661      -.0490961    .0763283
   cres1 |  -20.30153   13.78901     -1.472   0.151      -48.46244    7.859374
```

```
       _cons |   3.802331   3.430736     1.108   0.277     -3.204166    10.80883
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

.
. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
. test cres cres1

 ( 1)  cres = 0.0
 ( 2)  cres1 = 0.0

       F(  2,    30) =    9.40
            Prob > F =    0.0007


.
. gen res = abs(co2 - pco2)
(2 missing values generated)

. gen pres = abs(co2 - pco2)/co2
(2 missing values generated)

. sort year

. egen sres = sum(res) if year > 1961 & year < 1998
(3 missing values generated)

. egen spres = sum(pres) if year > 1961 & year < 1998
(3 missing values generated)

. replace sres = sres/36
(36 real changes made)

. replace spres = spres/36
(36 real changes made)

. list sres spres if year == 1997

         sres      spres
  6.  12.53774   .0103448

.
. sort year

. list year co2 pco2

        year        co2       pco2
  1.    1960      787.9          .
  2.    1961      793.7          .
  3.    1962      826.6   833.2172
  4.    1963      858.6   868.6913
  5.    1964      895.2   896.0519
```

```
  6.      1965       934.5   953.1162
  7.      1966       985.7   1010.504
  8.      1967      1011.5   1012.588
  9.      1968      1069.2   1056.961
 10.      1969      1115.6   1119.938
 11.      1970        1149   1137.622
 12.      1971      1162.5   1169.539
 13.      1972      1223.7   1197.881
 14.      1973      1277.9   1253.107
 15.      1974      1233.1   1228.765
 16.      1975        1197    1195.57
 17.      1976      1269.5   1231.474
 18.      1977      1307.4   1286.804
 19.      1978      1320.9   1353.797
 20.      1979      1337.7    1335.69
 21.      1980      1289.4   1297.376
 22.      1981        1256   1261.197
 23.      1982      1189.1   1200.138
 24.      1983      1182.5   1205.921
 25.      1984      1245.2   1242.179
 26.      1985      1244.6   1279.089
 27.      1986      1245.9   1261.297
 28.      1987      1286.6   1276.935
 29.      1988      1348.6   1333.497
 30.      1989      1360.8   1380.504
 31.      1990      1346.1   1348.214
 32.      1991      1330.8    1327.44
 33.      1992      1352.1    1345.84
 34.      1993      1379.8    1371.45
 35.      1994      1398.4   1396.819
 36.      1995      1411.7   1406.316
 37.      1996      1460.6   1431.828
 38.      1997      1479.6   1476.042
 39.      1998        1484   1484.589

.
. /****
> *** Summary Stats
> *******/
.
. su dco2 dntek cheat ccool cfoss cres ccom ccoal cgas coil cnumref crefcap cne
> tsum cextra cpdctu cpdcts cnumele cprpcoal if year < 1998

Variable |     Obs        Mean    Std. Dev.       Min        Max
---------+--------------------------------------------------------
    dco2 |      37    9.487894    34.52911  -76.60513   63.25078
   dntek |      37    .4687974    94.94416  -235.7253   192.0416
   cheat |      37   -4.918919    216.0386       -710        353
   ccool |      37   -1.351351    104.9924       -291        256
   cfoss |      37    .0108108    .3211125      -1.15    .8200002
    cres |      37        -.1    .3391166  -.7000008          1
    ccom |      37   -.0945946    .3299377  -.6000004          1
   ccoal |      37   -.0018919    .1437946       -.13        .74
    cgas |      37    .0362162    .2346079       -.71        .49
    coil |      37    .0143243     .816056      -2.61        2.22
 cnumref |      37   -3.918919    10.48644        -43          14
 crefcap |      37    .1516216    .4648567  -1.029999        1.16
```

```
    cnetsum |        37    14.72432    9.749998           2    43.79999
     cextra |        37    .0113514    .0297361       -.04         .05
     cpdctu |        37    -.472973    3.286539     -19.91         .26
     cpdcts |        37   -.3635135    3.328039     -19.95    .8099995
    cnumele |        37    63.97297    42.49607         -54         137
   cprpcoal |        37    .0010541    .0144497  -.0297088    .0360969

.
. log close
```

1/7/00

	Hi-Tek V-A (Billions 1992$)	GDP (")	Non-Hitek (")
1981 Q3	28.7287	4591.93	4563.20
1990 Q3	80.7081	6112.29	6031.58

	GDP (1996 chained Billions)	$\frac{1992}{1996}$ =
1981 Q3	~~6643.9~~ 5030.0	$\frac{1}{1.0954}$
1990 Q3	~~6643.9~~ 6695.4	

⇒ Trend Non-Hitek GDP = 3.148 %

5/24/00

	SAAR 1992$ Hi-Tek VA	GDP (1996$)	GDP (1992)	1992 NHTK2 Non-Hitek
~~1981 Q3~~				
1981 Q3	28.25	5056.8	4616.86	4588.61
1990 Q3	79.45	6719.4	6134.81	6055.36

≈ 3.13% Trend.

→ After GDP revisions.

```
.
. /********
> *** Detrend the series
> ********/
.
. sort year

. gen dntek = nonhitek[_n] - 1.03148*nonhitek[_n - 1]
(1 missing value generated)

. gen dco2 = co2[_n] - 1.007727*co2[_n - 1]
(1 missing value generated)

.
. gen tntek = 1.03148*nonhitek[_n-1]
(1 missing value generated)

. gen tco2 = 1.007727*co2[_n-1]
(1 missing value generated)

.
. gen cheat = htdgyear[_n] - htdgyear[_n-1]
(1 missing value generated)

. gen ccool = cldgyear[_n] - cldgyear[_n-1]
(1 missing value generated)

. gen cfoss = ffppcomr[_n] - ffppcomr[_n-1]
(1 missing value generated)

. gen cres = eleprrer[_n] - eleprrer[_n-1]
(1 missing value generated)

. gen ccom = eleprcor[_n] - eleprcor[_n-1]
(1 missing value generated)

. gen ccoal = ffppcoar[_n] - ffppcoar[_n-1]
(1 missing value generated)

. gen cgas = ffppngr[_n] - ffppngr[_n-1]
(1 missing value generated)

. gen coil = ffppoilr[_n] - ffppoilr[_n-1]
(1 missing value generated)

. gen cnumref = numrefin[_n] - numrefin[_n-1]
(1 missing value generated)

. gen crefcap = refincap[_n] - refincap[_n-1]
(1 missing value generated)

. gen cnetsum = netsumca[_n] - netsumca[_n-1]
(1 missing value generated)

. gen cextra = extralos[_n] - extralos[_n-1]
(1 missing value generated)
```

```
. gen cpdctu = cpvtyund[_n] - cpvtyund[_n-1]
(2 missing values generated)

. gen cpdcts = cpvtysur[_n] - cpvtysur[_n-1]
(2 missing values generated)

. gen cnumele = numeleut[_n] - numeleut[_n-1]
(1 missing value generated)

. gen propcoal = hrscoal/hrstotal

. gen cprpcoal = propcoal[_n] - propcoal[_n-1]
(1 missing value generated)

. gen cres1 = cres[_n-1]
(2 missing values generated)

. gen ccom1 = ccom[_n-1]
(2 missing values generated)

. gen cfoss1 = cfoss[_n-1]
(2 missing values generated)

. gen ccoal1 = ccoal[_n-1]
(2 missing values generated)

. gen cgas1 = cgas[_n-1]
(2 missing values generated)

. gen coil1 = coil[_n-1]
(2 missing values generated)

.
. /*******
> *** Fossil Index
> *******/
.
. /* Current Foss Only */
.
. reg dco2 dntek cheat ccool cfoss if year < 1998

  Source |       SS       df       MS                  Number of obs =      37
---------+------------------------------                F(  4,    32) =   13.02
   Model |  26578.2509     4  6644.56272                Prob > F      =  0.0000
Residual |  16335.8787    32   510.49621                R-squared     =  0.6193
---------+------------------------------                Adj R-squared =  0.5718
   Total |  42914.1296    36  1192.05916                Root MSE      =  22.594

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2950632   .0444559      6.637   0.000       .2045095    .3856169
   cheat |   .0295247   .0180842      1.633   0.112      -.0073116     .066361
   ccool |   .0267653   .0377781      0.708   0.484      -.0501861    .1037168
   cfoss |  -8.444157   12.12046     -0.697   0.491      -33.13272     16.2444
   _cons |   10.76143   3.720339      2.893   0.007        3.18335    18.33951
```

```
. reg dco2 dntek cheat ccool cfoss (dntek cheat ccool cnumre crefcap) if year <
> 1998
                                                                      (2SLS)
  Source |       SS       df       MS                  Number of obs =      37
---------+------------------------------                F(  4,    32) =   11.15
   Model |  23761.1072     4   5940.2768                Prob > F      =  0.0000
Residual |  19153.0224    32   598.53195                R-squared     =  0.5537
---------+------------------------------                Adj R-squared =  0.4979
   Total |  42914.1296    36  1192.05916                Root MSE      =  24.465

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   cfoss |   20.02845   25.45074      0.787   0.437      -31.81302    71.86991
   dntek |    .319671   .0516945      6.184   0.000       .2143728    .4249693
   cheat |    .030556   .0195974      1.559   0.129      -.0093627    .0704747
   ccool |   .0378712    .041781      0.906   0.371      -.0472338    .1229762
   _cons |   10.55627   4.031438      2.618   0.013       2.344496    18.76804
------------------------------------------------------------------------------

. predict pdco2
(1 missing value generated)

. gen pco2 = tco2 + pdco2
(1 missing value generated)

.
. list year co2 pco2 if year == 1998

        year        co2       pco2
 39.    1998     1485.4   1466.833

.
. /* Lagged foss only */
.
. drop pdco2 pco2

. reg dco2 dntek cheat ccool cfoss1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   14.05
   Model |  27597.0144     4  6899.25359                Prob > F      =  0.0000
Residual |  15218.6723    31  490.924914                R-squared     =  0.6446
---------+------------------------------                Adj R-squared =  0.5987
   Total |  42815.6867    35  1223.30533                Root MSE      =  22.157

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2694691   .0467843      5.760   0.000       .1740518    .3648864
   cheat |   .0278148   .0180136      1.544   0.133      -.0089242    .0645538
   ccool |   .0247151   .0371063      0.666   0.510      -.0509636    .1003938
  cfoss1 |  -21.19378   12.71484     -1.667   0.106      -47.12586    4.738296
   _cons |   10.83366    3.69625      2.931   0.006       3.295114    18.37222
------------------------------------------------------------------------------
```

```
. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
. list year co2 pco2 if year == 1998

        year        co2       pco2
 39.    1998     1485.4   1476.503

.
. /* Current and lagged foss */
.
. drop pdco2 pco2

. reg dco2 dntek cheat ccool cfoss1 cfoss if year < 1998

  Source |       SS       df       MS              Number of obs =      36
---------+------------------------------           F(  5,    30) =   10.90
   Model |  27611.7716     5  5522.35431           Prob > F      =  0.0000
Residual |  15203.9152    30  506.797172           R-squared     =  0.6449
---------+------------------------------           Adj R-squared =  0.5857
   Total |  42815.6867    35  1223.30533           Root MSE      =  22.512

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2687645   .0477136      5.633   0.000       .1713203    .3662088
   cheat |   .0278002   .0183027      1.519   0.139       -.009579    .0651793
   ccool |   .0240458   .0379048      0.634   0.531      -.0533661    .1014578
  cfoss1 |  -20.42994   13.67229     -1.494   0.146      -48.35247    7.492595
   cfoss |  -2.181591   12.78464     -0.171   0.866      -28.29131    23.92813
   _cons |   10.84626   3.756252      2.888   0.007       3.174971    18.51755
------------------------------------------------------------------------------

. reg dco2 dntek cheat ccool cfoss1 cfoss (dntek cheat ccool cfoss1 cnumre cref
> cap) if year < 1998
                                                                      (2SLS)
  Source |       SS       df       MS              Number of obs =      36
---------+------------------------------           F(  5,    30) =    9.20
   Model |   24383.553     5  4876.71059           Prob > F      =  0.0000
Residual |  18432.1337    30  614.404458           R-squared     =  0.5695
---------+------------------------------           Adj R-squared =  0.4978
   Total |  42815.6867    35  1223.30533           Root MSE      =  24.787

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   cfoss |   30.08498   28.67437      1.049   0.302      -28.47588    88.64585
   dntek |   .2791855   .0531514      5.253   0.000       .1706359    .3877351
   cheat |   .0280164    .020153      1.390   0.175      -.0131415    .0691744
   ccool |   .0339446   .0424332      0.800   0.430      -.0527156    .1206047
  cfoss1 |  -31.72751   17.41058     -1.822   0.078      -67.28467     3.82964
   _cons |   10.65995   4.138365      2.576   0.015       2.208279    19.11162
```

```
. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
. list year co2 pco2 if year == 1998

        year        co2       pco2
 39.    1998     1485.4    1467.56

.
. /*******
> *** Coal Prices
> *******/
.
. /* Current Coal Only */
.
. drop pdco2 pco2

. reg dco2 dntek cheat ccool ccoal if year < 1998

  Source |       SS       df       MS                  Number of obs =      37
---------+------------------------------                F(  4,    32) =   13.00
   Model |   26568.114     4   6642.0285                Prob > F      =  0.0000
Residual |  16346.0156    32  510.812988                R-squared     =  0.6191
---------+------------------------------                Adj R-squared =  0.5715
   Total |  42914.1296    36  1192.05916                Root MSE      =  22.601

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |    .293008   .0453409      6.462   0.000       .2006517    .3853644
   cheat |   .0300217   .0180866      1.660   0.107      -.0068196     .066863
   ccool |   .0238948   .0385666      0.620   0.540      -.0546627    .1024524
   ccoal |  -19.14481   28.06847     -0.682   0.500      -76.31841     38.0288
   _cons |   10.62559   3.722092      2.855   0.007       3.043942    18.20725
------------------------------------------------------------------------------

. reg dco2 dntek cheat ccool ccoal (dntek cheat ccool cpdctu cpdcts) if year <
> 1998
                                                                      (2SLS)
  Source |       SS       df       MS                  Number of obs =      37
---------+------------------------------                F(  4,    32) =    5.10
   Model | -365.074834     4 -91.2687085                Prob > F      =  0.0027
Residual |  43279.2044    32  1352.47514                R-squared     =       .
---------+------------------------------                Adj R-squared =       .
   Total |  42914.1296    36  1192.05916                Root MSE      =  36.776

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   ccoal |  -222.9577   230.2258     -0.968   0.340      -691.9122    245.9968
   dntek |   .1934355   .1326507      1.458   0.155      -.0767651    .4636361
```

```
   cheat |   .0320567   .0295162     1.086   0.286     -.0280658    .0921792
   ccool |  -.0417282   .0960038    -0.435   0.667     -.2372816    .1538253
   _cons |   9.827239   6.120645     1.606   0.118     -2.640107    22.29458
------------------------------------------------------------------------------

. predict pdco2
(1 missing value generated)

. gen pco2 = tco2 + pdco2
(1 missing value generated)

.
. list year co2 pco2 if year == 1998

        year        co2       pco2
 39.    1998     1485.4   1466.537

.
. /* Lagged foss only */
.
. drop pdco2 pco2

. reg dco2 dntek cheat ccool ccoal1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   12.26
   Model |  26235.1467     4  6558.78667                Prob > F      =  0.0000
Residual |    16580.54    31   534.85613                R-squared     =  0.6127
---------+------------------------------                Adj R-squared =  0.5628
   Total |  42815.6867    35  1223.30533                Root MSE      =  23.127

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .3018354   .0452654      6.668   0.000        .209516    .3941549
   cheat |    .030036   .0187908      1.598   0.120      -.0082881      .06836
   ccool |    .030127   .0386135      0.780   0.441      -.0486257    .1088797
  ccoal1 |  -1.732004   27.50936     -0.063   0.950      -57.83772    54.37371
   _cons |   10.67016   3.857248      2.766   0.009       2.803248    18.53707
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
. list year co2 pco2 if year == 1998

        year        co2       pco2
 39.    1998     1485.4   1473.632

.
. /* Current and lagged foss */
.
. drop pdco2 pco2
```

```
. reg dco2 dntek cheat ccool ccoal1 ccoal if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  5,    30) =    9.73
   Model |  26485.9716     5  5297.19431                Prob > F      =  0.0000
Residual |  16329.7152    30  544.323839                R-squared     =  0.6186
---------+------------------------------                Adj R-squared =  0.5550
   Total |  42815.6867    35  1223.30533                Root MSE      =  23.331

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |    .293909   .0471336      6.236   0.000       .1976494    .3901686
   cheat |   .0298546   .0189582      1.575   0.126      -.0088633    .0685725
   ccool |   .0236718   .0400977      0.590   0.559      -.0582186    .1055622
  ccoal1 |   5.093006    29.5169      0.173   0.864      -55.18855    65.37456
   ccoal | -20.94069    30.84852     -0.679   0.502      -83.94177    42.06039
   _cons |   10.62306   3.891856      2.730   0.011        2.67483    18.57129
------------------------------------------------------------------------------

. reg dco2 dntek cheat ccool ccoal1 ccoal (dntek cheat ccool ccoal1 cpdctu cpdc
> ts) if year < 1998
                                                                      (2SLS)
  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  5,    30) =    1.36
   Model | -80248.9922     5 -16049.7984                Prob > F      =  0.2679
Residual |  123064.679    30  4102.15596                R-squared     =       .
---------+------------------------------                Adj R-squared =       .
   Total |  42815.6867    35  1223.30533                Root MSE      =  64.048

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   ccoal |   411.0347   655.8316      0.627   0.536      -928.3521    1750.421
   dntek |   .4574188   .2780996      1.645   0.110      -.1105363    1.025374
   cheat |   .0335955   .0523484      0.642   0.526      -.0733142    .1405053
   ccool |   .1568329   .2287072      0.686   0.498      -.3102496    .6239153
  ccoal1 |  -135.6969   226.9204     -0.598   0.554      -599.1302    327.7365
   _cons |   11.59459   10.78366      1.075   0.291      -10.42858    33.61777
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
. list year co2 pco2 if year == 1998

         year        co2       pco2
 39.     1998     1485.4   1486.937

.
. /*******
> *** Oil Prices
```

```
> *******/
.
. /* Current Coal Only */
.
. drop pdco2 pco2

. reg dco2 dntek cheat ccool coil if year < 1998

  Source |       SS       df       MS                  Number of obs =      37
---------+------------------------------                F(  4,    32) =   12.84
   Model |  26440.9343     4  6610.23358                Prob > F      =  0.0000
Residual |  16473.1953    32  514.787353                R-squared     =  0.6161
---------+------------------------------                Adj R-squared =  0.5682
   Total |  42914.1296    36  1192.05916                Root MSE      =  22.689

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |    .299496    .043824      6.834   0.000       .2102294    .3887626
   cheat |   .0286743   .0183254      1.565   0.127      -.0086534    .0660021
   ccool |   .0277012   .0379809      0.729   0.471      -.0496635    .1050658
    coil |  -2.195324   4.739168     -0.463   0.646      -11.84869    7.458046
   _cons |   10.71355   3.735018      2.868   0.007       3.105564    18.32153
------------------------------------------------------------------------------

. reg dco2 dntek cheat ccool coil (dntek cheat ccool cnumre crefcap) if year <
> 1998
                                                                        (2SLS)
  Source |       SS       df       MS                  Number of obs =      37
---------+------------------------------                F(  4,    32) =   11.44
   Model |  24246.2102     4  6061.55255                Prob > F      =  0.0000
Residual |  18667.9194    32  583.372482                R-squared     =  0.5650
---------+------------------------------                Adj R-squared =  0.5106
   Total |  42914.1296    36  1192.05916                Root MSE      =  24.153

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
    coil |   7.590067    9.65071      0.786   0.437      -12.06779    27.24792
   dntek |   .3122672   .0478718      6.523   0.000       .2147556    .4097788
   cheat |   .0338279   .0199834      1.693   0.100       -.006877    .0745328
   ccool |    .038211   .0413862      0.923   0.363         -.04609     .122512
   _cons |   10.65578   3.976345      2.680   0.012        2.55623    18.75533
------------------------------------------------------------------------------

. predict pdco2
(1 missing value generated)

. gen pco2 = tco2 + pdco2
(1 missing value generated)

.
. list year co2 pco2 if year == 1998

        year        co2       pco2
 39.    1998     1485.4   1465.158
```

```
.
. /* Lagged foss only */
.
. drop pdco2 pco2

. reg dco2 dntek cheat ccool coil1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   12.87
   Model |   26725.727     4  6681.43175                Prob > F      =  0.0000
Residual |  16089.9597    31  519.030958                R-squared     =  0.6242
---------+------------------------------                Adj R-squared =  0.5757
   Total |  42815.6867    35  1223.30533                Root MSE      =  22.782

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2774027   .0506027      5.482   0.000       .1741979    .3806075
   cheat |   .0284117   .0185431      1.532   0.136      -.0094072    .0662305
   ccool |   .0263869    .038206      0.691   0.495      -.0515348    .1043087
   coil1 |  -5.280549   5.419812     -0.974   0.337      -16.33433     5.77323
   _cons |   10.71304   3.799519      2.820   0.008       2.963871    18.46221
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
. list year co2 pco2 if year == 1998

         year        co2       pco2
 39.     1998     1485.4   1476.443

.
. /* Current and lagged foss */
.
. drop pdco2 pco2

. reg dco2 dntek cheat ccool coil1 coil if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  5,    30) =   10.02
   Model |  26775.1056     5  5355.02113                Prob > F      =  0.0000
Residual |  16040.5811    30  534.686036                R-squared     =  0.6254
---------+------------------------------                Adj R-squared =  0.5629
   Total |  42815.6867    35  1223.30533                Root MSE      =  23.123

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2767223   .0514089      5.383   0.000       .1717313    .3817133
   cheat |   .0276717   .0189775      1.458   0.155      -.0110855     .066429
   ccool |   .0249385   .0390697      0.638   0.528      -.0548525    .1047296
   coil1 |  -5.010263    5.57238     -0.899   0.376      -16.39058    6.370055
```

```
    coil |  -1.487905   4.896153    -0.304   0.763     -11.48718    8.511374
   _cons |   10.72705   3.856669     2.781   0.009      2.850679    18.60342
------------------------------------------------------------------------------

. reg dco2 dntek cheat ccool coil1 coil (dntek cheat ccool coil1 cnumre crefcap
> ) if year < 1998
                                                                      (2SLS)
  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------               F(  5,    30) =    8.67
   Model |  23923.6235     5  4784.7247                 Prob > F      =  0.0000
Residual |  18892.0632    30  629.735441               R-squared     =  0.5588
---------+------------------------------               Adj R-squared =  0.4852
   Total |  42815.6867    35  1223.30533               Root MSE      =  25.095

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
    coil |   9.818926   10.42164      0.942   0.354      -11.46491    31.10276
   dntek |   .2818929    .055942      5.039   0.000       .1676442    .3961416
   cheat |   .0332944   .0210723      1.580   0.125       -.009741    .0763298
   ccool |   .0359451   .0432893      0.830   0.413      -.0524634    .1243536
   coil1 |  -7.064215    6.26288     -1.128   0.268      -19.85472    5.726293
   _cons |    10.6206     4.1863      2.537   0.017       2.071039    19.17017
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
. list year co2 pco2 if year == 1998

         year        co2       pco2
 39.     1998     1485.4   1466.255

.
. /*******
> *** Residential Electricity
> *******/
.
. /* Current only */
.
. drop pdco2 pco2

. reg dco2 dntek cheat ccool cres if year < 1998

  Source |       SS       df       MS                  Number of obs =      37
---------+------------------------------               F(  4,    32) =   21.04
   Model |  31091.3447     4  7772.83618                Prob > F      =  0.0000
Residual |  11822.7849    32  369.462028               R-squared     =  0.7245
---------+------------------------------               Adj R-squared =  0.6901
   Total |  42914.1296    36  1192.05916               Root MSE      =  19.221

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
```

```
---------+------------------------------------------------------------------
   dntek |   .2260852   .0424549      5.325   0.000      .1396075    .3125629
   cheat |    .027363   .0153955      1.777   0.085     -.0039965    .0587226
   ccool |   .0175285   .0320766      0.546   0.589     -.0478093    .0828664
    cres |  -39.20205    10.9207     -3.590   0.001     -61.44679   -16.95732
   _cons |   6.495383   3.374005      1.925   0.063     -.3772403    13.36801
---------+------------------------------------------------------------------

. reg dco2 dntek cheat ccool cres (dntek cheat ccool cnetsum cnumele cprpcoal)
> if year < 1998
                                                                      (2SLS)
  Source |       SS       df       MS                  Number of obs =      37
---------+------------------------------                F(  4,    32) =   18.27
   Model |  29905.5283     4  7476.38207                Prob > F      =  0.0000
Residual |  13008.6013    32  406.518791                R-squared     =  0.6969
---------+------------------------------                Adj R-squared =  0.6590
   Total |  42914.1296    36  1192.05916                Root MSE      =  20.162

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
    cres |   -58.7668   20.38959     -2.882   0.007       -100.299   -17.23457
   dntek |   .1880178     .05532      3.399   0.002       .0753346    .3007009
   cheat |   .0261315    .016184      1.615   0.116      -.0068341    .0590972
   ccool |   .0112749    .034076      0.331   0.743      -.0581356    .0806854
   _cons |   4.396674   3.974864      1.106   0.277      -3.699859    12.49321
------------------------------------------------------------------------------

. predict pdco2
(1 missing value generated)

. gen pco2 = tco2 + pdco2
(1 missing value generated)

.
. list year co2 pco2 if year == 1998

         year        co2       pco2
 39.     1998     1485.4   1477.643

.
. /* Lagged only */
. drop pdco2 pco2

. reg dco2 dntek cheat ccool cres1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   21.35
   Model |  31411.6358     4  7852.90894                Prob > F      =  0.0000
Residual |  11404.0509    31  367.872611                R-squared     =  0.7336
---------+------------------------------                Adj R-squared =  0.6993
   Total |  42815.6867    35  1223.30533                Root MSE      =  19.18

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2810719   .0371414      7.568   0.000       .2053216    .3568222
```

```
   cheat |   .0354186   .0156214     2.267   0.030      .0035587    .0672786
   ccool |   .0317545   .0319954     0.992   0.329     -.0335006    .0970096
   cres1 |  -35.99991   9.594969    -3.752   0.001     -55.56898   -16.43084
   _cons |   7.110895   3.336568     2.131   0.041      .3059192    13.91587
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
. list year co2 pco2 if year == 1998

         year        co2       pco2
 39.     1998     1485.4   1475.724

.
. /* current and lagged prices */
.
. drop pdco2 pco2

. reg dco2 dntek cheat ccool cres1 cres if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  5,    30) =   20.16
   Model |  32994.5459     5  6598.90918                Prob > F      =  0.0000
Residual |   9821.1408    30   327.37136                R-squared     =  0.7706
---------+------------------------------                Adj R-squared =  0.7324
   Total |  42815.6867    35  1223.30533                Root MSE      =  18.093

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2373973   .0402753     5.894   0.000       .1551442    .3196505
   cheat |   .0320169   .0148174     2.161   0.039       .0017558    .0622779
   ccool |   .0228764   .0304517     0.751   0.458      -.0393142    .0850669
   cres1 |  -25.36774   10.26191    -2.472   0.019      -46.32535   -4.410121
    cres |  -25.63882   11.65978    -2.199   0.036      -49.45127   -1.826379
   _cons |   5.448693   3.237042     1.683   0.103      -1.162228    12.05961
------------------------------------------------------------------------------

. reg dco2 dntek cheat ccool cres1 cres (dntek cheat ccool cres1 cnetsum cnumel
> e cprpcoal) if year < 1998
                                                                      (2SLS)
  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  5,    30) =   19.01
   Model |  32698.8207     5  6539.76415                Prob > F      =  0.0000
Residual |   10116.866    30  337.228866                R-squared     =  0.7637
---------+------------------------------                Adj R-squared =  0.7243
   Total |  42815.6867    35  1223.30533                Root MSE      =  18.364

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
    cres |  -36.72072   26.67595    -1.377   0.179      -91.20027    17.75883
```

```
------------------------------------------------------------------------------
       dntek |   .2185198   .0577016     3.787   0.001     .1006774    .3363623
       cheat |   .0305465   .0153697     1.987   0.056    -.0008426    .0619356
       ccool |    .019039   .0319962     0.595   0.556    -.0463061     .084384
       cres1 |  -20.77218   14.37943    -1.445   0.159     -50.1389    8.594546
       _cons |   4.730238   3.632671     1.302   0.203    -2.688665    12.14914
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
. list year co2 pco2 if year == 1998

         year        co2       pco2
 39.     1998     1485.4   1477.432

.
. /*******
> *** Commercial Electricity
> *******/
.
. /* Current only */
.
. drop pdco2 pco2

. reg dco2 dntek cheat ccool ccom if year < 1998

  Source |       SS       df       MS              Number of obs =      37
---------+------------------------------           F(  4,    32) =   22.67
   Model |   31719.926     4   7929.9815           Prob > F      =  0.0000
Residual |  11194.2036    32  349.818863           R-squared     =  0.7391
---------+------------------------------           Adj R-squared =  0.7065
   Total |  42914.1296    36  1192.05916           Root MSE      =  18.703

------------------------------------------------------------------------------
        dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
-------------+----------------------------------------------------------------
       dntek |   .2283654   .0404288     5.649   0.000       .1460147    .3107161
       cheat |   .0315505   .0149721     2.107   0.043       .0010534    .0620476
       ccool |   .0165476   .0312172     0.530   0.600      -.0470399     .080135
        ccom |  -42.00009   10.70038    -3.925   0.000      -63.79605   -20.20412
       _cons |    6.46953   3.262096     1.983   0.056      -.1751425     13.1142
------------------------------------------------------------------------------

. reg dco2 dntek cheat ccool ccom (dntek cheat ccool cnetsum cnumele cprpcoal)
> if year < 1998
                                                                      (2SLS)
  Source |       SS       df       MS              Number of obs =      37
---------+------------------------------           F(  4,    32) =   20.12
   Model |  31298.6293     4  7824.65732           Prob > F      =  0.0000
Residual |  11615.5003    32  362.984385           R-squared     =  0.7293
---------+------------------------------           Adj R-squared =  0.6955
   Total |  42914.1296    36  1192.05916           Root MSE      =  19.052
```

```
------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
    ccom |  -53.74289   19.09151     -2.815   0.008      -92.63102   -14.85476
   dntek |   .2076769    .049584      4.188   0.000       .1066776    .3086762
   cheat |   .0320314   .0152647      2.098   0.044       .0009382    .0631246
   ccool |   .0127699   .0321965      0.397   0.694      -.0528123    .0783521
   _cons |    5.28657   3.678994      1.437   0.160      -2.207297    12.78044
------------------------------------------------------------------------------

. predict pdco2
(1 missing value generated)

. gen pco2 = tco2 + pdco2
(1 missing value generated)

.
. list year co2 pco2 if year == 1998

         year        co2       pco2
 39.     1998     1485.4   1479.097

.
. /* Lagged only */
. drop pdco2 pco2

. reg dco2 dntek cheat ccool ccom1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   17.02
   Model |  29418.7547     4  7354.68868                Prob > F      =  0.0000
Residual |   13396.932    31  432.159097                R-squared     =  0.6871
---------+------------------------------                Adj R-squared =  0.6467
   Total |  42815.6867    35  1223.30533                Root MSE      =  20.788

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |    .277966   .0407883      6.815   0.000       .1947778    .3611542
   cheat |   .0356403   .0169871      2.098   0.044        .000995    .0702857
   ccool |   .0300232   .0346759      0.866   0.393      -.0406987    .1007451
   ccom1 |  -29.46616   10.85278     -2.715   0.011      -51.60056   -7.33177
   _cons |   7.818191   3.622846      2.158   0.039       .4293482    15.20703
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
. list year co2 pco2 if year == 1998

         year        co2       pco2
 39.     1998     1485.4   1471.796
```

```
.
. /* current and lagged prices */
.
. drop pdco2 pco2

. reg dco2 dntek cheat ccool ccom1 ccom if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  5,    30) =   18.25
   Model |  32221.9527     5  6444.39053                Prob > F      =  0.0000
Residual |  10593.7341    30  353.124469                R-squared     =  0.7526
---------+------------------------------                Adj R-squared =  0.7113
   Total |  42815.6867    35  1223.30533                Root MSE      =  18.792

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2296071   .0406696      5.646   0.000       .1465486    .3126655
   cheat |     .03401   .0153663      2.213   0.035       .0026279    .0653921
   ccool |   .0188358   .0315956      0.596   0.556        -.045691    .0833626
   ccom1 |  -14.53645   11.14994     -1.304   0.202      -37.30766     8.23476
    ccom |   -34.4339   12.22146     -2.817   0.008      -59.39346    -9.47434
   _cons |   5.829398   3.350063      1.740   0.092      -1.012344    12.67114
------------------------------------------------------------------------------

. reg dco2 dntek cheat ccool ccom1 ccom (dntek cheat ccool ccom1 cnetsum cnumel
> e cprpcoal) if year < 1998
                                                                      (2SLS)
  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  5,    30) =   16.90
   Model |  32088.9239     5  6417.78478                Prob > F      =  0.0000
Residual |  10726.7628    30  357.558761                R-squared     =  0.7495
---------+------------------------------                Adj R-squared =  0.7077
   Total |  42815.6867    35  1223.30533                Root MSE      =  18.909

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
    ccom |  -41.93512   27.99561     -1.498   0.145      -99.10979    15.23955
   dntek |   .2190724   .0540585      4.053   0.000       .1086702    .3294745
   cheat |   .0336549   .0155082      2.170   0.038       .0019828    .0653269
   ccool |   .0163987   .0328265      0.500   0.621       -.0506421    .0834395
   ccom1 |   -11.2841   15.64569     -0.721   0.476      -43.23685    20.66866
   _cons |   5.396151   3.670671      1.470   0.152       -2.10036    12.89266
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
. list year co2 pco2 if year == 1998

         year        co2       pco2
 39.     1998     1485.4   1477.243
```

```
.
.
.
.
. log close
```

```
.
. /********
> *** Detrend using series as a function of time and time squared
> ********/
.
. sort year

. gen t = year - 1959

. gen t2 = t^2

.
. reg nonhitek t t2 if year > 1959 & year < 1998

  Source |       SS       df       MS                  Number of obs =      38
---------+------------------------------                F(  2,    35) = 3838.06
   Model |  78121131.4     2  39060565.7                Prob > F      =  0.0000
Residual |  356201.041    35  10177.1726                R-squared     =  0.9955
---------+------------------------------                Adj R-squared =  0.9952
   Total |  78477332.4    37  2121008.98                Root MSE      =  100.88

------------------------------------------------------------------------------
nonhitek |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
       t |   89.57803   6.124895     14.625   0.000       77.14383    102.0122
      t2 |   1.045451   .1523153      6.864   0.000       .7362346    1.354668
   _cons |   2119.505   51.79796     40.919   0.000        2014.35    2224.661
------------------------------------------------------------------------------

. pred tntek

. reg co2 t t2 if year > 1959 & year < 1998

  Source |       SS       df       MS                  Number of obs =      38
---------+------------------------------                F(  2,    35) =  141.08
   Model |  1173540.35     2  586770.175                Prob > F      =  0.0000
Residual |  145569.29     35  4159.12256                R-squared     =  0.8896
---------+------------------------------                Adj R-squared =  0.8833
   Total |  1319109.64    37  35651.6119                Root MSE      =  64.491

------------------------------------------------------------------------------
     co2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
       t |   33.95098   3.915488      8.671   0.000       26.00211    41.89984
      t2 |  -.4775276   .0973713     -4.904   0.000      -.6752018   -.2798534
   _cons |   776.0454   33.11311     23.436   0.000       708.8222    843.2686
------------------------------------------------------------------------------

. pred tco2

.
. gen dntek = nonhitek - tntek

. gen dco2 = co2 - tco2

.
```

```
. gen cheat = htdgyear[_n] - htdgyear[_n-1]
(1 missing value generated)

. gen ccool = cldgyear[_n] - cldgyear[_n-1]
(1 missing value generated)

. gen cfoss1 = ffppcomr[_n-1] - ffppcomr[_n-2]
(2 missing values generated)

. gen celec = eleprrer[_n] - eleprrer[_n-1]
(1 missing value generated)

. gen celec1 = eleprrer[_n-1] - eleprrer[_n-2]
(2 missing values generated)

. gen cnumref = numrefin[_n] - numrefin[_n-1]
(1 missing value generated)

. gen crefcap = refincap[_n] - refincap[_n-1]
(1 missing value generated)

. gen cnetsum = netsumca[_n] - netsumca[_n-1]
(1 missing value generated)

. gen cextra = extralos[_n] - extralos[_n-1]
(1 missing value generated)

. gen cpdctu = cpvtyund[_n] - cpvtyund[_n-1]
(2 missing values generated)

. gen cpdcts = cpvtysur[_n] - cpvtysur[_n-1]
(2 missing values generated)

. gen cnumele = numeleut[_n] - numeleut[_n-1]
(1 missing value generated)

. gen propcoal = hrscoal/hrstotal

. gen cprpcoal = propcoal[_n] - propcoal[_n-1]
(1 missing value generated)

.
.
. reg dco2 dntek cheat ccool celec1 celec (dntek cheat ccool celec1 cnetsum cnu
> mele cprpcoal) if year > 1961 & year < 1998
                                                                      (2SLS)
  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  5,    30) =    2.40
   Model |  45401.9393     5  9080.38787                Prob > F      =  0.0605
Residual |  97227.5073    30  3240.91691                R-squared     =  0.3183
---------+------------------------------                Adj R-squared =  0.2047
   Total |  142629.447    35  4075.12705                Root MSE      =  56.929

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   celec |   26.42162   61.93791      0.427   0.673      -100.0725    152.9157
```

```
   dntek |   .4161244   .1316183     3.162   0.004      .1473241    .6849248
   cheat |   .0308702   .0483983     0.638   0.528     -.0679724    .1297128
   ccool |   .0277248   .0961688     0.288   0.775     -.1686782    .2241278
  celec1 |   25.65706   39.58241     0.648   0.522     -55.18101    106.4951
   _cons |   5.249081   10.69211     0.491   0.627     -16.58713    27.08529
------------------------------------------------------------------------------

.
. predict pdco2
(2 missing values generated)

. gen res = dco2 - pdco2
(2 missing values generated)

. sort year

. gen res1 = res[_n-1]
(3 missing values generated)

. reg res res1, noconstant

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------               F(  1,    35) =  125.39
   Model |  86714.4116     1  86714.4116               Prob > F      =  0.0000
Residual |  24203.6713    35  691.533465               R-squared     =  0.7818
---------+------------------------------               Adj R-squared =  0.7756
   Total |  110918.083    36  3081.05786               Root MSE      =  26.297

------------------------------------------------------------------------------
     res |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
    res1 |   .9443893   .0843358     11.198   0.000       .7731785      1.1156
------------------------------------------------------------------------------

. predict reshat
(3 missing values generated)

.
. gen pco2 = tco2 + pdco2
(2 missing values generated)

. gen co2hat = tco2 + pdco2 + reshat
(3 missing values generated)

.
. sort year

. list year co2 pco2 co2hat if year > 1959

        year        co2       pco2     co2hat
  1.    1960      787.9          .          .
  2.    1961      793.7          .          .
  3.    1962      826.6   849.9268          .
  4.    1963      858.6    868.607   846.5774
  5.    1964      895.2   906.7777   897.3272
  6.    1965      934.5   966.4081   955.4742
  7.    1966      985.7   1017.399   987.2653
```

```
  8.      1967     1011.5   1029.756   999.8203
  9.      1968     1069.2   1086.026   1068.785
 10.      1969     1115.6   1092.537   1076.646
 11.      1970       1149   1068.521   1090.301
 12.      1971     1162.5   1100.846    1176.85
 13.      1972     1223.7   1166.109   1224.335
 14.      1973     1277.9   1205.359   1259.747
 15.      1974     1233.1   1206.354    1274.86
 16.      1975       1197   1181.993   1207.252
 17.      1976     1269.5   1203.174   1217.347
 18.      1977     1307.4   1242.638   1305.275
 19.      1978     1320.9    1301.18   1362.341
 20.      1979     1337.7   1293.344   1311.967
 21.      1980     1289.4   1287.324   1329.213
 22.      1981       1256   1289.778   1291.739
 23.      1982     1189.1   1210.842   1178.943
 24.      1983     1182.5   1232.261   1211.728
 25.      1984     1245.2   1294.459   1247.465
 26.      1985     1244.6    1328.91    1282.39
 27.      1986     1245.9   1340.387   1260.766
 28.      1987     1286.6   1368.801   1279.569
 29.      1988     1348.6   1415.759   1338.129
 30.      1989     1360.8   1430.417   1366.993
 31.      1990     1346.1   1395.804   1330.059
 32.      1991     1330.8   1357.438   1310.499
 33.      1992     1352.1   1369.327    1344.17
 34.      1993     1379.8    1374.29   1358.021
 35.      1994     1398.4   1380.811   1386.014
 36.      1995     1411.7   1370.931   1387.542
 37.      1996     1460.5    1371.36   1409.862
 38.      1997       1480   1377.845   1462.027
 39.      1998     1485.4   1366.091   1462.565

.
. /* Get the standard errors correct */
.
. drop pco2 pdco2

. reg dco2 dntek cheat ccool celec1 cnetsum cnumele cprpcoal if year > 1961 & y
> ear < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  7,    28) =    2.46
   Model |  54375.6598     7   7767.9514                Prob > F      =  0.0420
Residual |  88253.7868    28  3151.92096                R-squared     =  0.3812
---------+------------------------------                Adj R-squared =  0.2265
   Total |  142629.447    35  4075.12705                Root MSE      =  56.142

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .3373357   .1369748      2.463   0.020       .0567555    .6179158
   cheat |   .0256565   .0548182      0.468   0.643      -.0866335    .1379466
   ccool |   .0037869   .1078407      0.035   0.972      -.2171149    .2246886
  celec1 |   26.00033   34.67416      0.750   0.460      -45.02647    97.02713
 cnetsum |   1.977037   1.088829      1.816   0.080      -.2533281    4.207403
 cnumele |   .1434818   .3187264      0.450   0.656      -.5093996    .7963631
```

```
cprpcoal |   113.3318   717.8583     0.158   0.876     -1357.134    1583.798
   _cons |  -35.69672    22.4991    -1.587   0.124     -81.78403    10.39059
------------------------------------------------------------------------------

. predict jdco2
(2 missing values generated)

.
. reg celec dntek cheat ccool celec1 cnetsum cnumele cprpcoal if year > 1961 &
> year < 1998

  Source |       SS       df       MS              Number of obs =      36
---------+------------------------------           F(  7,    28) =    3.75
   Model |  2.00184997     7  .285978568           Prob > F      =  0.0055
Residual |  2.13815167    28   .07636256           R-squared     =  0.4835
---------+------------------------------           Adj R-squared =  0.3544
   Total |  4.14000164    35  .118285761           Root MSE      =  .27634

------------------------------------------------------------------------------
   celec |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .0000804   .0006742     0.119   0.906      -.0013006    .0014615
   cheat |    .000283   .0002698     1.049   0.303      -.0002697    .0008357
   ccool |   .0005762   .0005308     1.085   0.287      -.0005112    .0016635
  celec1 |   .2366476   .1706705     1.387   0.177      -.1129551    .5862504
 cnetsum |   .0130937   .0053594     2.443   0.021       .0021155    .0240718
 cnumele |  -.0046928   .0015688    -2.991   0.006      -.0079063   -.0014792
cprpcoal |    4.05057   3.533388     1.146   0.261      -3.187247    11.28839
   _cons |   .0279816   .1107434     0.253   0.802      -.1988659    .2548291
------------------------------------------------------------------------------

. predict jcelec
(2 missing values generated)

.
. newey jdco2 dntek cheat ccool celec1 jcelec if year > 1961 & year < 1998, t(y
> ear) lag(1)

Regression with Newey-West standard errors          Number of obs =      36
maximum lag : 1                                     F(  5,    30) =   28.14
                                                    Prob > F      =  0.0000

------------------------------------------------------------------------------
             |               Newey-West
       jdco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
-------------+----------------------------------------------------------------
       dntek |   .4161244   .0605748     6.870   0.000       .2924141    .5398348
       cheat |   .0308702   .0181335     1.702   0.099      -.0061633    .0679038
       ccool |   .0277248    .029021     0.955   0.347      -.0315439    .0869935
      celec1 |   25.65706   15.10975     1.698   0.100      -5.201163    56.51528
      jcelec |   26.42162   25.88745     1.021   0.316       -26.4476    79.29084
       _cons |   5.249081   5.649554     0.929   0.360      -6.288848    16.78701
------------------------------------------------------------------------------

.
. log close
```

```
.
. /********
> *** Detrend the series
> ********/
.
. sort year

. gen dntek = nonhitek[_n] - 1.03148*nonhitek[_n - 1]
(1 missing value generated)

. gen tntek = 1.03148*nonhitek[_n-1]
(1 missing value generated)

.
. gen cheat = htdgyear[_n] - htdgyear[_n-1]
(1 missing value generated)

. gen ccool = cldgyear[_n] - cldgyear[_n-1]
(1 missing value generated)

. gen cfoss = ffppcomr[_n] - ffppcomr[_n-1]
(1 missing value generated)

. gen celec = eleprrer[_n] - eleprrer[_n-1]
(1 missing value generated)

. gen cnumref = numrefin[_n] - numrefin[_n-1]
(1 missing value generated)

. gen crefcap = refincap[_n] - refincap[_n-1]
(1 missing value generated)

. gen cnetsum = netsumca[_n] - netsumca[_n-1]
(1 missing value generated)

. gen cextra = extralos[_n] - extralos[_n-1]
(1 missing value generated)

. gen cpdctu = cpvtyund[_n] - cpvtyund[_n-1]
(2 missing values generated)

. gen cpdcts = cpvtysur[_n] - cpvtysur[_n-1]
(2 missing values generated)

. gen cnumele = numeleut[_n] - numeleut[_n-1]
(1 missing value generated)

. gen propcoal = hrscoal/hrstotal

. gen cprpcoal = propcoal[_n] - propcoal[_n-1]
(1 missing value generated)

. gen celec1 = celec[_n-1]
(2 missing values generated)

. gen cfoss1 = cfoss[_n-1]
```

```
(2 missing values generated)

.
.
.
. /* 1 */
. gen tco2 = co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   20.24
   Model |   30102.967     4  7525.74175                Prob > F      =  0.0000
Residual |  11527.5507    31  371.856475                R-squared     =  0.7231
---------+------------------------------                Adj R-squared =  0.6874
   Total |  41630.5177    35  1189.44336                Root MSE      =  19.284

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2757985   .0373419      7.386   0.000       .1996392    .3519579
   cheat |   .0347627   .0157057      2.213   0.034       .0027306    .0667947
   ccool |   .0306602   .0321682      0.953   0.348      -.0349473    .0962677
  celec1 |   -34.9154   9.646783     -3.619   0.001      -54.59015   -15.24066
   _cons |   16.49371   3.354586      4.917   0.000       9.651983    23.33543
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

         year        co2       pco2      pdco2       tco2
 39.     1998     1485.4   1473.885   -6.11469       1480

.
. /* 1.0025 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.0025*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998
```

```
  Source |       SS       df       MS              Number of obs =      36
---------+------------------------------           F(  4,    31) =   20.61
   Model |   30523.176     4  7630.79401           Prob > F      =  0.0000
Residual |  11476.7904    31  370.219047           R-squared     =  0.7267
---------+------------------------------           Adj R-squared =  0.6915
   Total |  41999.9665    35  1199.99904           Root MSE      =  19.241

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2775046   .0372596      7.448   0.000       .2015131    .3534961
   cheat |   .0349749   .0156711      2.232   0.033       .0030134    .0669363
   ccool |   .0310143   .0320973      0.966   0.341      -.0344486    .0964772
  celec1 |  -35.26631   9.625521     -3.664   0.001      -54.89769   -15.63493
   _cons |   13.45798   3.347192      4.021   0.000       6.631338    20.28463
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

         year        co2       pco2      pdco2       tco2
 39.     1998     1485.4    1474.48  -9.219649     1483.7

.
. /* 1.005 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.005*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS              Number of obs =      36
---------+------------------------------           F(  4,    31) =   20.97
   Model |  30946.4647     4  7736.61618           Prob > F      =  0.0000
Residual |  11436.3686    31  368.915115           R-squared     =  0.7302
---------+------------------------------           Adj R-squared =  0.6953
   Total |  42382.8333    35  1210.93809           Root MSE      =  19.207

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2792108    .037194      7.507   0.000       .2033532    .3550684
   cheat |   .0351872   .0156435      2.249   0.032       .0032821    .0670923
   ccool |   .0313683   .0320407      0.979   0.335      -.0339792    .0967158
```

```
------------------------------------------------------------------------------
      celec1 |  -35.61719   9.608555    -3.707   0.001    -55.21397   -16.02042
       _cons |   10.42226   3.341293     3.119   0.004     3.607646    17.23687
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

        year        co2       pco2      pdco2       tco2
 39.    1998     1485.4   1475.075  -12.32473     1487.4

.
. /* 1.0075 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.0075*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   21.32
   Model |  31372.7804     4   7843.1951                Prob > F      =  0.0000
Residual |  11406.2653    31  367.944041                R-squared     =  0.7334
---------+------------------------------                Adj R-squared =  0.6990
   Total |  42779.0457    35  1222.25845                Root MSE      =  19.182

------------------------------------------------------------------------------
       dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
------------+-----------------------------------------------------------------
      dntek |   .2809169    .037145      7.563   0.000       .2051593    .3566746
      cheat |   .0353994   .0156229      2.266   0.031       .0035363    .0672625
      ccool |   .0317224   .0319985      0.991   0.329      -.0335391    .0969838
     celec1 |  -35.96808     9.5959     -3.748   0.001      -55.53904   -16.39711
      _cons |   7.386531   3.336892      2.214   0.034       .5808952    14.19217
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998
```

```
        year        co2       pco2      pdco2       tco2
 39.    1998     1485.4    1475.67  -15.42975     1491.1

.
. /* 1.01 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.01*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   21.65
   Model |  31802.1815     4  7950.54537                Prob > F      =  0.0000
Residual |  11386.5162    31  367.306973                R-squared     =  0.7364
---------+------------------------------                Adj R-squared =  0.7023
   Total |  43188.6977    35  1233.96279                Root MSE      =  19.165

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2826233   .0371128      7.615   0.000       .2069312    .3583154
   cheat |   .0356116   .0156093      2.281   0.030       .0037762    .0674471
   ccool |   .0320764   .0319708      1.003   0.323      -.0331285    .0972814
  celec1 |  -36.31896    9.58759     -3.788   0.001      -55.87297   -16.76494
   _cons |   4.350814   3.334002      1.305   0.202      -2.448928    11.15056
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

        year        co2       pco2      pdco2       tco2
 39.    1998     1485.4   1476.265   -18.5348     1494.8

.
. /* 1.015 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.015*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
```

```
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   22.25
   Model |  32670.0036     4   8167.5009                Prob > F      =  0.0000
Residual |  11378.0128    31  367.032672                R-squared     =  0.7417
---------+------------------------------                Adj R-squared =  0.7084
   Total |  44048.0164    35  1258.51475                Root MSE      =  19.158

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2860354   .0370989      7.710   0.000       .2103716    .3616992
   cheat |   .0360361   .0156035      2.309   0.028       .0042125    .0678596
   ccool |   .0327845   .0319589      1.026   0.313      -.0323961    .0979651
  celec1 |  -37.02067   9.584009     -3.863   0.001      -56.56738   -17.47395
   _cons |  -1.720619   3.332757     -0.516   0.609      -8.517821    5.076584
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

         year        co2       pco2      pdco2       tco2
 39.     1998     1485.4   1477.455   -24.7448     1502.2

.
. /* 1.02 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.02*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   22.79
   Model |  33550.0692     4  8387.51731                Prob > F      =  0.0000
Residual |  11410.8466    31  368.091827                R-squared     =  0.7462
---------+------------------------------                Adj R-squared =  0.7135
   Total |  44960.9159    35   1284.5976                Root MSE      =  19.186

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2894477   .0371524      7.791   0.000       .2136748    .3652206
   cheat |   .0364605    .015626      2.333   0.026        .004591    .0683299
```

```
   ccool |   .0334926    .032005      1.046   0.303       -.031782    .0987671
  celec1 |  -37.72243   9.597827     -3.930   0.000      -57.29733   -18.14754
   _cons |  -7.792066   3.337562     -2.335   0.026      -14.59907   -.9850633
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

         year        co2       pco2      pdco2       tco2
 39.     1998     1485.4   1478.645  -30.95484     1509.6

.
. /* 1.025 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.025*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   23.24
   Model |  34442.3379     4  8610.58447                Prob > F      =  0.0000
Residual |  11485.0183    31  370.484463                R-squared     =  0.7499
---------+------------------------------                Adj R-squared =  0.7177
   Total |  45927.3562    35  1312.21018                Root MSE      =  19.248

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2928599    .037273      7.857   0.000       .2168411    .3688787
   cheat |    .036885   .0156767      2.353   0.025       .0049121    .0688579
   ccool |   .0342007   .0321088      1.065   0.295      -.0312856    .0996871
  celec1 |  -38.42425    9.62897     -3.990   0.000      -58.06266   -18.78584
   _cons |  -13.86353   3.348392     -4.140   0.000      -20.69262   -7.034435
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998
```

```
        year        co2        pco2       pdco2        tco2
 39.    1998     1485.4    1479.835   -37.16489        1517

.
. /* 1.03 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.03*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   23.61
   Model |  35346.8238     4  8836.70594                Prob > F      =  0.0000
Residual |  11600.5284    31  374.210595                R-squared     =  0.7529
---------+------------------------------                Adj R-squared =  0.7210
   Total |  46947.3522    35  1341.35292                Root MSE      =  19.345

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2962724     .03746      7.909   0.000       .2198723    .3726725
   cheat |   .0373094   .0157554      2.368   0.024       .0051762    .0694427
   ccool |   .0349089   .0322699      1.082   0.288      -.0309059    .1007237
  celec1 |  -39.12601   9.677271     -4.043   0.000      -58.86293   -19.38909
   _cons |  -19.93496   3.365188     -5.924   0.000      -26.79831   -13.07162
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

        year        co2        pco2       pdco2        tco2
 39.    1998     1485.4    1481.025   -43.3749      1524.4

.
. /* 1.035 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.035*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)
```

```
.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   23.90
   Model |  36263.4323     4  9065.85807                Prob > F      =  0.0000
Residual |  11757.3869    31  379.270547                R-squared     =  0.7552
---------+------------------------------                Adj R-squared =  0.7236
   Total |  48020.8192    35  1372.02341                Root MSE      =  19.475

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .2996845   .0377124      7.947   0.000       .2227697    .3765994
   cheat |   .0377339   .0158615      2.379   0.024       .0053842    .0700837
   ccool |   .0356171   .0324873      1.096   0.281      -.0306412    .1018754
  celec1 |  -39.82774   9.742477     -4.088   0.000      -59.69766   -19.95783
   _cons |  -26.00641   3.387863     -7.676   0.000        -32.916   -19.09682
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

        year        co2       pco2      pdco2       tco2
 39.    1998     1485.4   1482.215  -49.58496     1531.8

.
. /* 1.04 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.04*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   24.11
   Model |  37192.2798     4  9298.06994                Prob > F      =  0.0000
Residual |  11955.5803    31  385.663879                R-squared     =  0.7567
---------+------------------------------                Adj R-squared =  0.7254
   Total |    49147.86    35  1404.22457                Root MSE      =  19.638

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .3030968   .0380289      7.970   0.000       .2255364    .3806573
```

```
   cheat |   .0381584   .0159946     2.386   0.023      .0055371    .0707797
   ccool |   .0363252     .03276     1.109   0.276     -.0304892    .1031396
  celec1 |  -40.52952   9.824248    -4.125   0.000     -60.56621   -20.49284
   _cons |  -32.07787   3.416298    -9.390   0.000     -39.04545   -25.11028
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

         year        co2       pco2      pdco2       tco2
 39.     1998     1485.4   1483.405  -55.79503     1539.2

.
. /* 1.045 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.045*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   24.23
   Model |  38133.2977     4  9533.32444                Prob > F      =  0.0000
Residual |   12195.119    31  393.390935                R-squared     =  0.7577
---------+------------------------------                Adj R-squared =  0.7264
   Total |  50328.4167    35  1437.95476                Root MSE      =  19.834

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .3065091    .038408     7.980   0.000       .2281755    .3848427
   cheat |   .0385828   .0161541     2.388   0.023       .0056364    .0715293
   ccool |   .0370333   .0330865     1.119   0.272      -.0304471    .1045138
  celec1 |  -41.23128   9.922178    -4.155   0.000      -61.46769   -20.99486
   _cons |   -38.1493   3.450352   -11.057   0.000      -45.18634   -31.11226
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

. sort year
```

```
. list year co2 pco2 pdco2 tco2 if year == 1998

        year        co2       pco2      pdco2       tco2
 39.    1998     1485.4   1484.595  -62.00504     1546.6

.
. /* 1.05 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.05*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   24.28
   Model |  39086.5589     4  9771.63973                Prob > F      =  0.0000
Residual |   12475.989    31  402.451258                R-squared     =  0.7580
---------+------------------------------                Adj R-squared =  0.7268
   Total |  51562.5479    35  1473.21565                Root MSE      =  20.061

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .3099216   .0388477      7.978   0.000       .2306911    .3891521
   cheat |   .0390073   .0163391      2.387   0.023       .0056836    .0723311
   ccool |   .0377415   .0334654      1.128   0.268      -.0305116    .1059946
  celec1 |  -41.93306   10.03579     -4.178   0.000      -62.40118   -21.46493
   _cons |  -44.22075   3.489859    -12.671   0.000      -51.33837   -37.10314
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

        year        co2       pco2      pdco2       tco2
 39.    1998     1485.4   1485.785   -68.2151       1554

.
. /* 1.055 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.055*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)
```

```
.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   24.25
   Model |  40051.9539     4  10012.9885                Prob > F      =  0.0000
Residual |  12798.1994    31  412.845142                R-squared     =  0.7578
---------+------------------------------                Adj R-squared =  0.7266
   Total |  52850.1533    35  1510.00438                Root MSE      =  20.319

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .3133338   .0393462      7.964   0.000       .2330867    .3935809
   cheat |   .0394318   .0165487      2.383   0.023       .0056805    .0731831
   ccool |   .0384495   .0338948      1.134   0.265      -.0306794    .1075784
  celec1 |  -42.63482   10.16456     -4.194   0.000      -63.36557   -21.90407
   _cons |  -50.29219   3.534637    -14.228   0.000      -57.50113   -43.08325
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

         year        co2        pco2       pdco2       tco2
 39.     1998     1485.4    1486.975   -74.42515     1561.4

.
. /* 1.06 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.06*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   24.16
   Model |   41029.533     4  10257.3833                Prob > F      =  0.0000
Residual |    13161.76    31  424.572905                R-squared     =  0.7571
---------+------------------------------                Adj R-squared =  0.7258
   Total |  54191.2931    35  1548.32266                Root MSE      =  20.605

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
```

```
   dntek |    .316746   .0399011      7.938   0.000       .2353671    .3981249
   cheat |   .0398562   .0167821      2.375   0.024       .0056289    .0740835
   ccool |   .0391577   .0343728      1.139   0.263      -.0309462    .1092615
  celec1 |  -43.33655   10.30792     -4.204   0.000      -64.35969   -22.31341
   _cons |  -56.36363    3.58449    -15.724   0.000      -63.67425   -49.05302
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

         year        co2       pco2      pdco2       tco2
 39.     1998     1485.4   1488.165  -80.63515     1568.8

.
. /* 1.065 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.065*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   24.00
   Model |  42019.3269     4  10504.8317                Prob > F      =  0.0000
Residual |   13566.641    31  437.633579                R-squared     =  0.7559
---------+------------------------------                Adj R-squared =  0.7244
   Total |  55585.9679    35  1588.17051                Root MSE      =   20.92

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .3201582   .0405102      7.903   0.000       .2375371    .4027793
   cheat |   .0402808   .0170383      2.364   0.025        .005531    .0750305
   ccool |   .0398658   .0348975      1.142   0.262      -.0313081    .1110398
  celec1 |  -44.03834   10.46526     -4.208   0.000      -65.38239    -22.6943
   _cons |  -62.43509   3.639206    -17.156   0.000       -69.8573   -55.01289
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

. sort year
```

```
. list year co2 pco2 pdco2 tco2 if year == 1998

        year        co2       pco2      pdco2       tco2
 39.    1998     1485.4   1489.355  -86.84523     1576.2

.
. /* 1.07 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.07*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   23.79
   Model |  43021.3606     4  10755.3401                Prob > F      =  0.0000
Residual |  14012.8785    31  452.028338                R-squared     =  0.7543
---------+------------------------------                Adj R-squared =  0.7226
   Total |   57034.239    35  1629.54969                Root MSE      =  21.261

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .3235707   .0411711      7.859   0.000       .2396018    .4075397
   cheat |   .0407052   .0173162      2.351   0.025       .0053885    .0760218
   ccool |   .0405739   .0354668      1.144   0.261      -.0317611     .112909
  celec1 |  -44.74012   10.63598     -4.206   0.000      -66.43235   -23.04788
   _cons |  -68.50653   3.698572    -18.522   0.000      -76.04982   -60.96325
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

        year        co2       pco2      pdco2       tco2
 39.    1998     1485.4   1490.545  -93.05525     1583.6

.
. /* 1.075 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.075*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
```

```
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   23.54
   Model |  44035.5037     4  11008.8759                Prob > F      =  0.0000
Residual |  14500.4754    31   467.75727                R-squared     =  0.7523
---------+------------------------------                Adj R-squared =  0.7203
   Total |  58535.9791    35  1672.45655                Root MSE      =  21.628

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .3269829   .0418812      7.807   0.000       .2415655    .4124002
   cheat |   .0411296   .0176149      2.335   0.026       .0052038    .0770555
   ccool |    .041282   .0360786      1.144   0.261      -.0323007    .1148648
  celec1 |  -45.44186   10.81945     -4.200   0.000      -67.50827   -23.37545
   _cons |  -74.57798    3.76237    -19.822   0.000      -82.25139   -66.90458
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

        year        co2       pco2      pdco2       tco2
 39.    1998     1485.4   1491.735  -99.26529       1591

.
. /* 1.08 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.08*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   23.24
   Model |  45061.8723     4  11265.4681                Prob > F      =  0.0000
Residual |  15029.3888    31  484.818994                R-squared     =  0.7499
---------+------------------------------                Adj R-squared =  0.7176
   Total |  60091.2611    35  1716.89317                Root MSE      =  22.019

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
```

```
------------------------------------------------------------------------------
      dntek |   .3303951   .0426382     7.749   0.000     .2434339    .4173563
      cheat |   .0415541   .0179333     2.317   0.027     .0049789    .0781293
      ccool |   .0419901   .0367307     1.143   0.262    -.0329226    .1169028
     celec1 |  -46.14363     11.015    -4.189   0.000    -68.60887   -23.67838
      _cons |  -80.64942   3.830373   -21.055   0.000    -88.46152   -72.83732
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

         year        co2       pco2      pdco2       tco2
 39.     1998     1485.4   1492.925  -105.4753     1598.4

.
. /* 1.085 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.085*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   22.90
   Model |  46100.4464     4  11525.1116                Prob > F      =  0.0000
Residual |  15599.6443    31  503.214332                R-squared     =  0.7472
---------+------------------------------                Adj R-squared =  0.7145
   Total |  61700.0907    35  1762.85973                Root MSE      =  22.432

------------------------------------------------------------------------------
        dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
-------------+----------------------------------------------------------------
       dntek |   .3338074   .0434396     7.684   0.000       .2452118    .4224031
       cheat |   .0419786   .0182703     2.298   0.028       .0047159    .0792412
       ccool |   .0426983    .037421     1.141   0.263      -.0336224     .119019
      celec1 |   -46.8454   11.22203    -4.174   0.000      -69.73288   -23.95792
       _cons |  -86.72086   3.902364   -22.223   0.000      -94.67978   -78.76194
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)
```

```
. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

        year        co2       pco2      pdco2       tco2
 39.    1998     1485.4   1494.115  -111.6853     1605.8

.
. /* 1.09 */
. drop tco2 dco2 pdco2 pco2

. gen tco2 = 1.09*co2[_n-1]
(1 missing value generated)

. gen dco2 = co2[_n] - tco2
(1 missing value generated)

.
. reg dco2 dntek cheat ccool celec1 if year < 1998

  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  4,    31) =   22.54
   Model |  47151.2263     4  11787.8066                Prob > F      =  0.0000
Residual |  16211.2396    31  522.943213                R-squared     =  0.7442
---------+------------------------------                Adj R-squared =  0.7111
   Total |  63362.4659    35  1810.35617                Root MSE      =  22.868

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
   dntek |   .3372197   .0442829      7.615   0.000       .2469041    .4275354
   cheat |   .0424031   .0186251      2.277   0.030        .004417    .0803891
   ccool |   .0434064   .0381475      1.138   0.264       -.034396    .1212088
  celec1 |   -47.5472    11.4399     -4.156   0.000      -70.87902   -24.21537
   _cons |  -92.79232   3.978126    -23.326   0.000      -100.9058   -84.67888
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

. gen pco2 = tco2 + pdco2
(2 missing values generated)

. sort year

. list year co2 pco2 pdco2 tco2 if year == 1998

        year        co2       pco2      pdco2       tco2
 39.    1998     1485.4   1495.304  -117.8954     1613.2

.
.
.
.
. log close
```

```
.
. /********
> *** Detrend the series
> ********/
.
. sort year

. gen dntek = nonhitek[_n] - 1.03148*nonhitek[_n - 1]
(1 missing value generated)

. gen dco2 = co2[_n] - 1.007727*co2[_n - 1]
(1 missing value generated)

.
. gen tntek = 1.03148*nonhitek[_n-1]
(1 missing value generated)

. gen tco2 = 1.007727*co2[_n-1]
(1 missing value generated)

.
. gen cheat = htdgyear[_n] - htdgyear[_n-1]
(1 missing value generated)

. gen ccool = cldgyear[_n] - cldgyear[_n-1]
(1 missing value generated)

. gen cfoss = ffppcomr[_n] - ffppcomr[_n-1]
(1 missing value generated)

. gen cres = eleprrer[_n] - eleprrer[_n-1]
(1 missing value generated)

. gen ccom = eleprcor[_n] - eleprcor[_n-1]
(1 missing value generated)

. gen ccoal = ffppcoar[_n] - ffppcoar[_n-1]
(1 missing value generated)

. gen cgas = ffppngr[_n] - ffppngr[_n-1]
(1 missing value generated)

. gen coil = ffppoilr[_n] - ffppoilr[_n-1]
(1 missing value generated)

. gen cnumref = numrefin[_n] - numrefin[_n-1]
(1 missing value generated)

. gen crefcap = refincap[_n] - refincap[_n-1]
(1 missing value generated)

. gen cnetsum = netsumca[_n] - netsumca[_n-1]
(1 missing value generated)

. gen cextra = extralos[_n] - extralos[_n-1]
(1 missing value generated)
```

```
. gen cpdctu = cpvtyund[_n] - cpvtyund[_n-1]
(2 missing values generated)

. gen cpdcts = cpvtysur[_n] - cpvtysur[_n-1]
(2 missing values generated)

. gen cnumele = numeleut[_n] - numeleut[_n-1]
(1 missing value generated)

. gen propcoal = hrscoal/hrstotal

. gen cprpcoal = propcoal[_n] - propcoal[_n-1]
(1 missing value generated)

. gen cres1 = cres[_n-1]
(2 missing values generated)

. gen ccom1 = ccom[_n-1]
(2 missing values generated)

. gen cfoss1 = cfoss[_n-1]
(2 missing values generated)

. gen ccoal1 = ccoal[_n-1]
(2 missing values generated)

. gen cgas1 = cgas[_n-1]
(2 missing values generated)

. gen coil1 = coil[_n-1]
(2 missing values generated)

.
.
. /*******
> *** Residential Electricity
> *******/
.
. reg dco2 dntek cheat ccool cres1 cres (dntek cheat ccool cres1 cnetsum cnumel
> e cprpcoal) if year < 1998 & year > 1960
                                                                      (2SLS)
  Source |       SS       df       MS                  Number of obs =      36
---------+------------------------------                F(  5,    30) =   19.01
   Model |  32698.8207     5  6539.76415                Prob > F      =  0.0000
Residual |   10116.866    30  337.228866                R-squared     =  0.7637
---------+------------------------------                Adj R-squared =  0.7243
   Total |  42815.6867    35  1223.30533                Root MSE      =  18.364

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
    cres |  -36.72072   26.67595     -1.377   0.179      -91.20027    17.75883
   dntek |   .2185198   .0577016      3.787   0.001       .1006774    .3363623
   cheat |   .0305465   .0153697      1.987   0.056      -.0008426    .0619356
   ccool |    .019039   .0319962      0.595   0.556      -.0463061     .084384
   cres1 |  -20.77218   14.37943     -1.445   0.159       -50.1389    8.594546
```

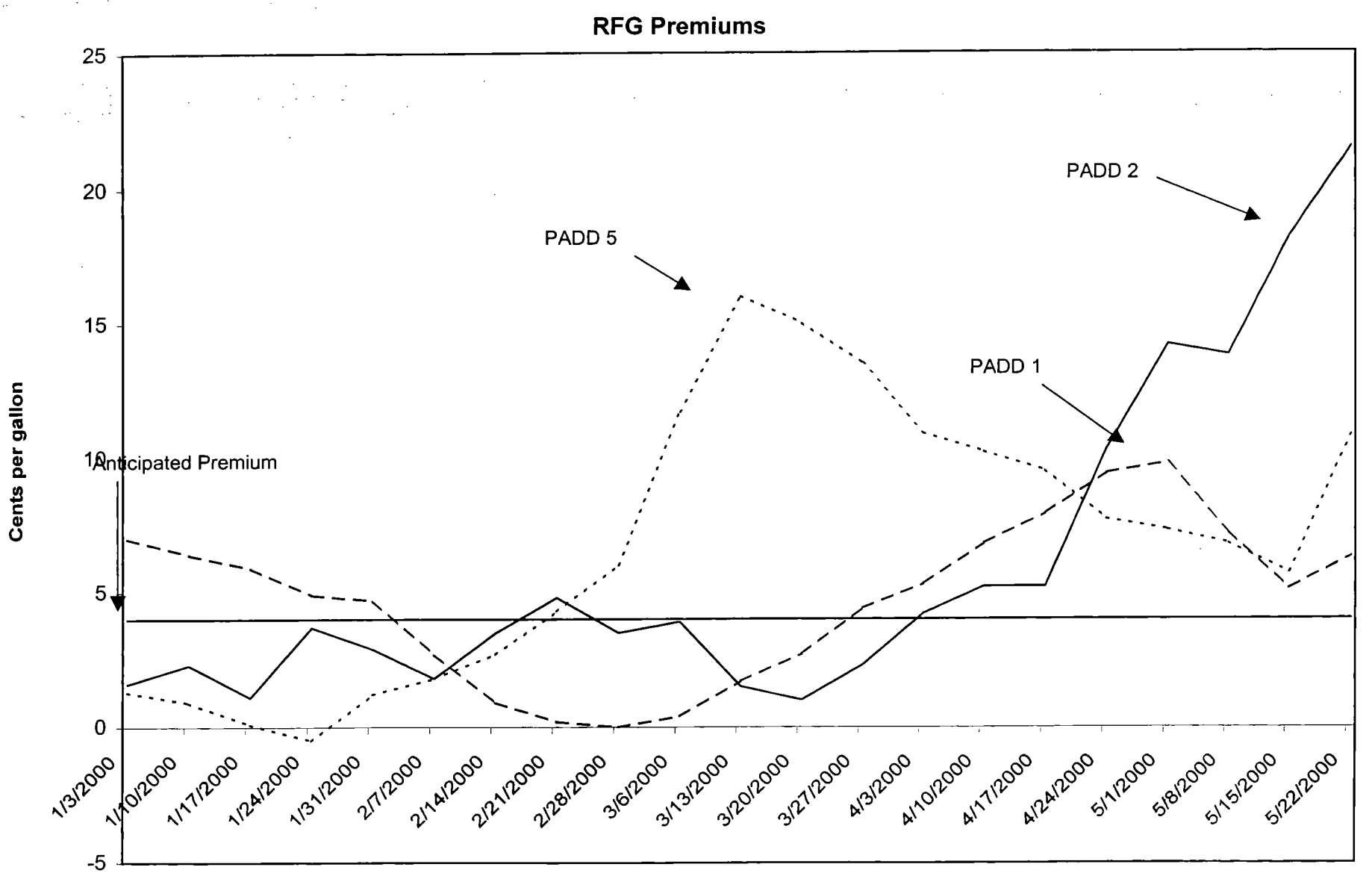
```
   _cons |   4.730238   3.632671      1.302   0.203      -2.688665    12.14914
------------------------------------------------------------------------------

. predict pdco2
(2 missing values generated)

.
. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
. test cres cres1

 ( 1)  cres = 0.0
 ( 2)  cres1 = 0.0

       F(  2,    30) =    8.63
            Prob > F =    0.0011


.
. gen res = abs(co2 - pco2)
(2 missing values generated)

. gen pres = abs(co2 - pco2)/co2
(2 missing values generated)

. sort year

. egen sres = sum(res) if year > 1961 & year < 1998
(3 missing values generated)

. egen spres = sum(pres) if year > 1961 & year < 1998
(3 missing values generated)

. replace sres = sres/36
(36 real changes made)

. replace spres = spres/36
(36 real changes made)

. list sres spres if year == 1997

          sres      spres
 14.  12.24878   .0100937

.
. sort year

. list year co2 pco2

        year        co2       pco2
  1.    1960      787.9          .
  2.    1961      793.7          .
  3.    1962      826.6   832.7742
  4.    1963      858.6   867.9325
  5.    1964      895.2   894.7097
```

```
  6.      1965       934.5   951.6642
  7.      1966       985.7   1009.519
  8.      1967      1011.5   1010.425
  9.      1968      1069.2   1056.519
 10.      1969      1115.6   1118.855
 11.      1970        1149   1136.014
 12.      1971      1162.5   1166.568
 13.      1972      1223.7   1195.436
 14.      1973      1277.9   1250.613
 15.      1974      1233.1   1230.401
 16.      1975        1197   1194.785
 17.      1976      1269.5   1228.558
 18.      1977      1307.4   1285.546
 19.      1978      1320.9   1355.125
 20.      1979      1337.7   1337.681
 21.      1980      1289.4   1299.796
 22.      1981        1256   1259.905
 23.      1982      1189.1   1198.699
 24.      1983      1182.5   1206.558
 25.      1984      1245.2   1243.121
 26.      1985      1244.6   1280.168
 27.      1986      1245.9   1261.914
 28.      1987      1286.6   1280.426
 29.      1988      1348.6   1336.241
 30.      1989      1360.8   1378.077
 31.      1990      1346.1   1349.238
 32.      1991      1330.8   1330.994
 33.      1992      1352.1   1349.149
 34.      1993      1379.8   1369.035
 35.      1994      1398.4   1400.692
 36.      1995      1411.7   1407.763
 37.      1996      1460.5   1430.094
 38.      1997        1480   1478.708
 39.      1998      1485.4   1477.432

.
. /****
> *** Summary Stats
> *******/
.
. su dco2 dntek cheat ccool cfoss cres ccom ccoal cgas coil cnumref crefcap cne
> tsum cextra cpdctu cpdcts cnumele cprpcoal if year < 1998

Variable |     Obs        Mean    Std. Dev.       Min        Max
---------+--------------------------------------------------------
    dco2 |      37    9.498726    34.52621  -76.60513   63.25078
   dntek |      37   -3.355278    87.84338  -231.6407    183.346
   cheat |      37   -4.918919    216.0386       -710        353
   ccool |      37   -1.351351    104.9924       -291        256
   cfoss |      37    .0108108    .3211125      -1.15   .8200002
    cres |      37        -.1    .3391166  -.7000008          1
    ccom |      37   -.0945946    .3299377  -.6000004          1
   ccoal |      37   -.0018919    .1437946       -.13        .74
    cgas |      37    .0362162    .2346079       -.71        .49
    coil |      37    .0143243     .816056      -2.61        2.22
 cnumref |      37   -3.918919    10.48644        -43          14
 crefcap |      37    .1516216    .4648567  -1.029999        1.16
```

```
 cnetsum |      37    14.72432   9.749998          2   43.79999
  cextra |      37    .0113514   .0297361       -.04        .05
  cpdctu |      37    -.472973   3.286539     -19.91        .26
  cpdcts |      37   -.3635135   3.328039     -19.95   .8099995
 cnumele |      37    63.97297   42.49607        -54        137
cprpcoal |      37    .0010541   .0144497  -.0297088   .0360969

.
. sort year

. gen ggdp = (gdp[_n] - gdp[_n-1])/gdp[_n-1]
(1 missing value generated)

. gen gco2 = (co2[_n] - co2[_n-1])/co2[_n-1]
(1 missing value generated)

.
. reg gco2 ggdp, noconstant

  Source |       SS       df       MS                  Number of obs =      38
---------+------------------------------                F(  1,    37) =   61.42
   Model |   .02635254     1   .02635254                Prob > F      =  0.0000
Residual |  .015876083    37  .000429083                R-squared     =  0.6240
---------+------------------------------                Adj R-squared =  0.6139
   Total |  .042228623    38   .00111128                Root MSE      =  .02071

------------------------------------------------------------------------------
    gco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
    ggdp |   .6500644   .0829499      7.837   0.000       .4819919    .8181369
------------------------------------------------------------------------------

.
.
.
. log close
```

	Seas Factr	%chng	NSA Month	NSA %	SA Avg	SA %
Jan	97.7		1.29		1.32	
Feb	96.4	-1.3	1.38	7.0	1.43	8.4
Mar	96.8	0.4	1.52	10.1	1.57	9.7
Apr	98.7	2.0	1.46	-3.9	1.48	-5.8
May	102.1	3.4	1.47	0.7	1.44	-2.7
Last Week May			1.53	4.8	1.50	1.3

	Seas Factr	%chng	NSA Month	NSA %	SA Avg	SA %
Jan	97.7		1.29		1.320368	
Feb	96.4	-1.3	1.38	6.976744	1.431535	8.419377
Mar	96.8	0.4	1.52	10.14493	1.570248	9.689783
Apr	98.7	2.0	1.46	-3.947368	1.47923	-5.796406
May	102.1	3.4	1.47	0.684932	1.439765	-2.667946
Last Week May			1.53	4.794521	1.498531	1.304791


RFG Premiums
Cents per gallon
25
20
15
10
5
0
-5
PADD 2
PADD 5
PADD 1
Anticipated Premium
1/3/2000
1/10/2000
1/17/2000
1/24/2000
1/31/2000
2/7/2000
2/14/2000
2/21/2000
2/28/2000
3/6/2000
3/13/2000
3/20/2000
3/27/2000
4/3/2000
4/10/2000
4/17/2000
4/24/2000
5/1/2000
5/8/2000
5/15/2000
5/22/2000

1441

1999 CO_2 Est

1998 CO_2 = 1485.4

+ 1999 CO_2 = ~~1486.8~~ 1496.9

$\Delta CVCS = -.3 \cdot (-35) = 10.5$

$\Delta CVCS1 = -.1 \cdot (-21.8) = 2.18$ } 12.68

$\Delta heat = 226 \cdot (.0285) = 6.44$

$\Delta cool = -133 \cdot (.0171) = -2.27$

$\Delta Ntek = -132 \cdot (.214) = -28.25$

~~-13.81~~

-11.4

5.3

=-6.1

Paul.Mcavdle@eia.doe.go

Statistics/Data Analysis

User: Leigh L. Linden
Project: CO2 Concavity

```
.
1. /********
 > *** Detrend the series
 > ********/
.
2. sort year

3. gen dntek = nonhitek[_n] - 1.03148*nonhitek[_n - 1]
(1 missing value generated)

4. gen dco2 = co2[_n] - 1.007727*co2[_n - 1]
(2 missing values generated)

.
5. gen tntek = 1.03148*nonhitek[_n-1]
(1 missing value generated)

6. gen tco2 = 1.007727*co2[_n-1]
(1 missing value generated)

.
7. gen cheat = htdgyear[_n] - htdgyear[_n-1]
(1 missing value generated)

8. gen ccool = cldgyear[_n] - cldgyear[_n-1]
(1 missing value generated)

9. gen cfoss = ffppcomr[_n] - ffppcomr[_n-1]
(2 missing values generated)

10. gen cres = eleprrer[_n] - eleprrer[_n-1]
(1 missing value generated)

11. gen ccom = eleprcor[_n] - eleprcor[_n-1]
(2 missing values generated)

12. gen ccoal = ffppcoar[_n] - ffppcoar[_n-1]
(2 missing values generated)

13. gen cgas = ffppngr[_n] - ffppngr[_n-1]
(2 missing values generated)

14. gen coil = ffppoilr[_n] - ffppoilr[_n-1]
(2 missing values generated)

15. gen cnumref = numrefin[_n] - numrefin[_n-1]
(2 missing values generated)

16. gen crefcap = refincap[_n] - refincap[_n-1]
(2 missing values generated)
```

```
17. gen cnetsum = netsumca[_n] - netsumca[_n-1]
(2 missing values generated)

18. gen cextra = extralos[_n] - extralos[_n-1]
(2 missing values generated)

19. gen cpdctu = cpvtyund[_n] - cpvtyund[_n-1]
(3 missing values generated)

20. gen cpdcts = cpvtysur[_n] - cpvtysur[_n-1]
(3 missing values generated)

21. gen cnumele = numeleut[_n] - numeleut[_n-1]
(2 missing values generated)

22. gen propcoal = hrscoal/hrstotal
(1 missing value generated)

23. gen cprpcoal = propcoal[_n] - propcoal[_n-1]
(2 missing values generated)

24. gen cres1 = cres[_n-1]
(2 missing values generated)

25. gen ccom1 = ccom[_n-1]
(2 missing values generated)

26. gen cfoss1 = cfoss[_n-1]
(2 missing values generated)

27. gen ccoal1 = ccoal[_n-1]
(2 missing values generated)

28. gen cgas1 = cgas[_n-1]
(2 missing values generated)

29. gen coil1 = coil[_n-1]
(2 missing values generated)

.
.
30. /*******
> *** Residential Electricity
> *******/
.
31. reg dco2 dntek cheat ccool cres1 cres (dntek cheat ccool cres1 cnetsum cnumel
> e cprpcoal) if year < 1999 & year > 1960

Instrumental variables (2SLS) regression

  Source |       SS       df       MS              Number of obs =      37
---------+------------------------------           F(  5,    31) =   20.65
   Model |  33308.5971     5  6661.71941           Prob > F      =  0.0000
Residual |  9750.18308    31  314.522035           R-squared     =  0.7736
```

```
---------+------------------------------              Adj R-squared =  0.7370
   Total |  43058.7801    36  1196.07723              Root MSE      =  17.735

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|      [95% Conf. Interval]
---------+--------------------------------------------------------------------
    cres |  -35.02527   30.24463     -1.158   0.256      -96.70961    26.65906
   cheat |   .0285269   .0141858      2.011   0.053      -.0004053    .0574591
   ccool |    .017093   .0301959      0.566   0.575      -.0444919    .0786779
   cres1 |  -21.78913   15.42529     -1.413   0.168      -53.24922    9.670965
   dntek |   .2136202   .0592512      3.605   0.001       .0927765    .3344639
   _cons |   5.340061   3.694117      1.446   0.158       -2.19414    12.87426
------------------------------------------------------------------------------

.
32. predict ncpdco2
(option xb assumed; fitted values)
(2 missing values generated)

.
33. gen pco2 = tco2 + ncpdco2
(2 missing values generated)

.
34. gen res = abs(co2 - pco2)
(3 missing values generated)

35. gen pres = abs(co2 - pco2)/co2
(3 missing values generated)

36. sort year

37. egen sres = sum(res) if year > 1961 & year < 1998
(4 missing values generated)

38. egen spres = sum(pres) if year > 1961 & year < 1998
(4 missing values generated)

39. replace sres = sres/36
(36 real changes made)

40. replace spres = spres/36
(36 real changes made)

41. list sres spres if year == 1997

         sres      spres
  3.  12.39082     .01018

.
42. sort year

43. list year co2 pco2

        year        co2       pco2
```

1.	1960	787.9	.
2.	1961	793.7	.
3.	1962	826.6	832.6566
4.	1963	858.6	867.6783
5.	1964	895.2	895.8261
6.	1965	934.5	951.2713
7.	1966	985.7	1009.09
8.	1967	1011.5	1011.834
9.	1968	1069.2	1056.323
10.	1969	1115.6	1117.83
11.	1970	1149	1137.076
12.	1971	1162.5	1169.457
13.	1972	1223.7	1196.567
14.	1973	1277.9	1252.147
15.	1974	1233.1	1230.643
16.	1975	1197	1194.24
17.	1976	1269.5	1231.07
18.	1977	1307.4	1287.222
19.	1978	1320.9	1352.597
20.	1979	1337.7	1336.859
21.	1980	1289.4	1299.277
22.	1981	1256	1260.767
23.	1982	1189.1	1198.896
24.	1983	1182.5	1207.682
25.	1984	1245.2	1242.691
26.	1985	1244.6	1280.264
27.	1986	1245.9	1262.526
28.	1987	1286.6	1279.201
29.	1988	1348.6	1335.492
30.	1989	1360.8	1379.206
31.	1990	1346.1	1351.47
32.	1991	1330.8	1328.634
33.	1992	1352.1	1346.341
34.	1993	1379.8	1372.792
35.	1994	1398.4	1401.747
36.	1995	1411.7	1407.625
37.	1996	1460.5	1429.432
38.	1997	1480	1475.549
39.	1998	1485.4	1479.12
40.	1999	.	1490.802

.

44. drop pco2 res pres sres spres

.

45. reg dco2 dntek cheat ccool cres1 cres (dntek cheat ccool cres1 cnetsum cnumel > e cprpcoal) if year < 1999 & year > 1960, noconstant

Instrumental variables (2SLS) regression

Source	SS	df	MS		
Model	29039.2378	5	5807.84757	Number of obs =	37
Residual	17249.5958	32	539.04987	F(5, 32) =	.
				Prob > F =	.
				R-squared =	.
				Adj R-squared =	.

```
   Total |  46288.8337    37  1251.04956             Root MSE      =  23.217

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
    cres |   -81.1811   34.27072     -2.369   0.024      -150.9883   -11.37392
   cheat |   .0228864   .0183833      1.245   0.222       -.014559    .0603319
   ccool |   .0029232   .0391893      0.075   0.941      -.0769027    .0827491
   cres1 |  -4.371342   19.70403     -0.222   0.826      -44.50714    35.76445
   dntek |   .1359288   .0683671      1.988   0.055      -.0033304    .2751879
------------------------------------------------------------------------------
```

46. predict pdco2
(option xb assumed; fitted values)
(2 missing values generated)

.
47. gen pco2 = tco2 + pdco2
(2 missing values generated)

.
48. test cres cres1

```
 ( 1)  cres = 0.0
 ( 2)  cres1 = 0.0

       F(  2,    32) =   10.30
            Prob > F =    0.0004
```

.
49. gen res = abs(co2 - pco2)
(3 missing values generated)

50. gen pres = abs(co2 - pco2)/co2
(3 missing values generated)

51. sort year

52. egen sres = sum(res) if year > 1961 & year < 1998
(4 missing values generated)

53. egen spres = sum(pres) if year > 1961 & year < 1998
(4 missing values generated)

54. replace sres = sres/36
(36 real changes made)

55. replace spres = spres/36
(36 real changes made)

56. list sres spres if year == 1997

```
          sres      spres
 23.  17.03412   .0141688
```

```
.
57. sort year

58. list year co2 pco2
```

	year	co2	pco2
1.	1960	787.9	.
2.	1961	793.7	.
3.	1962	826.6	828.7922
4.	1963	858.6	879.2025
5.	1964	895.2	887.4487
6.	1965	934.5	963.8498
7.	1966	985.7	1017.475
8.	1967	1011.5	1006.969
9.	1968	1069.2	1060.961
10.	1969	1115.6	1137.046
11.	1970	1149	1145.16
12.	1971	1162.5	1157.799
13.	1972	1223.7	1185.255
14.	1973	1277.9	1245.12
15.	1974	1233.1	1189.606
16.	1975	1197	1206.03
17.	1976	1269.5	1222.884
18.	1977	1307.4	1260.669
19.	1978	1320.9	1353.203
20.	1979	1337.7	1335.421
21.	1980	1289.4	1269.496
22.	1981	1256	1254.397
23.	1982	1189.1	1201.122
24.	1983	1182.5	1203.716
25.	1984	1245.2	1238.225
26.	1985	1244.6	1271.419
27.	1986	1245.9	1264.855
28.	1987	1286.6	1282.988
29.	1988	1348.6	1328.258
30.	1989	1360.8	1379.703
31.	1990	1346.1	1360.981
32.	1991	1330.8	1339.668
33.	1992	1352.1	1343.537
34.	1993	1379.8	1371.368
35.	1994	1398.4	1398.142
36.	1995	1411.7	1415.278
37.	1996	1460.5	1429.303
38.	1997	1480	1480.993
39.	1998	1485.4	1479.374
40.	1999	.	1508.46

```
.
59. /****
 > *** Summary Stats
 > *******/

.
60. su dco2 dntek cheat ccool cfoss cres ccom ccoal cgas coil cnumref crefcap cne
 > tsum cextra cpdctu cpdcts cnumele cprpcoal if year < 1998
```

Variable	Obs	Mean	Std. Dev.	Min	Max
dco2	37	9.498726	34.52621	-76.60513	63.25078
dntek	37	-5.090339	91.44317	-239.8102	183.579
cheat	37	-4.918919	216.0386	-710	353
ccool	37	-1.351351	104.9924	-291	256
cfoss	37	.0108108	.3211125	-1.15	.8200002
cres	37	-.1	.3391166	-.7000008	1
ccom	37	-.0945946	.3299377	-.6000004	1
ccoal	37	-.0018919	.1437946	-.13	.74
cgas	37	.0362162	.2346079	-.71	.49
coil	37	.0143243	.816056	-2.61	2.22
cnumref	37	-3.918919	10.48644	-43	14
crefcap	37	.1516216	.4648567	-1.029999	1.16
cnetsum	37	14.72432	9.749998	2	43.79999
cextra	37	.0113514	.0297361	-.04	.05
cpdctu	37	-.472973	3.286539	-19.91	.26
cpdcts	37	-.3635135	3.328039	-19.95	.8099995
cnumele	37	63.97297	42.49607	-54	137
cprpcoal	37	.0010541	.0144497	-.0297088	.0360969

.

61. sort year

62. gen ggdp = (gdp[_n] - gdp[_n-1])/gdp[_n-1]
(1 missing value generated)

63. gen gco2 = (co2[_n] - co2[_n-1])/co2[_n-1]
(2 missing values generated)

.

64. reg gco2 ggdp, noconstant

Source	SS	df	MS		
Model	.026951415	1	.026951415	Number of obs	= 38
Residual	.015277208	37	.000412898	F(1, 37)	= 65.27
				Prob > F	= 0.0000
Total	.042228623	38	.00111128	R-squared	= 0.6382
				Adj R-squared	= 0.6284
				Root MSE	= .02032

gco2	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ggdp	.6561952	.0812201	8.079	0.000	.4916277	.8207627

.
.
.

65. log close

Stata Corporation
702 University Drive East
College Station, Texas 77840
409-696-4600, fax 409-696-4601

Table 9.9 Retail Prices of Electricity Sold by Electric Utilities
(Cents per Kilowatthour)

	Residential	Commercial	Industrial	Other	Total
1973 Average.....	2.5	2.4	1.3	2.1	2.0
1974 Average.....	3.1	3.0	1.7	2.8	2.5
1975 Average.....	3.5	3.5	2.1	3.1	2.9
1976 Average.....	3.7	3.7	2.2	3.3	3.1
1977 Average.....	4.1	4.1	2.5	3.5	3.4
1978 Average.....	4.3	4.4	2.8	3.6	3.7
1979 Average.....	4.6	4.7	3.1	4.0	4.0
1980 Average.....	5.4	5.5	3.7	4.8	4.7
1981 Average.....	6.2	6.3	4.3	5.3	5.5
1982 Average.....	6.9	6.9	5.0	5.9	6.1
1983 Average.....	7.2	7.0	5.0	6.4	6.3
1984 Average.....	7.15	7.13	4.83	5.90	6.25
1985 Average.....	7.39	7.27	4.97	6.09	6.44
1986 Average.....	7.42	7.20	4.93	6.11	6.44
1987 Average.....	7.45	7.08	4.77	6.21	6.37
1988 Average.....	7.48	7.04	4.70	6.20	6.35
1989 Average.....	7.65	7.20	4.72	6.25	6.45
1990 Average.....	7.83	7.34	4.74	6.40	6.57
1991 Average.....	8.04	7.53	4.83	6.51	6.75
1992 Average.....	8.21	7.66	4.83	6.74	6.82
1993 Average.....	8.32	7.74	4.85	6.88	6.93
1994 Average.....	8.38	7.73	4.77	6.84	6.91
1995 Average.....	8.40	7.69	4.66	6.88	6.89
1996 Average.....	8.36	7.64	4.60	6.91	6.86
1997 Average.....	8.43	7.59	4.53	6.91	6.85
1998 January.....	7.87	7.22	4.36	6.37	6.57
February...	7.97	7.29	4.31	6.63	6.52
March.....	8.01	7.28	4.33	6.72	6.53
April.....	8.23	7.31	4.30	6.69	6.51
May.....	8.49	7.45	4.41	6.69	6.67
June.....	8.53	7.61	4.65	6.83	6.97
July.....	8.58	7.69	4.85	6.84	7.21
August.....	8.57	7.67	4.78	6.69	7.14
September..	8.43	7.55	4.62	6.56	6.95
October....	8.25	7.44	4.42	6.76	6.69
November...	8.04	7.11	4.32	6.11	6.39
December...	7.92	7.11	4.30	6.69	6.46
Average....	8.26	7.41	4.48	6.63	6.74
1999 January.....	R 7.55	R 6.92	R 4.24	R 6.51	R 6.37
February...	R 7.90	R 7.12	R 4.29	R 6.39	R 6.44
March.....	R 7.87	R 7.08	R 4.16	R 6.54	R 6.36
April.....	R 8.07	R 7.01	R 4.21	R 6.53	R 6.34
May.....	R 8.24	R 7.13	R 4.28	R 6.60	R 6.44
June.....	R 8.40	R 7.33	R 4.50	R 6.63	R 6.76
July.....	R 8.46	R 7.47	R 4.76	R 6.66	R 7.04
August.....	R 8.39	R 7.40	R 4.84	R 6.63	R 7.02
September..	R 8.33	R 7.36	R 4.53	R 6.61	R 6.80
October....	R 8.34	R 7.33	R 4.43	R 6.66	R 6.64
November...	R 8.07	R 7.06	R 4.24	R 6.32	R 6.35
December...	R 7.91	R 6.81	R 4.17	R 6.47	R 6.34
Average....	R 8.14	R 7.18	R 4.40	R 6.55	R 6.60
2000 January.....	7.61	6.82	4.15	5.98	6.29

R=Revised.

Notes: · Prices are calculated by dividing revenue by sales. Revenue may not correspond to sales for a particular month because of electric utility billing and accounting procedures. That lack of correspondence could result in uncharacteristic increases or decreases in the monthly prices. See Note 7 at end of section. · Geographic coverage is the 50 States and the District of Columbia.

Sources: See end of section.

Table A2. Annual U.S. Macroeconomic and Weather Indicators

	Year														
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Macroeconomic															
Real Gross Domestic Product (billion chained 1996 dollars)	**6093**	**6349**	**6569**	**6684**	**6869**	**6891**	**7054**	**7338**	**7537**	**7813**	**8165**	**8516**	**8867**	*9219*	*9514*
GDP Implicit Price Deflator (Index, 1996=1.000)	**0.779**	**0.805**	**0.835**	**0.868**	**0.897**	**0.917**	**0.942**	**0.961**	**0.982**	**1.000**	**1.017**	**1.029**	**1.043**	*1.061*	*1.077*
Real Disposable Personal Income (billion chained 1996 Dollars)	**4563**	**4766**	**4885**	**4991**	**5026**	**5200**	**5254**	**5388**	**5533**	**5678**	**5885**	**6125**	**6367**	*6620*	*6880*
Manufacturing Production (Index, 1992=1.000)	**0.928**	**0.971**	**0.990**	**0.985**	**0.962**	**1.000**	**1.037**	**1.100**	**1.159**	**1.213**	**1.298**	**1.361**	**1.418**	*1.464*	*1.504*
Real Fixed Investment (billion chained 1996 dollars)	**856**	**887**	**911**	**895**	**833**	**887**	**958**	**1046**	**1109**	**1213**	**1316**	**1472**	**1590**	*1702*	*1780*
Real Exchange Rate (Index, 1990=1.000)	**NA**	**NA**	**NA**	**0.999**	**1.007**	**1.013**	**1.057**	**1.034**	**0.961**	**1.017**	**1.104**	**1.152**	**1.153**	*1.159*	*1.102*
Business Inventory Change (billion chained 1996 dollars)	**8.4**	**16.9**	**14.2**	**8.9**	**-6.6**	**-4.7**	**3.6**	**12.1**	**14.1**	**10.1**	**22.1**	**25.1**	**0.9**	*9.9*	*12.5*
Producer Price Index (Index, 1982=1.000)	**1.028**	**1.069**	**1.122**	**1.163**	**1.165**	**1.172**	**1.189**	**1.205**	**1.248**	**1.277**	**1.276**	**1.244**	**1.255**	*1.303*	*1.308*
Consumer Price Index (Index, 1982-1984=1.000)	**1.137**	**1.184**	**1.240**	**1.308**	**1.363**	**1.404**	**1.446**	**1.483**	**1.525**	**1.570**	**1.606**	**1.631**	**1.667**	*1.714*	*1.746*
Petroleum Product Price Index (Index, 1982=1.000)	**0.568**	**0.539**	**0.612**	**0.748**	**0.671**	**0.647**	**0.620**	**0.591**	**0.608**	**0.701**	**0.680**	**0.513**	**0.610**	*0.782*	*0.716*
Non-Farm Employment (millions)	**102.0**	**105.2**	**107.9**	**109.4**	**108.3**	**108.6**	**110.7**	**114.1**	**117.2**	**119.6**	**122.7**	**125.8**	**128.6**	*131.2*	*133.0*
Commercial Employment (millions)	**65.2**	**67.8**	**70.0**	**71.3**	**70.8**	**71.2**	**73.2**	**76.1**	**78.8**	**81.1**	**83.9**	**86.6**	**89.5**	*91.8*	*94.1*
Total Industrial Production (Index, 1992=1.000)	**0.932**	**0.974**	**0.991**	**0.989**	**0.970**	**1.000**	**1.034**	**1.091**	**1.144**	**1.195**	**1.270**	**1.324**	**1.370**	*1.415*	*1.451*
Housing Stock (millions)	**99.8**	**101.6**	**102.9**	**103.6**	**104.6**	**105.5**	**106.8**	**108.2**	**109.6**	**111.0**	**112.5**	**114.3**	**115.8**	*117.0*	*118.3*
Weather [a]															
Heating Degree-Days															
U.S.	**4334**	**4653**	**4726**	**4016**	**4200**	**4441**	**4700**	**4483**	**4531**	**4713**	**4542**	**3951**	**4177**	*4251*	*4464*
New England	**6546**	**6715**	**6887**	**5948**	**5960**	**6844**	**6728**	**6672**	**6559**	**6679**	**6662**	**5680**	**6007**	*6354*	*6478*
Middle Atlantic	**5699**	**6088**	**6134**	**4998**	**5127**	**5964**	**5948**	**5934**	**5831**	**5986**	**5809**	**4812**	**5334**	*5555*	*5712*
U.S. Gas-Weighted	**4391**	**4804**	**4856**	**4138**	**4337**	**4458**	**4754**	**4659**	**4707**	**4980**	**4802**	**4185**	**4409**	*4429*	*4703*
Cooling Degree-Days (U.S.)	**1269**	**1283**	**1156**	**1260**	**1331**	**1040**	**1218**	**1220**	**1293**	**1180**	**1156**	**1410**	**1277**	*1240*	*1234*

[a] Population-weighted degree-days. A degree-day indicates the temperature variation from 65 degrees Fahrenheit (calculated as the simple average of the daily minimum and maximum temperatures) weighted by 1990 population.

Notes: Historical data are printed in bold; forecasts are in italics.

Sources: Historical data: latest data available from: U.S. Department of Commerce, Bureau of Economic Analysis; U.S. Department of Commerce, National Oceanic and Atmospheric Administration; Federal Reserve System, *Statistical Release* G.17(419); U.S. Department of Transportation; American Iron and Steel Institute. Macroeconomic projections are based on DRI/McGraw-Hill Forecast CONTROL0300.

EIA1.do

tm
Statistics/Data Analysis

User: Leigh L. Linden
Project: CO2 Concavity

```
.
1. /********
 > *** Detrend the series
 > ********/
.
2. sort year

3. gen dntek = nonhitek[_n] - 1.03148*nonhitek[_n - 1]
(1 missing value generated)

4. gen dco2 = co2[_n] - 1.007727*co2[_n - 1]
(1 missing value generated)

.
5. gen tntek = 1.03148*nonhitek[_n-1]
(1 missing value generated)

6. gen tco2 = 1.007727*co2[_n-1]
(1 missing value generated)

.
7. gen cheat = htdgyear[_n] - htdgyear[_n-1]
(1 missing value generated)

8. gen ccool = cldgyear[_n] - cldgyear[_n-1]
(1 missing value generated)

9. gen cfoss = ffppcomr[_n] - ffppcomr[_n-1]
(2 missing values generated)

10. gen cres = eleprrer[_n] - eleprrer[_n-1]
(1 missing value generated)

11. gen ccom = eleprcor[_n] - eleprcor[_n-1]
(2 missing values generated)

12. gen ccoal = ffppcoar[_n] - ffppcoar[_n-1]
(2 missing values generated)

13. gen cgas = ffppngr[_n] - ffppngr[_n-1]
(2 missing values generated)

14. gen coil = ffppoilr[_n] - ffppoilr[_n-1]
(2 missing values generated)

15. gen cnumref = numrefin[_n] - numrefin[_n-1]
(2 missing values generated)

16. gen crefcap = refincap[_n] - refincap[_n-1]
(2 missing values generated)
```

```
17. gen cnetsum = netsumca[_n] - netsumca[_n-1]
(2 missing values generated)

18. gen cextra = extralos[_n] - extralos[_n-1]
(2 missing values generated)

19. gen cpdctu = cpvtyund[_n] - cpvtyund[_n-1]
(3 missing values generated)

20. gen cpdcts = cpvtysur[_n] - cpvtysur[_n-1]
(3 missing values generated)

21. gen cnumele = numeleut[_n] - numeleut[_n-1]
(2 missing values generated)

22. gen propcoal = hrscoal/hrstotal
(1 missing value generated)

23. gen cprpcoal = propcoal[_n] - propcoal[_n-1]
(2 missing values generated)

24. gen cres1 = cres[_n-1]
(2 missing values generated)

25. gen ccom1 = ccom[_n-1]
(2 missing values generated)

26. gen cfoss1 = cfoss[_n-1]
(2 missing values generated)

27. gen ccoal1 = ccoal[_n-1]
(2 missing values generated)

28. gen cgas1 = cgas[_n-1]
(2 missing values generated)

29. gen coil1 = coil[_n-1]
(2 missing values generated)

.
.
30. /*******
 > *** Residential Electricity
 > *******/
.
31. reg dco2 dntek cheat ccool cres1 cres (dntek cheat ccool cres1 cnetsum cnumel
 > e cprpcoal) if year < 1999 & year > 1960

Instrumental variables (2SLS) regression

  Source |       SS       df       MS              Number of obs =      37
---------+------------------------------           F(  5,    31) =   20.59
   Model |  33281.8043     5  6656.36086           Prob > F      =  0.0000
Residual |  9733.19261    31  313.973955           R-squared     =  0.7737
```

```
---------+------------------------------                Adj R-squared =  0.7372
   Total |  43014.9969    36  1194.86103                Root MSE      =  17.719

------------------------------------------------------------------------------
    dco2 |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
    cres |  -33.81025   30.21827     -1.119   0.272      -95.44082    27.82031
   cheat |    .027059   .0141735      1.909   0.066       -.001848     .055966
   ccool |   .0117836   .0301695      0.391   0.699      -.0497475    .0733148
   cres1 |  -22.31244   15.41185     -1.448   0.158      -53.74511    9.12023
   dntek |   .2150862   .0591996      3.633   0.001       .0943479    .3358245
   _cons |   5.675934   3.690897      1.538   0.134         -1.8517    13.20357
------------------------------------------------------------------------------

.
32. predict ncpdco2
(option xb assumed; fitted values)
(2 missing values generated)

.
33. gen pco2 = tco2 + ncpdco2
(2 missing values generated)

.
34. gen res = abs(co2 - pco2)
(2 missing values generated)

35. gen pres = abs(co2 - pco2)/co2
(2 missing values generated)

36. sort year

37. egen sres = sum(res) if year > 1961 & year < 1998
(4 missing values generated)

38. egen spres = sum(pres) if year > 1961 & year < 1998
(4 missing values generated)

39. replace sres = sres/36
(36 real changes made)

40. replace spres = spres/36
(36 real changes made)

41. list sres spres if year == 1997

          sres       spres
  3.  12.41092   .0101946

.
42. sort year

43. list year co2 pco2

        year        co2       pco2
```

1.	1960	787.9	.
2.	1961	793.7	.
3.	1962	826.6	832.6114
4.	1963	858.6	867.3605
5.	1964	895.2	896.6985
6.	1965	934.5	951.2264
7.	1966	985.7	1008.833
8.	1967	1011.5	1012.767
9.	1968	1069.2	1055.934
10.	1969	1115.6	1117.148
11.	1970	1149	1136.98
12.	1971	1162.5	1170.386
13.	1972	1223.7	1197.09
14.	1973	1277.9	1252.568
15.	1974	1233.1	1232.562
16.	1975	1197	1193.717
17.	1976	1269.5	1231.819
18.	1977	1307.4	1286.824
19.	1978	1320.9	1352.466
20.	1979	1337.7	1338.035
21.	1980	1289.4	1299.336
22.	1981	1256	1262.01
23.	1982	1189.1	1199.387
24.	1983	1182.5	1207.21
25.	1984	1245.2	1243.342
26.	1985	1244.6	1280.6
27.	1986	1245.9	1262.907
28.	1987	1286.6	1279.128
29.	1988	1348.6	1335.273
30.	1989	1360.8	1379.995
31.	1990	1349	1352.034
32.	1991	1335	1330.902
33.	1992	1359	1352.124
34.	1993	1385	1378.572
35.	1994	1410	1407.606
36.	1995	1421	1418.873
37.	1996	1471	1439.389
38.	1997	1493	1486.616
39.	1998	1495	1491.97
40.	1999	1507	1500.68

.
.

```
44. /****
 > *** Summary Stats
 > *******/
 .
45. su dco2 dntek cheat ccool cfoss cres ccom ccoal cgas coil cnumref crefcap cne
 > tsum cextra cpdctu cpdcts cnumele cprpcoal if year < 1998

Variable |     Obs        Mean    Std. Dev.       Min        Max
---------+--------------------------------------------------------
    dco2 |      37     9.83951    34.45789  -76.60513   63.25078
   dntek |      37   -5.090339    91.44317  -239.8102    183.579
   cheat |      37   -4.918919    216.0386       -710        353
```

August 24, 1999

TO: Joe Aldy

FROM: Howard Gruenspecht

SUBJECT: 1998 Energy Use

Per your request, I have attached some information regarding energy use during 1998 and projections of energy use for 1999.

Based on some back-of-the envelope calculations, it appears that weather and production declines in energy-intensive industries might have depressed energy use by 1 to 1.3 quads during 1998. Taken together, a reduction in energy use of this magnitude would translate into a reduction of roughly 20 to 25 MMT in energy-related carbon emissions given the likely fuel composition of the reduction in energy use.

The latest short-term energy outlook (STEO, August 1998) produced by the Energy Information Administration projects that energy use in 1999 will be 1.8 percent higher than the 1998 level, and that carbon emissions from energy will increase by 31 MMT over the 1998 level. This is subject to some corrections for changes in data reporting as well as the resolution of key "wildcards" over the rest of the year.

Let me know if you need more. Çã

HKG Draft: 8-19-99

Energy Use and Carbon Emissions for 1999: Projections from the Short Term Energy Outlook

The Short Run Energy Outlook (STEO), prepared monthly by the Energy Information Administration, reflects year-to-date energy and economic data as well as the latest projections of economic and energy market conditions over the coming months. STEO is probably the single best source for an examination of how 1999 is shaping up from an energy perspective.

The latest STEO (August 1999) projects that 1999 U.S. energy consumption will be 96.4 quads, a 1.8 percent increase over the 1998 level. By way of comparison, energy consumption grew by only 0.5 percent between 1997 and 1998. Carbon emissions from energy are projected to increase by 31 MMT between 1998 and 1999.

Note that when EIA checked into an apparent inconsistency between energy #s and an earlier set of carbon #s they had provided, they indicated that there were potentially some number problems associated with the recent sale of power plants by utilities (who report to EIA) to independent power producers (who have taraditionally not reported, but who are now starting to report.) In the context of electricity restructuring. They indicated that the Sept 1999 STEO could change by up to 0.5 percent in emissions as they try to reconcile reporting.

The big "wildcards" in short term energy forecasting are weather, oil prices, and the level of economic activity during the remainder of the year. Consider, for example, the STEO projection for 1998 energy use that was issued one year ago in August, 1998. In late 1998, oil prices dropped dramatically towards the end of the year and the economy grew faster than projected, both of which tend to increase energy consumption. However, mild winter weather at the end of 1998 cut in the other direction by sharply reducing heating demand. As a result of these offsetting factors, actual 1998 energy use exactly equalled the August 1998 forecast of 94.7 quadrillion Btus, but its composition was different – less natural gas due to a mild heating season and more oil due to a robust economy and lower oil prices.

Of course, it is just happenstance that the combination energy-increasing and energy-decreasing developments in the final 4 months 1998 led to overall 1998 energy usage identical to that projected in the August 1998 STEO. If all of the big wildcards line up in one direction between now and the end of the year, actual energy consumption for 1999 could turn out to differ substantially from the August 1999 STEO projection. Like Yogi Berra said, "it ain't over until it's over." However, from information available today it appears more likely than not that energy use and emissions growth in 1999 will exceed last year's exceptionally low levels.

HG/PP Draft 8-19-99

Industrial Energy Use: Explaining Recent Data

Energy consumption in the industrial sector, which accounts for more than 1/3 of the nation's total energy use, decreased slightly between 1997 and 1998, a period over which GDP grew by 3.9 percent and overall industrial production grew nearly as fast. The question before us is why this happened, and whether we can count on a continued "decoupling" of industrial output growth and industrial energy use.

Manufacturing account for about 55 percent of total industrial energy use. Agriculture, construction, forestry and fisheries, and mining account for the remainder. While all manufacturing uses some energy, about two-thirds of manufacturing energy use, or over one-third of total industrial energy use occurs in the following industries: chemicals, paper products, steel, and petroleum refining. Therefore, it makes sense to focus on these sectors in examining drivers of recent industrial energy use trends. Between 1997 and 1998 there was an absolute output decline in steel and paper, while chemicals production grew at a slow rate.

The change in energy consumption in a particular industry depends on two main factors: (1) the change in production level, and (2) the change in energy used per unit of production. Both of these can be influenced by both short and long-run factors. The larger the role played by short-run factors, the less likely is it that the single-year trend will continue into the future.

Certainly, long-run factors are important. Output growth for energy-intensive industries has been slower than the growth of overall industrial production. There has also been a steady trend of energy-efficiency improvements in most energy-intensive industries. Because of these long-run factors, which we would expect to continue, industrial energy consumption has been growing at a much slower rate than industrial production over the last decade. These long run trends could be strengthened by DOE and EPA programs designed to promote energy efficiency improvement in industry.

However, our review of available information suggests that short-run factors, notably a flat or declining level of output in the steel, paper, and energy-intensive chemicals sectors between 1997 and 1998, also played a very significant role in driving down 1998 industrial energy use. Influences such as the recent economic upheavals in Russia and Asia, which significantly impacted trade patterns in energy-intensive goods, might have played a major effect.

For example, if production in steel, paper, and chemicals between 1997 and 1998 had continued to grow at the average rates experienced during the 1992 to 1997 period, total industrial energy consumption would have risen by .3 percent instead of falling by .7 percent between 1997 and 1998. Assuming that this additional energy use had the same composition as average industrial energy use, GHG emissions would have been roughly 5 MMT higher in 1998.

Finally, it is important to recognize that year-over-year comparisons in energy use reflect the

change in production rather than its absolute level. Data for the first half of 1999 suggest no evidence of a "bounceback" in production of steel, energy-intensive chemicals, or paper. However, even if output were to remain fixed at its 1998 level in 1999, comparisons of 1999 to 1998 energy data would not show the same "kick" from these production levels as do comparisons of 1998 to 1997 data. To the extent that we cannot expect continued absolute declines in these sectors, the year-over-year decline in industrial energy use during a period of strong economic growth is probably best seen as an anomaly rather than the new expectation, at least until more data is in.

Growth rates (%) (year over year)	1992	1993	1994	1995	1996	1997	**Avg. '92-'97**	1998
Iron and Steel	4.2	7.1	6.1	3.5	1.3	4.2	4.4	**-2.6**
Paper Products	0.4	2.4	-0.7	1.9	0.1	4.0	1.4	**-1.8**
Chemicals	5.1	2.8	2.4	4.4	4.1	4.5	3.9	0.9
Petroleum Products	0.9	2.9	-0.2	1.8	2.2	2.8	1.7	2.0
All Industrial Output	3.1	3.5	5.4	4.9	4.5	6.0	4.6	3.7
Real GDP	2.7	2.3	3.5	2.3	3.4	3.9	3.0	3.9
Industrial energy use	3.4	0.6	2.7	0.9	2.9	0.4	1.8	**-0.7**

Çã

HKG Draft: 8-19-99

The Impact of Weather on 1998 Energy Use

Although most energy uses is are independent of weather conditions, heating and cooling – lumped together under the term space conditioning – are important exceptions. Energy used to heat and cool residential and commercial buildings accounted for nearly 15 percent of total expenditures by end-users on energy in recent years.

There is significant year-to-year variation in weather, which for space conditioning purposes is most usefully measured in terms of heating and cooling degree-days. For example, over the past 50 years, annual U.S. population-weighted heating-degree days ranged from 4016 to 4958, while population weighted cooling degree-days ranged from 1029 to1348. More "degree-days" of either type implies more energy use for space conditioning.

Winter weather is more important than summer weather in driving energy use. This reflects the fact that in terms of heating and cooling expenditures, the United States is a "cold" country. In 1990, one of the warmest years on record, Americans used roughly 4 times as much primary energy and spent roughly 2.3 times as much to heat their homes and businesses as to cool them. The expenditure ratio is less than the primary energy use ratio because cooling energy, virtually 100 percent electricity, has a significantly higher cost to the customer per unit of energy content than average heating energy (a combination of natural gas, fuel oil, and electricity).

Because swings in weather can have quite a large impact on energy use levels, it is important to take account of their role when interpreting annual variation in energy statistics. For example, in 1998, the U.S. economy grew by 3.9 percent, yet energy use and greenhouse gas emissions increased only slightly over 1997 levels. Some have tried to interpret this outcome as a clear indication existing Administration programs and new technologies in the energy market have successfully "decoupled" economic growth and energy use trends.

While "decoupling" may or may not be taking place, it is clear that weather variation also played in determining the change in energy use between 1997 and 1998. Heating degree days were 13 percent lower in 1998 compared to 1997, while cooling degree days were 15 percent higher. Because of the dominance of heating, the overall net effect of climate changes between 1997 and 1998 was a significant reduction in space conditioning energy demand. A rough calculation suggests that if weather had remained unchanged between 1997 and 1998, primary energy consumption in 1998 would have been more than 1 percent above its actual value and carbon dioxide emissions from 1998 energy use would have been 15 to 20 MMT higher than their actual level.

The Department's programs and new technologies may also be having an impact on energy consumption, but that effect is likely to be a gradually increasing one that should not show up so dramatically over a one-year time period. The risk in overinterpreting weather related swings in energy consumption as an indicator that we are successfully "decoupling" energy use and the economy is that weather will continue to fluctuate. If we try to take credit for the weather now, those who seek to question the value of our programs and technologies will use it against us when

the thermometer moves in an unfavorable direction.

Heating degree days during the first four months of 1999 were up 7 percent from their level in the comparable 1998 period. Data on cooling degree days for this summer are not yet available. Even though anecdotal evidence suggests a hot summer, last summer was also very hot, so the year-to-year change in cooling degree days should be relatively small . The heating data that is already in hand, together with the summer data on cooling degree days and heating degree days in the first part of the upcoming winter, will together determine how 1999 ultimately shapes up relative to both 1998 and "normal" conditions. Based on what we know so far, we shouldn't count on getting the same type of "energy dividend" from weather changes that we experienced in 1998.

Çã