Osnove uporabe programskega paketa Stata

Delavnica SHARE 2019

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(gradivo temelji na gradivu prof. dr. Miroslava Verbiča iz 2017)

Primer: Datoteka `Podatki_SHARE.dta` vsebuje podatke iz zbirke podatkov easySHARE (različica 6.0.0) v formatu programskega paketa Stata. Gre za vzorec 300 opazovanj, ki predstavljajo posameznike iz Slovenije, zajete v šestem valu raziskave SHARE.

Podatkovna datoteka vsebuje različne spremenljivke, od katerih izpostavljamo naslednje:

- *mergeid*: identifikator posameznika (država-gospodinjstvo-član);
- *female*: spol posameznika (1 = ženski, 0 = moški);
- *age*: starost posameznika v letih;
- *iv009_mod*: območje prebivanja (urbanost, ruralnost);
- *eduyears_mod*: število let šolanja posameznika;
- *mar_stat*: zakonski stan;
- *hhsize*: število članov gospodinjstva;
- *ch001_*: število otrok;
- *sphus*: zadovoljstvo z zdravjem;
- *casp*: indeks kakovosti življenja in blaginje CASP;
- *bmi*: indeks telesne mase;
- *ep005_*: kategorija delovne aktivnosti;
- *co007_*: shajanje gospodinjstva z dohodkom;
- *thinc_m*: skupni neto dohodki gospodinjstva v € na letni ravni;
- *ores*: vrednost nepremičnin gospodinjstva v €;
- *fahc*: izdatki za hrano gospodinjstva (porabljeni doma) v €;
- *car*: vrednost avtomobilov v €;
- *hnfass*: neto finančna sredstva gospodinjstva v €.

a) Proučite podatke iz zbirke podatkov easySHARE s pomočjo ustreznih ukazov za pregled in obdelavo podatkov v programskem paketu Stata, še posebej za spremenljivko *fahc*. Pri diskretnih spremenljivkah po potrebi generirajte ustrezne neprave spremenljivke.
b) Prikažite korelacijsko matriko spremenljivk iz zgornjega nabora. Ugotovite tudi statistično značilnost izračunanih Pearsonovih in Spearmanovih korelacijskih koeficientov.
c) S pomočjo *t*–preizkusa preverite, ali se aritmetična sredina indeksa kakovosti življenja in blaginje CASP razlikuje glede na spol.
d) Oblikujte in ocenite linearno multiplo regresijsko funkcijo, v kateri boste proučevali vpliv različnih (družbenoekonomsko utemeljenih) dejavnikov iz zgornjega nabora na izdatke za hrano gospodinjstva. Odvisnosti med odvisno in pojasnjevalnimi spremenljivkami prikažite najprej grafično. Razložite dobljene rezultate.
e) Izračunajte ocenjene vrednosti odvisne spremenljivke in ostanke ter jih izpišite skupaj z opazovanimi vrednostmi odvisne spremenljivke.
f) Ocenite še logaritemsko-logaritemsko (linearizirano potenčno) multiplo regresijsko funkcijo, v kateri boste proučevali vpliv ugotovljenih dejavnikov na izdatke za hrano gospodinjstva. Razložite dobljene rezultate. S pomočjo *F*–preizkusa preverite, ali sta učinka neto dohodkov in vrednosti nepremičnin gospodinjstva enaka po jakosti.

Izpis rezultatov obdelav v programskem paketu Stata:

Pregled in ureditev podatkov:

. describe

```
Contains data from Podatki_SHARE.dta
  obs:           300                          easySHARE release 6.0.0
 vars:            69
 size:       106,500
-------------------------------------------------------------------------------
              storage   display
variable name   type    format     variable label
-------------------------------------------------------------------------------
mergeid         str12   %12s       Person identifier (fix across modules and waves)
wave            byte    %9.0g      Wave
country         byte    %37.0g     Country identifier
female          byte    %37.0g     Gender: female=1, male=0
age             float   %37,1f     Age at interview (in years)
iv009_mod       byte    %41.0g     Area of location
isced1997_r     byte    %37.0g     Education of respondent in ISCED-97 Coding
eduyears_mod    float   %37.0g     Years of education
mar_stat        byte    %42.0f     Marital status
hhsize          byte    %37.0g     Household size
partnerinhh     byte    %47.0g     Living with spouse/partner
ch001_          byte    %37.0f     Number of children
ch021_mod       int     %37.0f     Number of grandchildren
sphus           byte    %37.0g     Self-perceived health - us version
chronic_mod     byte    %37.0g     Number of chronic diseases (easySHARE version)
casp            byte    %55.0g     CASP: quality of life and well-being index
eurod           byte    %37.0g     Depression scale EURO-D - high is depressed
hc002_mod       byte    %37.0f     How often seen a medical doctor last 12 months
hc012_          byte    %37.0f     Stayed over night in hospital last 12 months
hc029_          byte    %37.0f     In a nursing home during last 12 months
maxgrip         byte    %24.0g     Max. of grip strength measure
adla            byte    %37.0g     Activities of daily living index (high: diffic.)
bmi             float   %37.0g     Body mass index
bmi2            byte    %37.0g     Body mass index categories
ep005_          byte    %65.0g     Current job situation
ep009_mod       byte    %37.0f     Employee or a self-employed in (main) job
ep011_mod       byte    %41.0f     Term of (main) job
ep013_mod       double  %37.1f     Total hours worked per week (main) job
ep026_mod       byte    %37.0f     Satisfied with (main) job
ep036_mod       byte    %37.0f     Look for early retirement in (main) job
co007_          byte    %37.0f     Is household able to make ends meet
thinc_m         float   %9.0g      Household net income, imputed
inpat6          double  %9.0g      Paid out-of-pocket for inpatient care
outpa6          double  %9.0g      Paid out-of-pocket for outpatient care
drugs6          double  %9.0g      Paid out-of-pocket for prescribed drugs
nurs6           double  %9.0g      Paid out-of-pocket for nursing home/home care
ydip            double  %9.0g      Earnings from employment
yind            double  %9.0g      Earnings from self-employment
ypen1           double  %9.0g      Old age, early retirement, and survivor pensions
ypen2           double  %9.0g      Private and occupational pensions
ypen3           double  %9.0g      Disability pensions/benefits
ypen4           double  %9.0g      Unemployment benefits/insurances
ypen5           double  %9.0g      Social assistance
ypen6           double  %9.0g      Sickness benefits
home            double  %9.0g      Value of main residence
mort            double  %9.0g      Mortgage on main residence
rhre            double  %9.0g      Rent and home-related expenditures
ores            double  %9.0g      Value of real estate - Amount
ysrent          double  %9.0g      Income from rent/sublet
yaohm           double  %9.0g      Income from other household members
fahc            double  %9.0g      Amount spent on food at home
fohc            double  %9.0g      Amount spent on food outside home
hprf            double  %9.0g      Value of home produced food
```

```
hmem            double  %9.0g      Paid out-of-pocket for dental care - Amount
bacc            double  %9.0g      Bank accounts
bsmf            double  %9.0g      Bond, stock and mutual funds
ybabsmf         double  %9.0g      Interest/dividend from bank account, bond, funds
slti            double  %9.0g      Savings for long-term investments
vbus            double  %9.0g      Value of own business
sbus            float   %9.0g      Share of own business
car             double  %9.0g      Value of cars
liab            double  %9.0g      Financial liabilities
thinc2          double  %9.0g      Total household income - Version B
thinc           double  %9.0g      Total household income - Version A
hnetw           double  %9.0g      Household net worth
yincnrp         double  %9.0g      Income from nonresponding partner
hrass           double  %9.0g      Household real assets
hgfass          double  %9.0g      Household gross financial assets
hnfass          double  %9.0g      Household net financial assets
------------------------------------------------------------------------------
Sorted by:
```

. tab female

```
             Gender: female=1, male=0 |      Freq.     Percent        Cum.
--------------------------------------+-----------------------------------
                           0. male |        124       41.33       41.33
                         1. female |        176       58.67      100.00
--------------------------------------+-----------------------------------
                            Total |        300      100.00
```

. gen spol=0
. replace spol=1 if female==0
(124 real changes made)

. tab iv009_mod, gen(urb)

```
                      Area of location |      Freq.     Percent        Cum.
---------------------------------------+-----------------------------------
                   -15. no information |          4        1.33        1.33
    -9. filtered: interview not at home |          8        2.67        4.00
                         1. A big city |         28        9.33       13.33
2. The suburbs or outskirts of a big ci |         18        6.00       19.33
                       3. A large town |         17        5.67       25.00
                       4. A small town |         67       22.33       47.33
            5. A rural area or village |        158       52.67      100.00
---------------------------------------+-----------------------------------
                                 Total |        300      100.00
```

. tab mar_stat, gen(ms)

```
                        Marital status |      Freq.     Percent        Cum.
---------------------------------------+-----------------------------------
1. Married and living together with spo |        217       72.33       72.33
             2. Registered partnership |         17        5.67       78.00
3. Married, living separated from spous |          1        0.33       78.33
                      4. Never married |         11        3.67       82.00
                           5. Divorced |         15        5.00       87.00
                            6. Widowed |         39       13.00      100.00
---------------------------------------+-----------------------------------
                                 Total |        300      100.00
```

. tab sphus, gen(zz)

```
   Self-perceived health - us version |      Freq.     Percent        Cum.
--------------------------------------+-----------------------------------
                       1. Excellent |         21        7.00        7.00
                       2. Very good |         36       12.00       19.00
                            3. Good |        121       40.33       59.33
```

```
                          4. Fair |         82       27.33       86.67
                          5. Poor |         40       13.33      100.00
----------------------------------+-----------------------------------
                            Total |        300      100.00
```

. tab ep005_, gen(dakt)

```
               Current job situation |      Freq.     Percent        Cum.
-------------------------------------+-----------------------------------
                  -15. no information |          1        0.33        0.33
                          1. retired |        224       74.67       75.00
        2. employed or self-employed |         39       13.00       88.00
                        3. unemployed |          9        3.00       91.00
     4. permanently sick or disabled |          5        1.67       92.67
                        5. homemaker |         18        6.00       98.67
                           97. other |          4        1.33      100.00
-------------------------------------+-----------------------------------
                             Total |        300      100.00
```

. tab co007_, gen(sdoh)

```
  Is household able to make ends meet |      Freq.     Percent        Cum.
--------------------------------------+-----------------------------------
                   -15. no information |          2        0.67        0.67
              1. With great difficulty |         54       18.00       18.67
               2. With some difficulty |        115       38.33       57.00
                      3. Fairly easily |         72       24.00       81.00
                              4. Easily |         57       19.00      100.00
--------------------------------------+-----------------------------------
                                Total |        300      100.00
```

. sum female age eduyears_mod hhsize ch001_ sphus casp bmi thinc_m ores fahc car hnfass

```
    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
      female |        300    .5866667    .4932544          0          1
         age |        300      67.944    9.275548       48.1       94.4
eduyears_mod |        300          10    5.198405        -15         23
      hhsize |        300        2.28    .9650758          1          6
      ch001_ |        300    2.136667    1.108491          0          6
-------------+---------------------------------------------------------
       sphus |        300        3.28    1.063974          1          5
        casp |        300    34.45667    14.77665        -15         48
         bmi |        300    26.51387    8.403939        -12   48.88889
     thinc_m |        300     19096.2    18355.04   669.9236   141360.5
        ores |        300    20781.04    67807.35          0     500000
-------------+---------------------------------------------------------
        fahc |        300    3543.656    1641.078          0       8400
         car |        300    3872.551    4617.122          0   21973.73
      hnfass |        300    3900.898    9299.317     -16000   63962.95
```

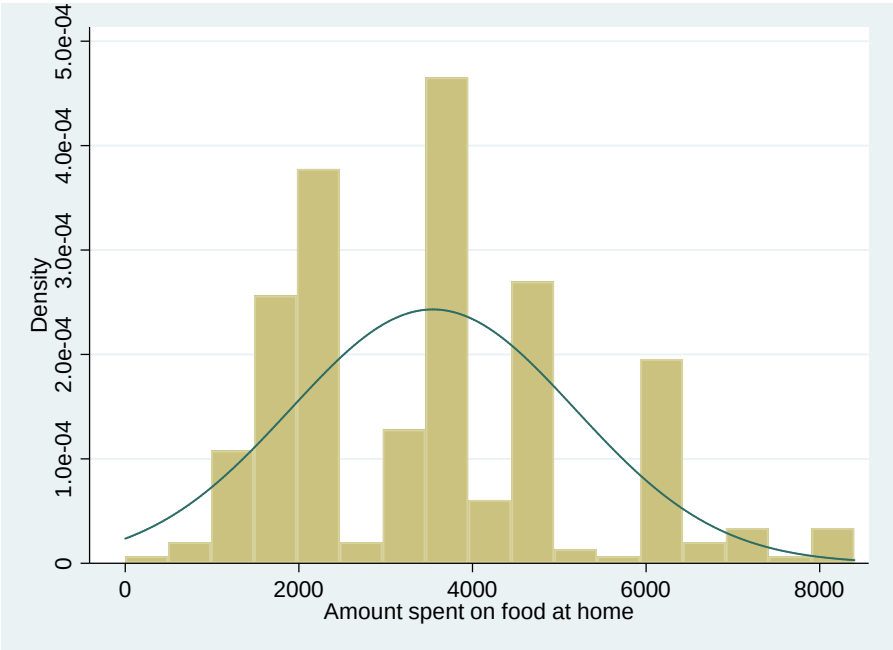
. tab eduyears_mod

```
                   Years of education |      Freq.     Percent        Cum.
--------------------------------------+-----------------------------------
                   -15. no information |          7        2.33        2.33
                                     0 |          1        0.33        2.67
                                     2 |          1        0.33        3.00
                                     3 |          5        1.67        4.67
                                     4 |         10        3.33        8.00
                                     5 |          5        1.67        9.67
                                     6 |          4        1.33       11.00
                                     7 |          8        2.67       13.67
                                     8 |         70       23.33       37.00
                                     9 |          7        2.33       39.33
                                    10 |         13        4.33       43.67
                                    11 |         54       18.00       61.67
                                    12 |         54       18.00       79.67
```

```
                                    13 |         11        3.67       83.33
                                    14 |         11        3.67       87.00
                                    15 |          8        2.67       89.67
                                    16 |         13        4.33       94.00
                                    17 |          9        3.00       97.00
                                    18 |          6        2.00       99.00
                                    19 |          1        0.33       99.33
                                    20 |          1        0.33       99.67
                                    23 |          1        0.33      100.00
------------------------------------+-----------------------------------
                                 Total |        300      100.00
```

```
. replace eduyears_mod=. if eduyears_mod==-15
(7 real changes made, 7 to missing)

. replace casp=. if casp==-15
(21 real changes made, 21 to missing)

. replace bmi=. if bmi==-12
(10 real changes made, 10 to missing)

. sum fahc, detail

                Amount spent on food at home
-------------------------------------------------------------
      Percentiles      Smallest
 1%          720              0
 5%         1200            720
10%         1800            720       Obs                 300
25%         2400            720       Sum of Wgt.         300

50%         3600                      Mean           3543.656
                        Largest       Std. Dev.      1641.078
75%         4800           8400
90%         6000           8400       Variance        2693137
95%     6049.852           8400       Skewness       .6922547
99%         8400           8400       Kurtosis       3.122141

. inspect fahc bmi

fahc:  Amount spent on food at home            Number of Observations
-----------------------------------    ----------------------------------------
                                                 Total      Integers   Nonintegers
|          #                 Negative              -             -             -
|      #   #                 Zero                  1             1             -
|      #   #                 Positive            299            19           280
|      #   #                                   -----------   -----------   -----------
|      #   #                 Total               300            20           280
|  #   #   #   #   .         Missing               -
+----------------------      -----------
0                   8400                        300
  (39 unique values)

bmi:  Body mass index                          Number of Observations
----------------------                 ----------------------------------------
                                                 Total      Integers   Nonintegers
|      #                     Negative              -             -             -
|      #                     Zero                  -             -             -
|      #                     Positive            290             1           289
|      #                                   -----------   -----------   -----------
|  #   #   #                 Total               290             1           289
|  #   #   #   .   .         Missing              10
+----------------------      -----------
18.08021       48.88889                        300
(More than 99 unique values)

      bmi is labeled but 290 values are NOT documented in the label.
```

```
. hist fahc, normal
(bin=17, start=0, width=494.11765)
```




```
. list mergeid spol age eduyears_mod hhsize thinc_m fahc if dakt3==1
```

	mergeid	spol	age	eduyea~d	hhsize	thinc_m	fahc
2.	SI-001361-02	1	56,0	15	2	23781.36	4200
7.	SI-002427-01	0	54,3	12	2	36613.89	4800
13.	SI-005225-01	0	62,0	16	1	15116.28	1800
19.	SI-006643-03	0	56,5	.	5	20348.84	3600
26.	SI-009396-01	1	62,4	11	2	29079.27	4800
28.	SI-010100-01	1	58,0	12	2	27961.89	3600
29.	SI-010100-03	0	53,3	15	2	27961.89	3600
52.	SI-016144-01	1	57,8	8	3	17441.86	4800
68.	SI-018868-01	1	56,8	11	4	21867.71	3600
71.	SI-020327-01	0	56,0	14	1	5813.954	3600
81.	SI-022776-02	0	49,9	11	2	13372.09	2400
87.	SI-023460-01	1	52,9	14	4	1162.791	3600
89.	SI-023530-01	1	61,8	16	1	6193.654	2058.289
92.	SI-023630-01	0	53,3	10	2	8723.188	2400

...

231.	SI-055711-02	0	67,0	16	3	41860.46	6000
234.	SI-056404-01	0	56,2	13	4	29883.72	3600
235.	SI-056404-02	1	55,2	11	4	29883.72	3600
236.	SI-056467-01	1	54,8	6	2	21162.79	2400
237.	SI-056467-02	0	53,1	11	2	21162.79	2400
263.	SI-062083-01	1	56,8	8	2	18604.65	4800
274.	SI-063660-01	0	58,3	17	4	88997.52	2709.197
277.	SI-066437-01	0	54,3	17	2	2773.216	2400
279.	SI-066644-01	1	60,7	12	2	6408.271	1440
286.	SI-067556-01	0	59,9	23	1	17209.3	4800
287.	SI-067741-01	1	54,6	11	4	21860.64	1904.012
288.	SI-067834-01	0	57,0	17	3	2330.208	6600

Korelacijska matrika:

```
. correlate age eduyears_mod hhsize thinc_m fahc
(obs=293)

             |      age eduyea~d   hhsize  thinc_m     fahc
-------------+---------------------------------------------
         age |   1.0000
eduyears_mod |  -0.1733   1.0000
      hhsize |  -0.2881  -0.0010   1.0000
     thinc_m |  -0.1162   0.2272   0.0758   1.0000
        fahc |  -0.0622   0.2753   0.2722   0.2845   1.0000

. pwcorr age eduyears_mod hhsize thinc_m fahc, sig

             |      age eduyea~d   hhsize  thinc_m     fahc
-------------+---------------------------------------------
         age |   1.0000
             |
             |
eduyears_mod |  -0.1733   1.0000
             |   0.0029
             |
      hhsize |  -0.2993  -0.0010   1.0000
             |   0.0000   0.9865
             |
     thinc_m |  -0.1220   0.2272   0.0650   1.0000
             |   0.0346   0.0001   0.2616
             |
        fahc |  -0.0566   0.2753   0.2638   0.2662   1.0000
             |   0.3289   0.0000   0.0000   0.0000
             |

. spearman hhsize ch001_ sphus co007_
(obs=300)

             |   hhsize   ch001_    sphus   co007_
-------------+------------------------------------
      hhsize |   1.0000
      ch001_ |   0.1934   1.0000
       sphus |  -0.0379   0.1155   1.0000
      co007_ |  -0.0192  -0.0975  -0.3090   1.0000

. spearman hhsize ch001_ sphus co007_, stats(rho p)
(obs=300)

+-----------------+
|  Key            |
|-----------------|
|   rho           |
|   Sig. level    |
+-----------------+

             |   hhsize   ch001_    sphus   co007_
-------------+------------------------------------
      hhsize |   1.0000
             |
             |
      ch001_ |   0.1934   1.0000
             |   0.0008
             |
       sphus |  -0.0379   0.1155   1.0000
             |   0.5137   0.0457
             |
      co007_ |  -0.0192  -0.0975  -0.3090   1.0000
             |   0.7401   0.0918   0.0000
             |
```

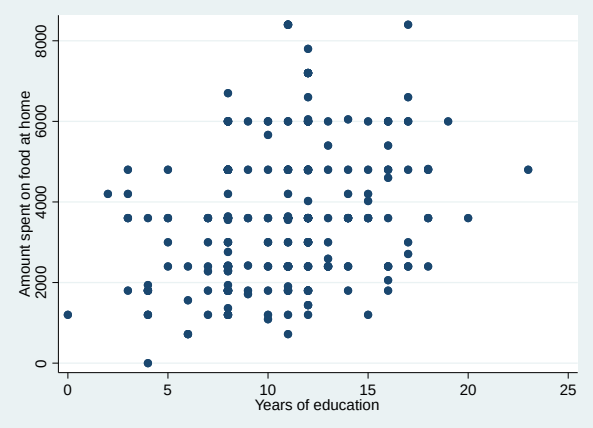
Preverjanje enakosti aritmetičnih sredin na dveh podvzorcih:

. ttest casp, by(spol)

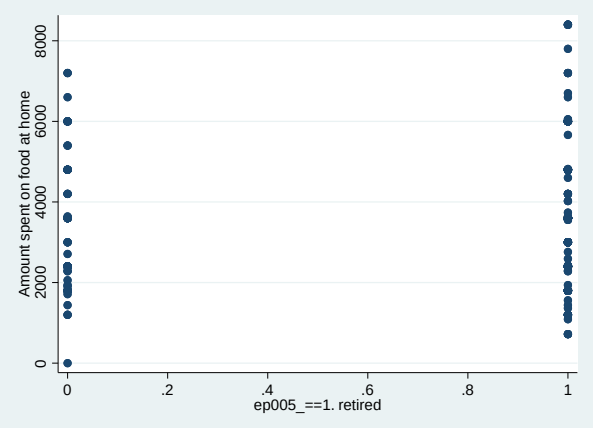
```
Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |     167    37.98204    .4881152    6.307839    37.01832    38.94575
       1 |     112    38.47321    .5255627    5.562033    37.43178    39.51465
---------+--------------------------------------------------------------------
combined |     279    38.17921    .3600538    6.014084    37.47043    38.88799
---------+--------------------------------------------------------------------
    diff |           -.4911784    .7352538               -1.938573    .9562166
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.6680
Ho: diff = 0                                     degrees of freedom =      277

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.2523         Pr(|T| > |t|) = 0.5047          Pr(T > t) = 0.7477
```

Prikaz odvisnosti v razsevnem diagramu in ocenjevanje linearnega modela:

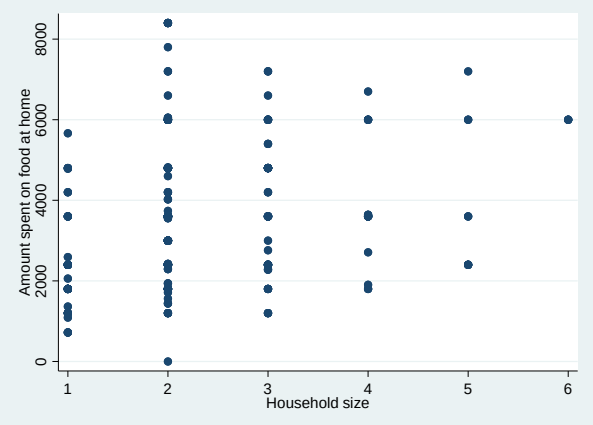
. scatter fahc eduyears_mod



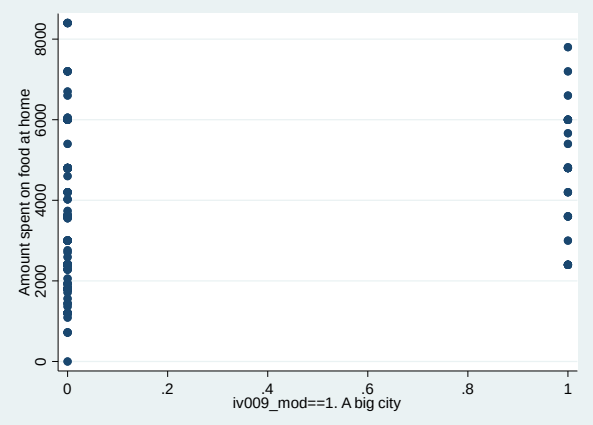
. scatter fahc dakt2



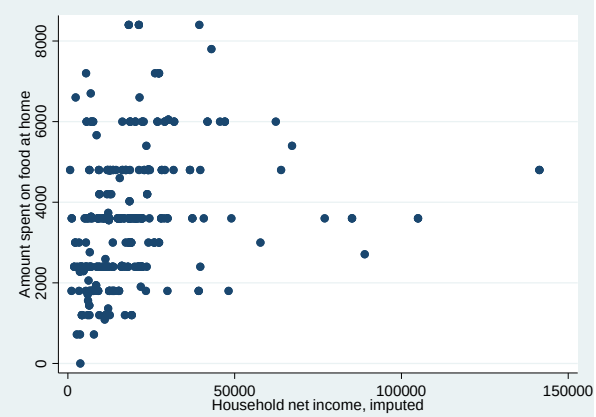
. scatter fahc hhsize



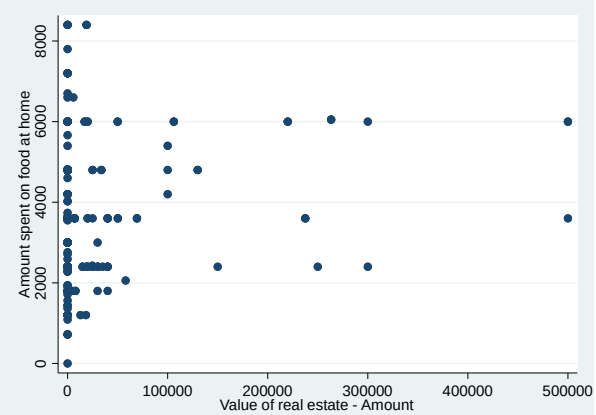
. scatter fahc urb3



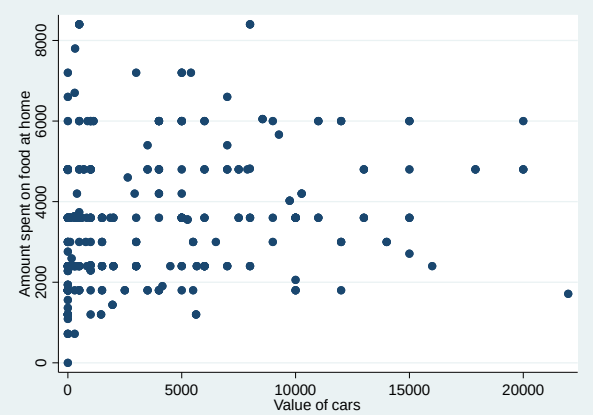
. scatter fahc thinc_m



. scatter fahc ores



. scatter fahc car



. regress fahc eduyears_mod dakt2 hhsize urb3 thinc_m ores car

```
      Source |       SS           df       MS      Number of obs   =       293
-------------+----------------------------------   F(7, 285)       =     15.09
       Model |   216705116         7  30957873.7   Prob > F        =    0.0000
    Residual |   584865698       285  2052160.34   R-squared       =    0.2704
-------------+----------------------------------   Adj R-squared   =    0.2524
       Total |   801570814       292  2745105.53   Root MSE        =    1432.5

------------------------------------------------------------------------------
        fahc |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eduyears_mod |   68.38859   25.80981     2.65   0.009     17.58655    119.1906
       dakt2 |   394.9844   198.8579     1.99   0.048     3.567916    786.4009
      hhsize |   514.3805   90.23081     5.70   0.000     336.7772    691.9839
        urb3 |   1203.913   292.3475     4.12   0.000     628.4791    1779.348
     thinc_m |   .0174705   .0050296     3.47   0.001     .0075706    .0273704
        ores |    .002435   .0012669     1.92   0.056    -.0000586    .0049287
         car |   .0403618    .019394     2.08   0.038     .0021882    .0785354
       _cons |   689.7797   380.3994     1.81   0.071    -58.96911    1438.528
------------------------------------------------------------------------------
```

Prikaz ocenjenih vrednosti in ostankov:

. qui regress fahc eduyears_mod dakt2 hhsize urb3 thinc_m ores car

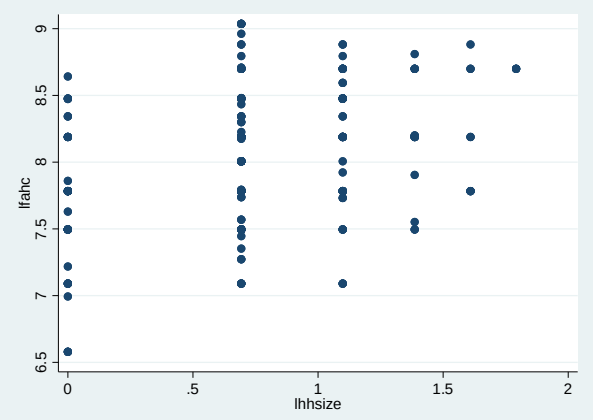
. predict e, resid
(7 missing values generated)

```
. predict fahc_hat, xb
(7 missing values generated)

. list fahc fahc_hat e if fahc_hat!=. & e!=., mean
```

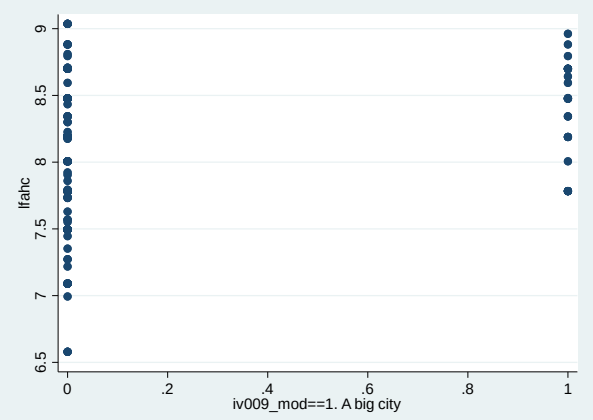
	fahc	fahc_hat	e
1.	4200	3900.802	299.1984
2.	4200	3574.206	625.7942
3.	1800	2548.558	-748.5578
4.	1089.749	2476.018	-1386.269
5.	1800	3297.425	-1497.425
6.	1800	3092.259	-1292.259
7.	4800	3983.448	816.5518
8.	4800	4378.433	421.5674
9.	2400	3619.107	-1219.108
10.	2400	3550.719	-1150.719
11.	0	2057.34	-2057.34
12.	1712.354	3324.83	-1612.475
13.	1800	2784.456	-984.4559
...			
295.	1200	2584.355	-1384.355
296.	2400	4888.494	-2488.494
297.	4800	3819.498	980.5018
298.	4800	3365.784	1434.216
299.	4800	3365.784	1434.216
300.	3000	3269.574	-269.5744
Mean	3531.604	3531.604	-1.92e-06

Ocenjevanje logaritemsko-logaritemskega modela:

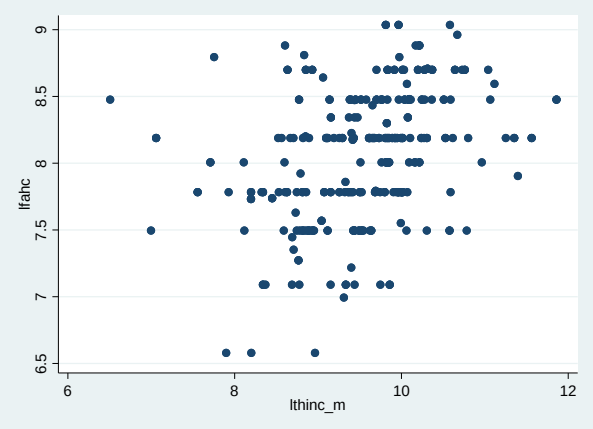
```
. gen lfahc=log(fahc)
(1 missing value generated)

. gen lhhsize=log(hhsize)

. gen lthinc_m=log(thinc_m)

. gen lores=log(ores)
(223 missing values generated)

. scatter lfahc lhhsize
```



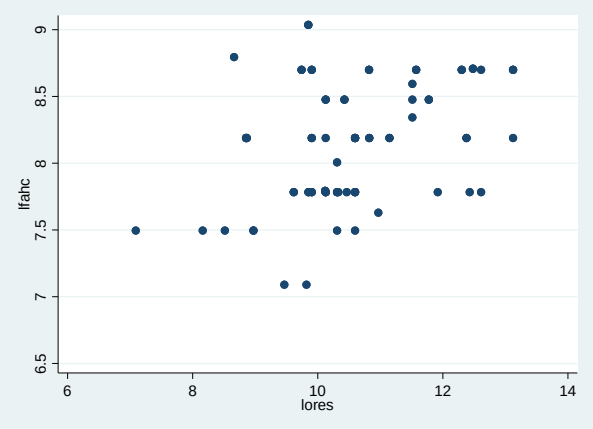

```
. scatter lfahc lurb3
```



. scatter lfahc lthinc_m



. scatter lfahc lores



. regress lfahc lhhsize urb3 lthinc_m lores

```
      Source |       SS           df       MS      Number of obs   =        77
-------------+----------------------------------   F(4, 72)        =     14.57
       Model |  7.10437973         4  1.77609493   Prob > F        =    0.0000
    Residual |   8.7766655        72  .121898132   R-squared       =    0.4473
-------------+----------------------------------   Adj R-squared   =    0.4166
       Total |  15.8810452        76  .208961121   Root MSE        =    .34914

------------------------------------------------------------------------------
       lfahc |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     lhhsize |   .4640447   .0950227     4.88   0.000     .2746205     .653469
        urb3 |   .2566703   .1441502     1.78   0.079    -.0306878    .5440283
    lthinc_m |   .1209255   .0492399     2.46   0.016     .0227675    .2190834
       lores |   .1099059    .033519     3.28   0.002      .043087    .1767248
       _cons |   5.419108   .5336027    10.16   0.000      4.35539    6.482825
------------------------------------------------------------------------------
```

. test lthinc_m=lores

```
 ( 1)  lthinc_m - lores = 0

       F(  1,    72) =    0.03
            Prob > F =    0.8645
```

■