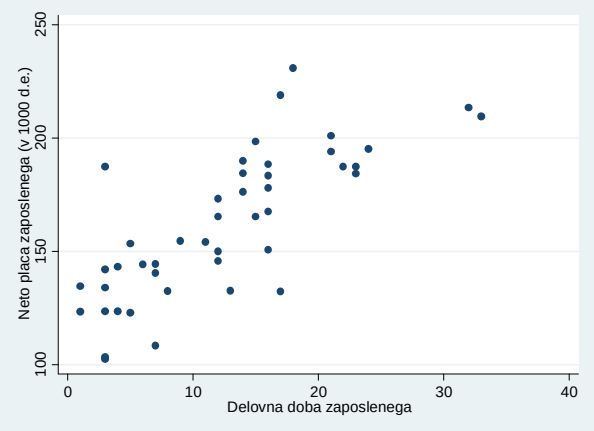
Primer 1: Za 45 zaposlenih oseb smo v datoteki `placa1.dta` zbrali podatke o njihovi neto plači (v 1.000 d.e.), delovni dobi (v letih) in spolu (neprava spremenljivka, ki ima vrednost 1, če gre za moškega in vrednost 2, če gre za žensko). Za spol uvedemo novo nepravo spremenljivko *D*, ki ima vrednost 1, če gre za moškega in vrednost 0, če gre za žensko.

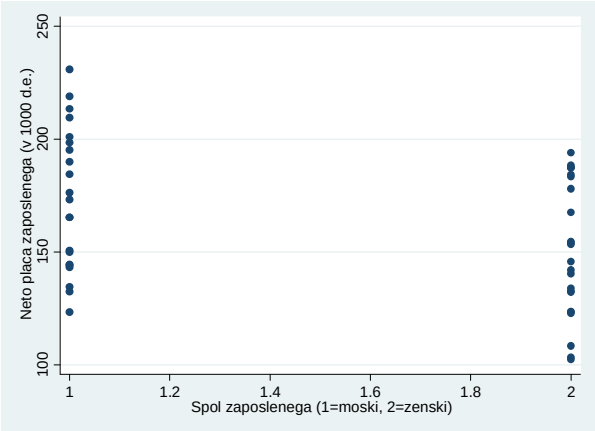
Ocenite regresijske modele, v katerih bo na različne načine nastopala neprava spremenljivka in razložite dobljene regresijske koeficiente.

Izpis rezultatov obdelav v programskem paketu Stata:

```
. scatter placa doba
```




```
. scatter placa spol
```




```
. gen d=1
. replace d=0 if spol==2
(24 real changes made)

. label variable d "Spol zaposlenega (1=moski, 0=zenski)"

. gen dalt=1
. replace dalt=0 if spol==1
(21 real changes made)

. label variable dalt "Spol zaposlenega (1=zenski, 0=moski)"

. regress placa d

      Source |       SS       df       MS              Number of obs =      45
-------------+------------------------------           F(  1,    43) =    5.90
       Model |  5549.44883     1  5549.44883           Prob > F      =  0.0194
    Residual |  40416.5491    43  939.919746           R-squared     =  0.1207
-------------+------------------------------           Adj R-squared =  0.1003
       Total |  45965.9979    44  1044.68177           Root MSE      =  30.658

------------------------------------------------------------------------------
       placa |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           d |   22.25953   9.160863     2.43   0.019     3.784886    40.73417
       _cons |   151.3167   6.258061    24.18   0.000     138.6961    163.9372
------------------------------------------------------------------------------
```

. tab d, sum(placa)

```
       Spol |
zaposlenega |  Summary of Neto placa zaposlenega
  (1=moski, |            (v 1000 d.e.)
  0=zenski) |        Mean   Std. Dev.       Freq.
------------+------------------------------------
          0 |   151.31667   29.742015          24
          1 |   173.57619   31.678887          21
------------+------------------------------------
      Total |   161.70444   32.321537          45
```

. regress placa doba d

```
      Source |       SS       df       MS              Number of obs =      45
-------------+------------------------------           F(  2,    42) =   36.07
       Model |     29052.7     2    14526.35           Prob > F      =  0.0000
    Residual |  16913.2979    42  402.697568           R-squared     =  0.6320
-------------+------------------------------           Adj R-squared =  0.6145
       Total |  45965.9979    44  1044.68177           Root MSE      =  20.067

------------------------------------------------------------------------------
       placa |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        doba |   2.975623   .3894964     7.64   0.000     2.189588    3.761659
           d |   12.67731   6.126038     2.07   0.045      .314466    25.04015
       _cons |   118.9568    5.89244    20.19   0.000     107.0653    130.8482
------------------------------------------------------------------------------
```

. gen ddoba=d*doba

. regress placa doba d ddoba

```
      Source |       SS       df       MS              Number of obs =      45
-------------+------------------------------           F(  3,    41) =   23.48
       Model |  29052.7495     3  9684.24985           Prob > F      =  0.0000
    Residual |  16913.2484    41  412.518253           R-squared     =  0.6320
-------------+------------------------------           Adj R-squared =  0.6051
       Total |  45965.9979    44  1044.68177           Root MSE      =  20.311

------------------------------------------------------------------------------
       placa |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        doba |   2.970835   .5886187     5.05   0.000     1.782095    4.159574
           d |   12.57033   11.56706     1.09   0.284    -10.78982    35.93047
       ddoba |    .008684   .7926433     0.01   0.991    -1.592092     1.60946
       _cons |   119.0088   7.626532    15.60   0.000     103.6067    134.4109
------------------------------------------------------------------------------
```

. list placa doba spol d ddoba

```
     +---------------------------------+
     | placa   doba   spol   d   ddoba |
     |---------------------------------|
  1. | 150.6     16      1   1      16 |
  2. | 213.4     32      1   1      32 |
  3. | 108.4      7      2   0       0 |
  4. | 123.6      4      2   0       0 |
  5. |   194     21      2   0       0 |
     |---------------------------------|
  6. | 154.1     11      2   0       0 |
  7. | 184.5     14      1   1      14 |
  8. | 173.2     12      1   1      12 |
  9. | 167.5     16      2   0       0 |
 10. | 144.3      6      1   1       6 |
```

```
     |---------------------------------|
 11. | 165.3     15      1   1      15 |
 12. | 103.4      3      2   0       0 |
 13. | 154.7      9      2   0       0 |
 14. |   219     17      1   1      17 |
 15. | 188.4     16      2   0       0 |
     |---------------------------------|
 16. |   201     21      1   1      21 |
 17. | 153.4      5      2   0       0 |
 18. | 132.7     13      2   0       0 |
 19. | 183.4     16      2   0       0 |
 20. | 165.3     12      1   1      12 |
     |---------------------------------|
 21. | 187.4     22      2   0       0 |
 22. | 132.4     17      2   0       0 |
 23. | 123.6      3      2   0       0 |
 24. | 176.3     14      1   1      14 |
 25. | 187.4     23      2   0       0 |
     |---------------------------------|
 26. | 134.5      1      1   1       1 |
 27. | 102.3      3      2   0       0 |
 28. | 198.4     15      1   1      15 |
 29. |   150     12      1   1      12 |
 30. | 140.4      7      2   0       0 |
     |---------------------------------|
 31. | 184.3     23      2   0       0 |
 32. | 143.1      4      1   1       4 |
 33. | 187.5      3      2   0       0 |
 34. | 132.5      8      1   1       8 |
 35. |   190     14      1   1      14 |
     |---------------------------------|
 36. | 145.7     12      2   0       0 |
 37. | 123.4      1      1   1       1 |
 38. |   142      3      2   0       0 |
 39. | 195.3     24      1   1      24 |
 40. |   123      5      2   0       0 |
     |---------------------------------|
 41. | 144.4      7      1   1       7 |
 42. |   134      3      2   0       0 |
 43. |   231     18      1   1      18 |
 44. |   178     16      2   0       0 |
 45. | 209.6     33      1   1      33 |
     +---------------------------------+
```

. regress placa d dalt

```
note: dalt omitted because of collinearity

      Source |       SS       df       MS              Number of obs =      45
-------------+------------------------------           F(  1,    43) =    5.90
       Model |  5549.44883     1  5549.44883           Prob > F      =  0.0194
    Residual |  40416.5491    43  939.919746           R-squared     =  0.1207
-------------+------------------------------           Adj R-squared =  0.1003
       Total |  45965.9979    44  1044.68177           Root MSE      =  30.658

------------------------------------------------------------------------------
       placa |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           d |   22.25953   9.160863     2.43   0.019     3.784886    40.73417
        dalt |  (omitted)
       _cons |   151.3167   6.258061    24.18   0.000     138.6961    163.9372
------------------------------------------------------------------------------
```

```
. regress placa doba d dalt
note: dalt omitted because of collinearity

      Source |       SS       df       MS              Number of obs =      45
-------------+------------------------------           F(  2,    42) =   36.07
       Model |     29052.7     2    14526.35           Prob > F      =  0.0000
    Residual |  16913.2979    42  402.697568           R-squared     =  0.6320
-------------+------------------------------           Adj R-squared =  0.6145
       Total |  45965.9979    44  1044.68177           Root MSE      =  20.067

------------------------------------------------------------------------------
       placa |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        doba |   2.975623   .3894964     7.64   0.000     2.189588    3.761659
           d |   12.67731   6.126038     2.07   0.045      .314466    25.04015
        dalt |  (omitted)
       _cons |   118.9568    5.89244    20.19   0.000     107.0653    130.8482
------------------------------------------------------------------------------
```

■

Primer 2: V vzorec smo izbrali 32 evropskih držav in za leto 2003 pridobili naslednje podatke (datoteka `zdravstvo.dta`):

- pričakovana življenjska doba (*PZD*; v letih);
- izdatki za zdravstvo na prebivalca (*IZDATKI*; v ameriških dolarjih);
- odstotek kadilcev med odraslimi prebivalci (*TOBAK*);
- poraba čistega alkohola na prebivalca (*ALKO*; v litrih – upoštevane žgane pijače).

Države smo razdelili v dve skupini in sicer glede na to, ali je država članica EU15 (pri teh državah ima neprava spremenljivka *DEU* vrednost 1) ali ne (pri teh državah ima neprava spremenljivka *DEU* vrednost 0).

Na šestih predavanjih smo za vsako skupino posebej ocenili naslednji regresijski model:

$$PZD_i = \beta_1 + \beta_2 IZDATKI_i + \beta_3 ALKO_i + \beta_4 TOBAK_i + u_i$$

in na podlagi Chowovega testa ugotovili, da se proučevana regresijska funkcija razlikuje med omenjenima skupinama držav. Dopolnite ugotovitve z uporabo nepravih spremenljivk.

Izpis rezultatov obdelav v programskem paketu Stata:

```
. regress pzd izdatki alko tobak

      Source |       SS       df       MS              Number of obs =      32
-------------+------------------------------           F(  3,    28) =   26.30
       Model |  413.850212     3  137.950071           Prob > F      =  0.0000
    Residual |  146.874565    28  5.24552017           R-squared     =  0.7381
-------------+------------------------------           Adj R-squared =  0.7100
       Total |  560.724777    31   18.087896           Root MSE      =  2.2903
```

```
------------------------------------------------------------------------------
         pzd |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     izdatki |   .0018569   .0004023     4.62   0.000     .0010329    .0026809
        alko |  -.6493606   .2805689    -2.31   0.028     -1.22408   -.0746412
       tobak |  -.2238391   .0837702    -2.67   0.012    -.3954346   -.0522436
       _cons |   81.42053   2.720683    29.93   0.000     75.84746    86.99359
------------------------------------------------------------------------------
```

```
. gen dizdatki=deu*izdatki
. gen dalko=deu*alko
. gen dtobak=deu*tobak

. regress pzd izdatki alko tobak deu

      Source |       SS       df       MS              Number of obs =      32
-------------+------------------------------           F(  4,    27) =   24.56
       Model |  439.854433     4  109.963608           Prob > F      =  0.0000
    Residual |  120.870344    27  4.47667939           R-squared     =  0.7844
-------------+------------------------------           Adj R-squared =  0.7525
       Total |  560.724777    31   18.087896           Root MSE      =  2.1158

------------------------------------------------------------------------------
         pzd |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     izdatki |   .0015803   .0003889     4.06   0.000     .0007823    .0023783
        alko |  -.4965685   .2668332    -1.86   0.074    -1.044065     .050928
       tobak |  -.2039382   .0778272    -2.62   0.014    -.3636265   -.0442499
         deu |   2.144349   .8897162     2.41   0.023     .3188019    3.969896
       _cons |   79.81336   2.600354    30.69   0.000     74.47788    85.14885
------------------------------------------------------------------------------

. regress pzd izdatki alko tobak deu dizdatki dalko dtobak

      Source |       SS       df       MS              Number of obs =      32
-------------+------------------------------           F(  7,    24) =   23.59
       Model |  489.576762     7  69.9395375           Prob > F      =  0.0000
    Residual |  71.1480148    24  2.96450062           R-squared     =  0.8731
-------------+------------------------------           Adj R-squared =  0.8361
       Total |  560.724777    31   18.087896           Root MSE      =  1.7218

------------------------------------------------------------------------------
         pzd |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     izdatki |   .0015388   .0003798     4.05   0.000     .0007548    .0023227
        alko |  -.5335537   .2317374    -2.30   0.030    -1.011836   -.0552712
       tobak |  -.4019988   .0917503    -4.38   0.000    -.5913622   -.2126354
         deu |  -7.934472   4.162727    -1.91   0.069    -16.52592    .6569745
    dizdatki |  -.0014602   .0007901    -1.85   0.077    -.0030908    .0001705
       dalko |   .6710069   .8493576     0.79   0.437    -1.081981    2.423995
      dtobak |   .4129869   .1349227     3.06   0.005     .1345201    .6914537
       _cons |   85.90512   3.096202    27.75   0.000     79.51487    92.29537
------------------------------------------------------------------------------

. test deu=dizdatki=dalko=0

 ( 1)  deu - dizdatki = 0
 ( 2)  deu - dalko = 0
 ( 3)  deu = 0

       F(  3,    24) =    4.20
            Prob > F =    0.0159
```

```
. test dizdatki=dalko=0

 ( 1)  dizdatki - dalko = 0
 ( 2)  dizdatki = 0

       F(  2,    24) =    2.20
            Prob > F =    0.1332
```

```
. regress pzd izdatki alko tobak deu dtobak

      Source |       SS       df       MS              Number of obs =      32
-------------+------------------------------           F(  5,    26) =   29.44
       Model |  476.562498     5  95.3124995           Prob > F      =  0.0000
    Residual |  84.1622793    26  3.23701074           R-squared     =  0.8499
-------------+------------------------------           Adj R-squared =  0.8210
       Total |  560.724777    31   18.087896           Root MSE      =  1.7992

------------------------------------------------------------------------------
         pzd |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     izdatki |   .0012305   .0003467     3.55   0.001      .000518    .0019431
        alko |  -.5723521    .228013    -2.51   0.019     -1.04104   -.1036647
       tobak |  -.4311841   .0945176    -4.56   0.000    -.6254678   -.2369004
         deu |  -10.55756   3.847028    -2.74   0.011    -18.46524    -2.64988
      dtobak |   .4550991   .1351442     3.37   0.002     .1773063    .7328919
       _cons |   87.19745   3.114081    28.00   0.000     80.79636    93.59853
------------------------------------------------------------------------------
```

■