```
      name:  <unnamed>
       log:  /Users/samueleborsini/Library/Mobile Documents/com~apple~CloudDo
> cs/Universita`/Economics and econometrics/II anno/Advanced Microeconometric
> s/Project/Data analysis/New data application - Advanced Microeconometrics.s
> mcl
  log type:  smcl
 opened on:  18 Nov 2023, 11:12:14

1 .
2 . ************************************************
3 . /*
  > New data application using simulated based methods - Advanced microeconomet
  > rics.
  >
  > "Effect of high school satisfaction on studying and working decisions"
  >
  > Samuele Borsini, Stella Gatti & Pablo Suarez-Sucunza
  > October 31st, 2023
  > */
4 . ************************************************
5 .
6 . ************************************************
7 . /*
  > 1.- Introduction and motivation:
  >
  > We want to study whether a high school student being satisfied or not with
  > high school (in this case regarding the study plan of the high school) has
  > an impact on its decisions post-graduation, most specifically on its decisi
  > on to go to university or start working.
  >
  > The choices students make upon completing high school significantly impact
  > their future paths and contributions to society. The quality of one's high
  > school experience can significantly shape their future trajectory, affectin
  > g their academic pursuits and career choices. This research addresses a cru
  > cial aspect of educational and career development, shedding light on the fa
  > ctors that influence these decisions.
  >
  > We plan to study this by modelling both the probability that a student enro
  > lls in university the year after graduation, and the probability that the s
  > tudent has a job the year after graduation.
  >
  > Since these 2 decisions are most likely related, it makes sense to model th
  > em together. To account for unobserved characteristics, as for example skil
  > l, affect these decisions but also affect the high school satisfaction of t
  > he student, we account for this by also modelling the probability that a st
```

```
   > udent is satisfied with high school. Overall, we propose a trivariate probi
   > t model. We will expand more on this a bit further.
   >
   > We will start by modelling each probability separately, the jointly, and fi
   > nally accounting for the endogeneity of high school satisfaction.
   > */
 8 . ************************************************
 9 .
10 .
11 . ************************************************
12 . /*
   > 2.- Data:
   >
   > We use microdata from ISTAT about "path of study work of high school gradua
   > tes" (https://www.istat.it/it/archivio/96042). The data was published in 20
   > 15, and belongs to students who inished high school in 2011. The interviews
   >  were conducted almost 4 years after the students had graduated. We have da
   > ta on 26,235 students.
   > */
13 . import delimited "Data/GEPPS_2015_IT_TXT/MICRODATI/GEPPS_Microdati_Anno_201
   > 5.txt", clear
   (encoding automatically selected: ISO-8859-2)
   (161 vars, 26,235 obs)

14 .
15 .
16 . keep v3_3 v4_49 v0_5 cittad v1_7d scuola_pubblica v0_3_micro v1_1 v0_8 v1_3
   >  v6_5 v6_10

17 .
18 . drop if v1_7d == "  "
   (1,049 observations deleted)

19 . drop if v0_3_micro == " "
   (122 observations deleted)
```

```
20 .
21 . destring v0_3_micro, replace
   v0_3_micro: all characters numeric; replaced as byte

22 . destring v1_7d, replace
   v1_7d: all characters numeric; replaced as byte

23 .
24 . foreach var in v3_3 v4_49 v0_5 cittad v1_7d scuola_pubblica v0_3_micro v1_1
   >  v0_8 v1_3 v6_5 v6_10 {
     2.         tab `var'
     3. }
```

V3_3	Freq.	Percent	Cum.
1	13,162	52.51	52.51
2	11,902	47.49	100.00
Total	25,064	100.00	

V4_49	Freq.	Percent	Cum.
1	7,961	31.76	31.76
2	17,103	68.24	100.00
Total	25,064	100.00	

V0_5	Freq.	Percent	Cum.
1	11,101	44.29	44.29
2	13,963	55.71	100.00
Total	25,064	100.00	

CITTAD	Freq.	Percent	Cum.
1	24,424	97.45	97.45
2	640	2.55	100.00
Total	25,064	100.00	

V1_7D	Freq.	Percent	Cum.
0	63	0.25	0.25
1	35	0.14	0.39
2	109	0.43	0.83
3	144	0.57	1.40
4	399	1.59	2.99
5	1,289	5.14	8.14
6	4,297	17.14	25.28
7	8,088	32.27	57.55
8	7,280	29.05	86.59
9	2,302	9.18	95.78
10	1,058	4.22	100.00
Total	25,064	100.00	

scuola_pubblica	Freq.	Percent	Cum.
0	978	3.90	3.90
1	24,086	96.10	100.00
Total	25,064	100.00	

V0_3_MICRO	Freq.	Percent	Cum.
1	8,294	33.09	33.09
2	5,271	21.03	54.12
3	3,473	13.86	67.98
4	3,694	14.74	82.72
5	1,209	4.82	87.54
6	892	3.56	91.10
7	2,231	8.90	100.00
Total	25,064	100.00	

V1_1	Freq.	Percent	Cum.
1	3,245	12.95	12.95
2	21,819	87.05	100.00
Total	25,064	100.00	

V0_8	Freq.	Percent	Cum.
60	2,045	8.16	8.16
61	402	1.60	9.76
62	1,055	4.21	13.97
63	603	2.41	16.38
64	710	2.83	19.21
65	887	3.54	22.75
66	721	2.88	25.63
67	615	2.45	28.08
68	994	3.97	32.05
69	217	0.87	32.91
70	1,621	6.47	39.38
71	438	1.75	41.13
72	1,021	4.07	45.20
73	665	2.65	47.85
74	749	2.99	50.84
75	965	3.85	54.69
76	715	2.85	57.54
77	566	2.26	59.80
78	901	3.59	63.40
79	188	0.75	64.15
80	1,289	5.14	69.29
81	402	1.60	70.89
82	730	2.91	73.81
83	466	1.86	75.67
84	495	1.97	77.64
85	600	2.39	80.04
86	449	1.79	81.83
87	367	1.46	83.29
88	356	1.42	84.71
89	166	0.66	85.37
90	508	2.03	87.40
91	175	0.70	88.10
92	291	1.16	89.26
93	196	0.78	90.04
94	183	0.73	90.77
95	254	1.01	91.79
96	189	0.75	92.54
97	149	0.59	93.13
98	226	0.90	94.04
99	30	0.12	94.15
100	1,262	5.04	99.19
101	203	0.81	100.00
Total	25,064	100.00	

V1_3	Freq.	Percent	Cum.
1	5,207	20.77	20.77
2	19,857	79.23	100.00
Total	25,064	100.00	

V6_5	Freq.	Percent	Cum.
1	1,849	7.38	7.38
2	9,078	36.22	43.60
3	8,995	35.89	79.48
4	375	1.50	80.98
5	2,013	8.03	89.01
6	2,754	10.99	100.00
Total	25,064	100.00	

V6_10	Freq.	Percent	Cum.
1	1,589	6.34	6.34
2	9,049	36.10	42.44
3	9,954	39.71	82.16
4	545	2.17	84.33
5	1,832	7.31	91.64
6	2,095	8.36	100.00
Total	25,064	100.00	

```
25 .
26 .
27 . // Perform transformations
28 . *enrollment to university
```

```
29 . tab v3_3
```

V3_3	Freq.	Percent	Cum.
1	**13,162**	**52.51**	**52.51**
2	**11,902**	**47.49**	**100.00**
Total	**25,064**	**100.00**	

```
30 . gen uni_ins = .
   (25,064 missing values generated)

31 . replace uni_ins = 0 if v3_3 == 2
   (11,902 real changes made)

32 . replace uni_ins = 1 if v3_3 == 1
   (13,162 real changes made)

33 . *working or not in 2012
34 . tab v4_49
```

V4_49	Freq.	Percent	Cum.
1	**7,961**	**31.76**	**31.76**
2	**17,103**	**68.24**	**100.00**
Total	**25,064**	**100.00**	

```
35 . gen work2012 = .
   (25,064 missing values generated)

36 . replace work2012 = 0 if v4_49 == 2
   (17,103 real changes made)
```

```
37 . replace work2012 = 1 if v4_49 == 1
   (7,961 real changes made)

38 . *gender
39 . tab v0_5
```

V0_5	Freq.	Percent	Cum.
1	**11,101**	**44.29**	**44.29**
2	**13,963**	**55.71**	**100.00**
Total	**25,064**	**100.00**	

```
40 . gen female = .
   (25,064 missing values generated)

41 . replace female = 0 if v0_5 == 1
   (11,101 real changes made)

42 . replace female = 1 if v0_5 == 2
   (13,963 real changes made)

43 . *nationality
44 . tab cittad
```

CITTAD	Freq.	Percent	Cum.
1	**24,424**	**97.45**	**97.45**
2	**640**	**2.55**	**100.00**
Total	**25,064**	**100.00**	

```
45 . gen italian = .
   (25,064 missing values generated)
```

```
46 . replace italian = 0 if cittad == 2
   (640 real changes made)

47 . replace italian = 1 if cittad == 1
   (24,424 real changes made)

48 . *level of satisfaction reported by the students
49 . tab v1_7d
```

V1_7D	Freq.	Percent	Cum.
0	**63**	**0.25**	**0.25**
1	**35**	**0.14**	**0.39**
2	**109**	**0.43**	**0.83**
3	**144**	**0.57**	**1.40**
4	**399**	**1.59**	**2.99**
5	**1,289**	**5.14**	**8.14**
6	**4,297**	**17.14**	**25.28**
7	**8,088**	**32.27**	**57.55**
8	**7,280**	**29.05**	**86.59**
9	**2,302**	**9.18**	**95.78**
10	**1,058**	**4.22**	**100.00**
Total	**25,064**	**100.00**	

```
50 . sum v1_7d, detail
```

V1_7D

Percentiles		Smallest		
1%	**3**	**0**		
5%	**5**	**0**		
10%	**6**	**0**	Obs	**25,064**
25%	**6**	**0**	Sum of wgt.	**25,064**
50%	**7**		Mean	**7.208027**
		Largest	Std. dev.	**1.374428**
75%	**8**	**10**		
90%	**9**	**10**	Variance	**1.889053**
95%	**9**	**10**	Skewness	**-.8129987**
99%	**10**	**10**	Kurtosis	**5.818157**

```
51 . gen hs_satisfied = 0

52 . replace hs_satisfied = 1 if v1_7d>=8 // We chose 8 as the threshold so as t
   > o have the most even split possible (42.44% satisfied, 47.56% not). Results
   >  are robust to changen the definition of this variable to equal or higher t
   > han 7.
   (10,640 real changes made)

53 . *public school
54 . rename scuola_pubblica public_school

55 . *type of high school
56 . tab v0_3_micro
```

V0_3_MICRO	Freq.	Percent	Cum.
1	**8,294**	**33.09**	**33.09**
2	**5,271**	**21.03**	**54.12**
3	**3,473**	**13.86**	**67.98**
4	**3,694**	**14.74**	**82.72**
5	**1,209**	**4.82**	**87.54**
6	**892**	**3.56**	**91.10**
7	**2,231**	**8.90**	**100.00**
Total	**25,064**	**100.00**	

```
57 . gen hs_professionali = 0

58 . replace hs_professionali = 1 if v0_3_micro == 1
   (8,294 real changes made)

59 . gen hs_tecnici = 0

60 . replace hs_tecnici = 1 if v0_3_micro == 2
   (5,271 real changes made)
```

```
61 . gen hs_liceo = 0

62 . replace hs_liceo = 1 if inlist(v0_3_micro,3,4,5,6,7)
   (11,499 real changes made)

63 . *If ever changed type of high school
64 . gen changed_hs = 0

65 . replace changed_hs = 1 if v1_1 == 1
   (3,245 real changes made)

66 . *graduating grade
67 . rename v0_8 grade

68 . *if ever failed a subject
69 . gen ever_failed=0

70 . replace ever_failed=1 if v1_3==1
   (5,207 real changes made)

71 . *father education variables
72 . tab v6_5
```

V6_5	Freq.	Percent	Cum.
1	**1,849**	**7.38**	**7.38**
2	**9,078**	**36.22**	**43.60**
3	**8,995**	**35.89**	**79.48**
4	**375**	**1.50**	**80.98**
5	**2,013**	**8.03**	**89.01**
6	**2,754**	**10.99**	**100.00**
Total	**25,064**	**100.00**	

```
73 . gen father_elementary=0

74 . replace father_elementary=1 if v6_5==1
   (1,849 real changes made)

75 . gen father_middle=0

76 . replace father_middle=1 if v6_5==2
   (9,078 real changes made)

77 . gen father_hs=0

78 . replace father_hs=1 if v6_5==3
   (8,995 real changes made)

79 . gen father_uni=0

80 . replace father_uni=1 if v6_5==4
   (375 real changes made)

81 . gen father_postgrad=0

82 . replace father_postgrad=1 if v6_5==5
   (2,013 real changes made)

83 . drop if v6_5==6 //drop because this correspond to "Don't know" answers
   (2,754 observations deleted)

84 . sum father*
```

Variable	Obs	Mean	Std. dev.	Min	Max
father_ele~y	**22,310**	**.0828776**	**.2757034**	**0**	**1**
father_mid~e	**22,310**	**.4069027**	**.4912675**	**0**	**1**
father_hs	**22,310**	**.4031824**	**.4905478**	**0**	**1**
father_uni	**22,310**	**.0168086**	**.1285567**	**0**	**1**
father_pos~d	**22,310**	**.0902286**	**.2865154**	**0**	**1**

```
85 . *mother education variables
86 . tab v6_10
```

V6_10	Freq.	Percent	Cum.
1	**1,492**	**6.69**	**6.69**
2	**8,588**	**38.49**	**45.18**
3	**9,424**	**42.24**	**87.42**
4	**517**	**2.32**	**89.74**
5	**1,774**	**7.95**	**97.69**
6	**515**	**2.31**	**100.00**
Total	**22,310**	**100.00**	

```
87 . gen mother_elementary=0

88 . replace mother_elementary=1 if v6_10==1
   (1,492 real changes made)

89 . gen mother_middle=0

90 . replace mother_middle=1 if v6_10==2
   (8,588 real changes made)

91 . gen mother_hs=0

92 . replace mother_hs=1 if v6_10==3
   (9,424 real changes made)

93 . gen mother_uni=0

94 . replace mother_uni=1 if v6_10==4
   (517 real changes made)
```

```
 95 . gen mother_postgrad=0

 96 . replace mother_postgrad=1 if v6_10==5
   (1,774 real changes made)

 97 . drop if v6_10==6 //drop because this correspond to "Don't know" answers
   (515 observations deleted)

 98 . sum mother*

    Variable |        Obs        Mean    Std. dev.       Min        Max
-------------+---------------------------------------------------------
  mother_ele~y |     21,795    .0684561    .2525327          0          1
  mother_mid~e |     21,795    .3940353    .4886537          0          1
     mother_hs |     21,795    .4323928    .4954195          0          1
    mother_uni |     21,795     .023721    .1521822          0          1
  mother_pos~d |     21,795    .0813948    .2734468          0          1

 99 .
100 .
101 .
102 . /*
   > Description of the final variables:
   > -uni_ins: 1 if student has enrolled in university after hisgh school, 0 if
   > not
   > -work2012: 1 if student was working in 2012 (year after graduating high sch
   > ool), 0 if not
   > -hs_satisfied: 1 if student reported a level of satisfaction with high scho
   > ol of 8 or higher in a 1-10 scale, 0 of 7 or lower. We chose 8 as the thres
   > hold so as to have the most even split possible (42.44% satisfied, 47.56% n
   > ot)
   > -female: 1 if student is female, 0 if male
   > -italian: 1 if student is italian, 0 if not
   > -public_school: 1 if student attended publici school, 0 otherwise
   > -Type of high school
   >         -hs_professionali: 1 if student attended "Istituti professionali",
   > 0 otherwise
   >         -hs_tecnici: 1 if  tudent attended "Istituti tecnici", 0 otherwise
   >         -hs_liceo: 1 if student attended any type of "Liceo", 0 otherwise
   > -changed_hs: 1 if student ever changes type of high school.
   > -grade: graduation grade of the student.
   > -ever_failed: 1 if student has ever failed a subkect in high school, 0 if n
   > ot.
   > -mother's and father's education level: dummies for the highest education l
   > evelsof the parents: elementary school, middle school, high school, univers
   > ity and post graduate studies. High school is omitted to avoid colinearity
```

```
    > and used as base level.
    >
    >
    > Summary statistics:
    > Our final sample is made of 22787 students.
    > */
103 . sum uni_ins work2012 hs_satisfied female italian public_school hs_professio
    > nali hs_tecnici hs_liceo changed_hs grade ever_failed mother* father*
```

Variable	Obs	Mean	Std. dev.	Min	Max
uni_ins	**21,795**	**.5531085**	**.4971829**	**0**	**1**
work2012	**21,795**	**.3063088**	**.4609701**	**0**	**1**
hs_satisfied	**21,795**	**.4283551**	**.4948517**	**0**	**1**
female	**21,795**	**.5643496**	**.4958532**	**0**	**1**
italian	**21,795**	**.979766**	**.140803**	**0**	**1**
public_sch~l	**21,795**	**.9601285**	**.1956618**	**0**	**1**
hs_profess~i	**21,795**	**.3075017**	**.4614696**	**0**	**1**
hs_tecnici	**21,795**	**.2101858**	**.4074498**	**0**	**1**
hs_liceo	**21,795**	**.4823125**	**.4996985**	**0**	**1**
changed_hs	**21,795**	**.1274604**	**.3334957**	**0**	**1**
grade	**21,795**	**76.20615**	**11.57859**	**60**	**101**
ever_failed	**21,795**	**.19844**	**.3988344**	**0**	**1**
mother_ele~y	**21,795**	**.0684561**	**.2525327**	**0**	**1**
mother_mid~e	**21,795**	**.3940353**	**.4886537**	**0**	**1**
mother_hs	**21,795**	**.4323928**	**.4954195**	**0**	**1**
mother_uni	**21,795**	**.023721**	**.1521822**	**0**	**1**
mother_pos~d	**21,795**	**.0813948**	**.2734468**	**0**	**1**
father_ele~y	**21,795**	**.0819913**	**.2743577**	**0**	**1**
father_mid~e	**21,795**	**.4072494**	**.4913333**	**0**	**1**
father_hs	**21,795**	**.4028906**	**.4904904**	**0**	**1**
father_uni	**21,795**	**.0169305**	**.129014**	**0**	**1**
father_pos~d	**21,795**	**.0909383**	**.2875279**	**0**	**1**

```
104 .
105 .
106 . drop mother_hs father_hs hs_liceo //drop one category to avoid collinearity
    >  in the regressions, these levels become the base category of the model.

107 .
108 . ************************************************
109 .
110 . ************************************************
111 . /*
    > 3.- Model
    >
    > 3.1.- Separate estimation
    > We start by modelling both the probablity of going to university and the pr
    > obability of starting to work after graduation separately.
    >
    > We model them through with a probit model following the following equations
    > :
    >
    > uni_ins = hs_satisfied + public_school + hs_professionali + hs_tecnici + fa
    > ther study level dummies (except high school) + mother study level dummies
    > (except high school) + female + italian + error_1
    >
    > work2012 = hs_satisfied + public_school + hs_professionali + hs_tecnici + f
    > ather study level dummies (except high school) + mother study level dummies
    >  (except high school) + female + italian + error_2
    > */
112 . global firsteq "hs_satisfied public_school hs_professionali hs_tecnici fath
    > er* mother* female italian"

113 . global secondeq "hs_satisfied public_school hs_professionali hs_tecnici fat
    > her* mother* female italian"

114 .
```

```
115 . probit uni_ins $firsteq, robust

    Iteration 0:  Log pseudolikelihood = -14983.964
    Iteration 1:  Log pseudolikelihood = -11509.883
    Iteration 2:  Log pseudolikelihood = -11493.421
    Iteration 3:  Log pseudolikelihood = -11493.388
    Iteration 4:  Log pseudolikelihood = -11493.388

    Probit regression                                 Number of obs =  21,79
    > 5
                                                      Wald chi2(14) = 5859.5
    > 1
                                                      Prob > chi2   =  0.000
    > 0
    Log pseudolikelihood = -11493.388                 Pseudo R2     =  0.233
    > 0

    ------------------------------------------------------------------------
    > -------
                         |               Robust
                uni_ins |  Coefficient  std. err.      z    P>|z|     [95% conf. int
    > erval]
    -------------------------------------------------------------------------
    > -------
             hs_satisfied |   .1028535   .0193004     5.33   0.000     .0650255    .1
    > 406815
            public_school |   .1097415   .0481617     2.28   0.023     .0153464    .2
    > 041366
         hs_professionali |  -1.392691    .023573   -59.08   0.000    -1.438894   -1.
    > 346489
               hs_tecnici |  -.6981575   .0246883   -28.28   0.000    -.7465457   -.6
    > 497693
        father_elementary |  -.3444927   .0391651    -8.80   0.000    -.4212549   -.2
    > 677305
            father_middle |  -.2049577   .0218555    -9.38   0.000    -.2477936   -.1
    > 621218
               father_uni |   .1474542   .0806308     1.83   0.067    -.0105793    .3
    > 054877
          father_postgrad |   .3836558    .042707     8.98   0.000     .2999515    .4
    > 673601
        mother_elementary |  -.4703924   .0426377   -11.03   0.000    -.5539609    -.
    > 386824
            mother_middle |  -.2975506    .021762   -13.67   0.000    -.3402034   -.2
    > 548978
               mother_uni |   .2049907   .0717787     2.86   0.004     .0643071    .3
    > 456743
```

```
  mother_postgrad │   .2334993   .0437006     5.34   0.000     .1478477     .
> 319151
          female │   .1834513   .0200068     9.17   0.000     .1442387     .
> 222664
         italian │  -.1152613   .0708341    -1.63   0.104    -.2540935     .
> 023571
           _cons │   .8018584   .0874004     9.17   0.000     .6305567    .9
> 731601
------------------┴------------------------------------------------------------
> ------

116 . margins, dydx(hs_satisfied)

Average marginal effects                                  Number of obs = 21,79
> 5
Model VCE: Robust

Expression: Pr(uni_ins), predict()
dy/dx wrt:  hs_satisfied

-------------┬------------------------------------------------------------------
> -
             │            Delta-method
             │      dy/dx   std. err.      z    P>|z|     [95% conf. interval
> ]
-------------┼------------------------------------------------------------------
> -
hs_satisfied │   .0305888   .0057313     5.34   0.000     .0193557    .041821
> 9
-------------┴------------------------------------------------------------------
> -

117 .
118 . probit work2012 $secondeq, robust

Iteration 0:  Log pseudolikelihood = -13428.234
Iteration 1:  Log pseudolikelihood = -12559.967
Iteration 2:  Log pseudolikelihood = -12554.118
Iteration 3:  Log pseudolikelihood = -12554.114
Iteration 4:  Log pseudolikelihood = -12554.114
```

```
Probit regression                                       Number of obs =  21,79
> 5
                                                        Wald chi2(14) = 1662.3
> 1
                                                        Prob > chi2   =  0.000
> 0
Log pseudolikelihood = -12554.114                       Pseudo R2     =  0.065
> 1

------------------------------------------------------------------------------
> ------
             |               Robust
        work2012 |  Coefficient  std. err.      z    P>|z|     [95% conf. int
> erval]
-------------+----------------------------------------------------------------
> ------
     hs_satisfied |  -.0441631   .0186813    -2.36   0.018    -.0807778   -.0
> 075484
    public_school |  -.0068184   .0486363    -0.14   0.889    -.1021439     .
> 088507
 hs_professionali |   .6221622   .0226722    27.44   0.000     .5777255    .6
> 665988
       hs_tecnici |   .4707206   .0249306    18.88   0.000     .4218576    .5
> 195836
father_elementary |   .1556512   .0370049     4.21   0.000     .0831229    .2
> 281795
    father_middle |   .1197559   .0215514     5.56   0.000     .0775159    .1
> 619959
       father_uni |  -.1220772    .079969    -1.53   0.127    -.2788136    .0
> 346593
  father_postgrad |    -.26968   .0410671    -6.57   0.000    -.3501701   -.1
> 891899
mother_elementary |   .0480094   .0397138     1.21   0.227    -.0298282     .
> 125847
    mother_middle |   .1029202   .0215372     4.78   0.000      .060708    .1
> 451323
       mother_uni |  -.0718389   .0681345    -1.05   0.292     -.20538    .0
> 617022
  mother_postgrad |  -.1227745     .04212    -2.91   0.004    -.2053282   -.0
> 402209
           female |  -.1473709    .019189    -7.68   0.000    -.1849806   -.1
> 097611
          italian |  -.0171213   .0642578    -0.27   0.790    -.1430643    .1
> 088217
            _cons |  -.7779385   .0826133    -9.42   0.000    -.9398576   -.6
> 160194
```

```
                  |
------------------------------------------------------------------------------
> ------

119 . margins, dydx(hs_satisfied)

Average marginal effects                                  Number of obs = 21,79
> 5
Model VCE: Robust

Expression: Pr(work2012), predict()
dy/dx wrt:  hs_satisfied

------------------------------------------------------------------------------
> -
             |            Delta-method
             |      dy/dx   std. err.      z    P>|z|     [95% conf. interval
> ]
-------------+----------------------------------------------------------------
> -
hs_satisfied |  -.0144352   .0061042    -2.36   0.018    -.0263992   -.002471
> 3
             |
------------------------------------------------------------------------------
> -

120 . /*
> We report the marginal effects. We focus on the one corresponfing to hs_sat
> isfied, the chnage in the probability of going to university (and starting
> to work) after high school, from a student who is not satisfied and one who
>  is.
>
> A student being staisfied increases the probability of going to university
> by 2.11 percentage points. This effect is significant as its p-value is clo
> se to zero.
>
> On the probability of working after high school, the effect is negative but
>  not significant.
>
> */
```

```
121 .
122 . /*
    > 3.2.- Joint model
    > However, it makes sense to think that both variables are related (see the f
    > reuqnecies and corelation below).
    > */
123 . tab uni_ins work2012
```

uni_ins	work2012 0	work2012 1	Total
0	**5,095**	**4,645**	**9,740**
1	**10,024**	**2,031**	**12,055**
Total	**15,119**	**6,676**	**21,795**

```
124 . corr uni_ins work2012
    (obs=21,795)
```

	uni_ins	work2012
uni_ins	**1.0000**	
work2012	**-0.3327**	**1.0000**

```
125 .
126 . /*
    > For this reason, next we propose a biprobit moodel to jointly estimate both
    >  probabilities. The equations for each probability are the same proposed ab
    > ove.
    > */
127 .
128 . global firsteq "hs_satisfied public_school hs_professionali hs_tecnici fath
    > er* mother* female italian"
```

```
129 . global secondeq "hs_satisfied public_school hs_professionali hs_tecnici fat
    > her* mother* female italian"

130 .
131 . biprobit (uni_ins = $firsteq ) (work2012=$secondeq ), robust

    Fitting comparison equation 1:

    Iteration 0:  Log pseudolikelihood = -14983.964
    Iteration 1:  Log pseudolikelihood = -11509.883
    Iteration 2:  Log pseudolikelihood = -11493.421
    Iteration 3:  Log pseudolikelihood = -11493.388
    Iteration 4:  Log pseudolikelihood = -11493.388

    Fitting comparison equation 2:

    Iteration 0:  Log pseudolikelihood = -13428.234
    Iteration 1:  Log pseudolikelihood = -12559.967
    Iteration 2:  Log pseudolikelihood = -12554.118
    Iteration 3:  Log pseudolikelihood = -12554.114
    Iteration 4:  Log pseudolikelihood = -12554.114

    Comparison:   Log pseudolikelihood = -24047.501

    Fitting full model:

    Iteration 0:  Log pseudolikelihood = -24047.501
    Iteration 1:  Log pseudolikelihood = -23512.913
    Iteration 2:  Log pseudolikelihood = -23509.725
    Iteration 3:  Log pseudolikelihood = -23509.724

    Seemingly unrelated bivariate probit                  Number of obs =  21,79
    > 5
                                                          Wald chi2(28) = 6637.1
    > 4
    Log pseudolikelihood = -23509.724                     Prob > chi2   =  0.000
    > 0
```

	Coefficient	Robust std. err.	z	P>|z|	[95% conf.	int erval]
uni_ins						
hs_satisfied	**.10395**	**.0192516**	**5.40**	**0.000**	**.0662175**	**.1 > 416825**
public_school	**.1060449**	**.0481514**	**2.20**	**0.028**	**.01167**	**.2 > 004198**
hs_professionali	**−1.387465**	**.0234624**	**−59.14**	**0.000**	**−1.433451**	**−1 > .34148**
hs_tecnici	**−.6974291**	**.0247902**	**−28.13**	**0.000**	**−.7460169**	**−.6 > 488413**
father_elementary	**−.3420853**	**.0387591**	**−8.83**	**0.000**	**−.4180518**	**−.2 > 661188**
father_middle	**−.2040462**	**.0217964**	**−9.36**	**0.000**	**−.2467663**	**−. > 161326**
father_uni	**.1464275**	**.0799618**	**1.83**	**0.067**	**−.0102947**	**.3 > 031496**
father_postgrad	**.3869663**	**.0429524**	**9.01**	**0.000**	**.3027812**	**.4 > 711514**
mother_elementary	**−.467235**	**.0422368**	**−11.06**	**0.000**	**−.5500176**	**−.3 > 844525**
mother_middle	**−.2973766**	**.021696**	**−13.71**	**0.000**	**−.3398999**	**−.2 > 548533**
mother_uni	**.2047216**	**.0715536**	**2.86**	**0.004**	**.0644792**	**.3 > 449641**
mother_postgrad	**.2318154**	**.0438295**	**5.29**	**0.000**	**.1459111**	**.3 > 177196**
female	**.1835215**	**.0199891**	**9.18**	**0.000**	**.1443436**	**.2 > 226993**
italian	**−.1116679**	**.0706909**	**−1.58**	**0.114**	**−.2502196**	**.0 > 268838**
_cons	**.7989569**	**.0872956**	**9.15**	**0.000**	**.6278606**	**.9 > 700532**
work2012						
hs_satisfied	**−.044542**	**.018664**	**−2.39**	**0.017**	**−.0811227**	**−.0 > 079612**
public_school	**−.0000993**	**.0489365**	**−0.00**	**0.998**	**−.0960132**	**.0 > 958146**
hs_professionali	**.6203703**	**.0226254**	**27.42**	**0.000**	**.5760254**	**.6**

```
> 647153
       hs_tecnici |   .4664617   .0250125    18.65   0.000     .4174382    .5
> 154853
father_elementary |   .1559512   .0369289     4.22   0.000      .083572    .2
> 283305
    father_middle |   .1193858   .0215617     5.54   0.000     .0771258    .1
> 616459
       father_uni |  -.1216772   .0798782    -1.52   0.128    -.2782356    .0
> 348811
  father_postgrad |  -.2707297   .0411851    -6.57   0.000     -.351451   -.1
> 900085
mother_elementary |    .051747   .0395486     1.31   0.191    -.0257669    .1
> 292608
    mother_middle |   .1034189   .0215532     4.80   0.000     .0611755    .1
> 456623
       mother_uni |   -.071286    .068024    -1.05   0.295    -.2046107    .0
> 620387
  mother_postgrad |  -.1194102   .0421256    -2.83   0.005    -.2019748   -.0
> 368455
          female |  -.1438536   .0192138    -7.49   0.000     -.181512   -.1
> 061953
         italian |  -.0165138    .064276    -0.26   0.797    -.1424925    .1
> 094649
           _cons |  -.7850144   .0827752    -9.48   0.000    -.9472507    -.
> 622778
------------------+------------------------------------------------------------
> ------
         /athrho |  -.4223541   .0132188   -31.95   0.000    -.4482625   -.3
> 964457
------------------+------------------------------------------------------------
> ------
             rho |  -.3989118   .0111153                     -.4204697   -.3
> 769036
------------------+------------------------------------------------------------

> ------
Wald test of rho=0: chi2(1) = 1020.86                  Prob > chi2 = 0.000
> 0
```

```
132 . margins, dydx(hs_satisfied) predict(pmarg1) //on uni_ins

    Average marginal effects                                  Number of obs = 21,79
    > 5
    Model VCE: Robust

    Expression: Pr(uni_ins=1), predict(pmarg1)
    dy/dx wrt:  hs_satisfied

    ──────────────┬──────────────────────────────────────────────────────────────
    > ─
                  │            Delta-method
                  │      dy/dx   std. err.      z    P>|z|     [95% conf. interval
    > ]
    ──────────────┼──────────────────────────────────────────────────────────────
    > ─
    hs_satisfied  │   .0309593   .0057246     5.41   0.000     .0197393    .042179
    > 2
    ──────────────┴──────────────────────────────────────────────────────────────
    > ─

133 . margins, dydx(hs_satisfied) predict(pmarg2) //on work2022

    Average marginal effects                                  Number of obs = 21,79
    > 5
    Model VCE: Robust

    Expression: Pr(work2012=1), predict(pmarg2)
    dy/dx wrt:  hs_satisfied

    ──────────────┬──────────────────────────────────────────────────────────────
    > ─
                  │            Delta-method
                  │      dy/dx   std. err.      z    P>|z|     [95% conf. interval
    > ]
    ──────────────┼──────────────────────────────────────────────────────────────
    > ─
    hs_satisfied  │  -.0145708   .0061032    -2.39   0.017    -.0265328   -.002608
    > 9
    ──────────────┴──────────────────────────────────────────────────────────────
    > ─
```

```
134 .
135 . /*
    > The value the estimated correlation coefficient (rho) represents the correl
    > ation between the error terms in the two equations. A negative rho suggests
    >  a negative correlation, meaning that the two outcomes, uni_ins and work201
    > 2, are inversely related. Students who are more likely to go to university
    > are less likely to start working immediately after high school, as intuitio
    > n suggests.
    >
    > This correlation is significant, so there is evidence to suggest that there
    >  is a meaningful negative correlation between the two outcomes. This confir
    > ms that modelling both probabilities together does indeed makes sense.
    >
    > We now proceed to estimate and comment the marginal effect of high school s
    > atisfaction on these probabilities.
    > */
136 .
137 . /*
    > The marginal effect of hs_satisfied for both uni_ins and work2012 is almost
    >  identical to when we modeled both probabilities separately. The effect on
    > uni_ins is still positive and significant (now 2.14 percentage points, befo
    > re 2.11), and the effect on work2012 is still negative but not statisticall
    > y significant.
    > */
138 . /*
    > Until now, both models provide strong evidence that a higher level of satis
    > faction with high school significantly increases the probability of a stude
    > nt going to university.
    > */
139 .
140 . /*
    > 3.3. Endogeneity of high school satisfaction
    >
    > Another problem we encounter, is that these estimates could be biased since
    >  we believe that high school satisfaction is endogenous when modelling the
    > 2 variables mentioned aboved. This belief is based on the intuition that ma
    > ny characteristics that make a student be more satisfied with high school (
    > e.g., skill and preferences towards studying and leisure) will make it more
    >  prone to keep studying after graduation and less likely that he or she wil
    > l start working right after graduation, and viceversa. To solve this, we al
    > so model high school satisfaction and we use ever_failed, changed_hs and gr
    > ade as instruments for high school satisfaction.
    >
    > As stated before, we propose a trivariate probit model. The equations for u
    > ni_ins and work2012 are the same as above, and that of hs_satsifaction is t
    > he following:
```

```
    >
    > hs_satisfied = ever_failed + changed_hs + grade + hs_satisfied + public_sch
    > ool + hs_professionali + hs_tecnici + father study level dummies (except hi
    > gh school) + mother study level dummies (except high school) + female + ita
    > lian + error_3
    > */
141 .
142 . //model
143 . global firsteq "hs_satisfied public_school hs_professionali hs_tecnici fath
    > er* mother* female italian"

144 . global secondeq "hs_satisfied public_school hs_professionali hs_tecnici fat
    > her* mother* female italian"

145 . global thirdeq "ever_failed changed_hs public_school grade hs_professionali
    >  hs_tecnici father* mother* female italian"

146 .
147 . mvprobit (uni_ins = $firsteq ) (work2012=$secondeq ) (hs_satisfied=$thirdeq
    >  ), robust draws(1500) seed(683)

    Iteration 0:  Log pseudolikelihood = -38500.951  (not concave)
    Iteration 1:  Log pseudolikelihood = -37992.071  (not concave)
    Iteration 2:  Log pseudolikelihood = -37904.696  (not concave)
    Iteration 3:  Log pseudolikelihood = -37874.541  (not concave)
    Iteration 4:  Log pseudolikelihood = -37844.441  (not concave)
    Iteration 5:  Log pseudolikelihood = -37751.666
    Warning: cannot do Cholesky factorization of rho matrix
    Warning: cannot do Cholesky factorization of rho matrix
    Iteration 6:  Log pseudolikelihood = -37604.841
    Iteration 7:  Log pseudolikelihood =  -37424.02
    Iteration 8:  Log pseudolikelihood = -37391.754
    Iteration 9:  Log pseudolikelihood = -37390.469
    Iteration 10: Log pseudolikelihood = -37390.466

    Multivariate probit (SML, # draws = 1500)         Number of obs   =      2179
    > 5
                                                      Wald chi2(44)   =   17342.6
    > 7
    Log pseudolikelihood = -37390.466                 Prob > chi2     =     0.000
    > 0
```

	Coefficient	Robust std. err.	z	P>|z|	[95% conf.	int erval]
uni_ins						
hs_satisfied	**1.462484**	**.0147639**	**99.06**	**0.000**	**1.433547**	**1.49142**
public_school	**.2020148**	**.0420762**	**4.80**	**0.000**	**.119547**	**.284826**
hs_professionali	**-.9069755**	**.0220958**	**-41.05**	**0.000**	**-.9502825**	**-.8636685**
hs_tecnici	**-.4411816**	**.0226486**	**-19.48**	**0.000**	**-.4855721**	**-.396791**
father_elementary	**-.1878787**	**.0338642**	**-5.55**	**0.000**	**-.2542513**	**-.1215062**
father_middle	**-.1392039**	**.019092**	**-7.29**	**0.000**	**-.1766236**	**-.1017841**
father_uni	**.117326**	**.0687058**	**1.71**	**0.088**	**-.0173348**	**.2519869**
father_postgrad	**.2734651**	**.0353877**	**7.73**	**0.000**	**.2041065**	**.3428238**
mother_elementary	**-.4137305**	**.036086**	**-11.47**	**0.000**	**-.4844577**	**-.3430033**
mother_middle	**-.2517813**	**.0191176**	**-13.17**	**0.000**	**-.2892511**	**-.2143115**
mother_uni	**.1501327**	**.0585572**	**2.56**	**0.010**	**.0353628**	**.2649026**
mother_postgrad	**.1471514**	**.0364078**	**4.04**	**0.000**	**.0757935**	**.2185093**
female	**-.0011997**	**.0174122**	**-0.07**	**0.945**	**-.035327**	**.0329275**
italian	**.0411212**	**.0623062**	**0.66**	**0.509**	**-.0809967**	**.1632392**
_cons	**-.2061305**	**.0765588**	**-2.69**	**0.007**	**-.3561829**	**-.056078**
work2012						
hs_satisfied	**-.7237565**	**.050304**	**-14.39**	**0.000**	**-.8223505**	**-.6251625**
public_school	**-.0600815**	**.0477224**	**-1.26**	**0.208**	**-.1536157**	**.0334526**
hs_professionali	**.5547139**	**.0233673**	**23.74**	**0.000**	**.5089148**	**.**

```
> 600513
       hs_tecnici │   .4189084   .0251539    16.65   0.000     .3696077    .4
> 682092
father_elementary │   .1231984   .0359361     3.43   0.001      .052765    .1
> 936318
    father_middle │   .1106843   .0210037     5.27   0.000     .0695177    .1
> 518508
       father_uni │  -.1213854   .0792719    -1.53   0.126    -.2767554    .0
> 339846
  father_postgrad │  -.2578158   .0398596    -6.47   0.000    -.3359392   -.1
> 796923
mother_elementary │   .0930895   .0381438     2.44   0.015     .0183289
> .16785
    mother_middle │   .1178048   .0209981     5.61   0.000     .0766493    .1
> 589602
       mother_uni │  -.0764626   .0658295    -1.16   0.245     -.205486    .0
> 525608
  mother_postgrad │    -.10804   .0408321    -2.65   0.008    -.1880694   -.0
> 280106
           female │  -.0743631   .0195334    -3.81   0.000    -.1126479   -.0
> 360784
          italian │  -.0705806   .0642654    -1.10   0.272    -.1965384    .0
> 553772
            _cons │  -.3652625   .0883304    -4.14   0.000    -.5383869   -.1
> 921381
──────────────────┼──────────────────────────────────────────────────────────────
> ──────
hs_satisfied      │
      ever_failed │  -.1953113   .0189194   -10.32   0.000    -.2323926   -.1
> 582299
       changed_hs │  -.0549374   .0224583    -2.45   0.014    -.0989549   -.0
> 109199
    public_school │  -.3043633   .0440017    -6.92   0.000     -.390605   -.2
> 181216
            grade │   .0220555   .0006246    35.31   0.000     .0208314    .0
> 232797
 hs_professionali │   .0249427   .0218124     1.14   0.253    -.0178089    .0
> 676943
       hs_tecnici │  -.0192992   .0239847    -0.80   0.421    -.0663084
> .02771
father_elementary │  -.0451535   .0352715    -1.28   0.200    -.1142844    .0
> 239774
    father_middle │   .0202223   .0201298     1.00   0.315    -.0192313     .
> 059676
       father_uni │  -.0260256   .0710191    -0.37   0.714    -.1652204    .1
> 131692
```

```
  father_postgrad │  -.0601692   .0345142    -1.74   0.081    -.1278158    .0
> 074774
mother_elementary │   .1829721   .0376992     4.85   0.000      .109083    .2
> 568611
    mother_middle │   .1031114   .0201606     5.11   0.000     .0635972    .1
> 426255
       mother_uni │  -.1043025   .0592685    -1.76   0.078    -.2204666    .0
> 118616
  mother_postgrad │  -.0210575   .0358548    -0.59   0.557    -.0913316    .0
> 492166
           female │   .1391747   .0181822     7.65   0.000     .1035383     .
> 174811
          italian │  -.2359293   .0640279    -3.68   0.000    -.3614216    -.
> 110437
            _cons │   -1.42901   .0914036   -15.63   0.000    -1.608158   -1.
> 249863
──────────────────┼──────────────────────────────────────────────────────────
> ──────
    /atrho21 │  -.5529181    .024233   -22.82   0.000     -.600414   -.505422
> 2
─────────────┼──────────────────────────────────────────────────────────
> ─
    /atrho31 │  -1.629906      .0432   -37.73   0.000    -1.714576   -1.54523
> 5
─────────────┼──────────────────────────────────────────────────────────
> ─
    /atrho32 │   .4777528   .0392883    12.16   0.000     .4007493    .554756
> 4
─────────────┼──────────────────────────────────────────────────────────
> ─
       rho21 │  -.5027041   .0181091   -27.76   0.000    -.5373441   -.466370
> 8
─────────────┼──────────────────────────────────────────────────────────
> ─
       rho31 │  -.9260482   .0061532  -150.50   0.000    -.9372066   -.912995
> 9
─────────────┼──────────────────────────────────────────────────────────
> ─
       rho32 │   .4444421   .0315277    14.10   0.000     .3805899    .504076
> 6
─────────────┴──────────────────────────────────────────────────────────
> ─
Likelihood ratio test of  rho21 = rho31 = rho32 = 0:
            chi2(3) =  2220.97   Prob > chi2 = 0.0000
```

```
148 . estimates store main_model

149 . /*
    > As in the biprobit model, rho21 is negative and significant, signalling the
    >  negative relation between uni_ins and work2012.
    >
    > The significant correlations between the residuals of high school satisfact
    > ion and those of the first two equations (rho31 and rho32) provide evidence
    >  of endogeneity, indicating that high school satisfaction is influenced by
    > the same factors that affect university enrollment and starting to work aft
    > er high school. These results highlight the need to account for this endoge
    > neity when analyzing the relationships between these variables, and support
    >  the use of a trivariate probit.
    > */
150 .
151 . //marginal effect of hs_satisfied
152 . cap preserve

153 . estimates restore main_model
    (results main_model are active now)

154 . replace hs_satisfied=1
    (12,459 real changes made)

155 . mvppred pred_xb, xb
    (xb will be stored in variables pred_xbi, i = 1,...,#eqs)

156 . replace hs_satisfied=0
    (21,795 real changes made)

157 . mvppred pred_xb_, xb
    (xb will be stored in variables pred_xb_i, i = 1,...,#eqs)

158 .
```

```
159 . di pred_xb1
    1.9230871

160 . di pred_xb_1
    .46060339

161 .
162 . //marginal effect of high school satisfaction on prob(uni_ins)
163 . cap gen APE_hssat_uni=normal(pred_xb1)-normal(pred_xb_1)

164 . bootstrap r(mean), seed(683) reps(1000): sum APE_hssat_uni
    (running summarize on estimation sample)

    warning: summarize does not set e(sample), so no observations will be
             excluded from the resampling because of missing values or other
             reasons. To exclude observations, press Break, save the data, drop
             any observations that are to be excluded, and rerun bootstrap.

    Bootstrap replications (1,000): .........10.........20.........30.........40.
    > .........50.........60.........70.........80.........90.........100.........
    > 110.........120.........130.........140.........150.........160.........170
    > .........180.........190.........200.........210.........220.........230...
    > ......240.........250.........260.........270.........280.........290......
    > ...300.........310.........320.........330.........340.........350.........
    > 360.........370.........380.........390.........400.........410.........420
    > .........430.........440.........450.........460.........470.........480...
    > ......490.........500.........510.........520.........530.........540......
    > ...550.........560.........570.........580.........590.........600.........
    > 610.........620.........630.........640.........650.........660.........670
    > .........680.........690.........700.........710.........720.........730...
    > ......740.........750.........760.........770.........780.........790......
    > ...800.........810.........820.........830.........840.........850.........
    > 860.........870.........880.........890.........900.........910.........920
    > .........930.........940.........950.........960.........970.........980...
    > ......990.........1,000 done

    Bootstrap results                                       Number of obs = 21,79
    > 5
                                                            Replications  =  1,00
    > 0

          Command: summarize APE_hssat_uni
            _bs_1: r(mean)
```

```
-------------+----------------------------------------------------------------
> -
             |   Observed   Bootstrap                         Normal-based
             |  coefficient  std. err.      z    P>|z|     [95% conf. interval
> ]
-------------+----------------------------------------------------------------
> -
       _bs_1 |   .4706483   .0004018  1171.49   0.000     .4698608    .471435
> 7
-------------+----------------------------------------------------------------
> -

165 .
166 . //marginal effect of high school satisfaction on prob(work2012)
167 . cap gen APE_hssat_work=normal(pred_xb2)-normal(pred_xb_2)

168 . bootstrap Mean=r(mean), seed(683) reps(1000): sum APE_hssat_work
    (running summarize on estimation sample)

    warning: summarize does not set e(sample), so no observations will be
             excluded from the resampling because of missing values or other
             reasons. To exclude observations, press Break, save the data, drop
             any observations that are to be excluded, and rerun bootstrap.

    Bootstrap replications (1,000): .........10.........20.........30.........40.
    > .........50.........60.........70.........80.........90.........100.........
    > 110.........120.........130.........140.........150.........160.........170
    > .........180.........190.........200.........210.........220.........230...
    > ......240.........250.........260.........270.........280.........290......
    > ...300.........310.........320.........330.........340.........350.........
    > 360.........370.........380.........390.........400.........410.........420
    > .........430.........440.........450.........460.........470.........480...
    > ......490.........500.........510.........520.........530.........540......
    > ...550.........560.........570.........580.........590.........600.........
    > 610.........620.........630.........640.........650.........660.........670
    > .........680.........690.........700.........710.........720.........730...
    > ......740.........750.........760.........770.........780.........790......
    > ...800.........810.........820.........830.........840.........850.........
    > 860.........870.........880.........890.........900.........910.........920
    > .........930.........940.........950.........960.........970.........980...
    > ......990.........1,000 done
```

```
Bootstrap results                                       Number of obs = 21,79
> 5
                                                        Replications  =  1,00
> 0

      Command: summarize APE_hssat_work
         Mean: r(mean)

─────────────┬──────────────────────────────────────────────────────────────
> ─
             │   Observed   Bootstrap                         Normal-based
             │ coefficient  std. err.      z    P>|z|     [95% conf. interval
> ]
─────────────┼──────────────────────────────────────────────────────────────
> ─
        Mean │  -.2335497   .0002988  -781.62   0.000    -.2341354   -.232964
> 1
─────────────┴──────────────────────────────────────────────────────────────
> ─

169 . cap restore

170 .
171 . /*
    > Now the marginal effects of being satisfied in high school have become much
    >  larger in magnitude, and more significant.
    >
    > The effect on the probability of working after high school is now significa
    > nt, which was not the case before.
    > */
172 .
173 . /*
    > These results indicate that high school satisfaction plays a significant ro
    > le in influencing the choices of students regarding university enrollment a
    > nd immediate entry into the workforce. Higher satisfaction with high school
    >  is associated with a higher likelihood of going to university and a lower
    > likelihood of starting to work after high school.
    > */
```

```
174 .
175 . /*
    > Results of the trivariate model are robust to changing the threshold of hig
    > h school satisfaction from higher or equal than 8 to higher or equal than 7
    > .
    > */
176 . ************************************************
177 .
178 . ************************************************
179 . /*
    > 4.- PEA
    > */
180 .
181 . estimates restore main_model
    (results main_model are active now)

182 .
183 . //gender effect
184 . *female
185 . scalar pr_f_l_phs_0=normal(e(b)[1,1]*0+e(b)[1,13]+e(b)[1,14]+e(b)[1,2]+e(b)
    > [1,15])

186 . di pr_f_l_phs_0
    .5142814

187 . scalar pr_f_l_phs_1=normal(e(b)[1,1]*1+e(b)[1,13]+e(b)[1,14]+e(b)[1,2]+e(b)
    > [1,15])

188 . di pr_f_l_phs_1
    .93297098

189 . scalar PEA_f_l_phs=pr_f_l_phs_1-pr_f_l_phs_0

190 . di PEA_f_l_phs
    .41868958
```

```
. *male
. scalar pr_m_l_phs_0=normal(e(b)[1,1]*0+e(b)[1,14]+e(b)[1,2]+e(b)[1,15])

. di pr_m_l_phs_0
.51475971

. scalar pr_m_l_phs_1=normal(e(b)[1,1]*1+e(b)[1,14]+e(b)[1,2]+e(b)[1,15])

. di pr_m_l_phs_1
.93312662

. scalar PEA_m_l_phs=pr_m_l_phs_1-pr_m_l_phs_0

. di PEA_m_l_phs
.41836691

.
. //high school type effect
. *female
. *liceo
. scalar pr_f_l_phs_0=normal(e(b)[1,1]*0+e(b)[1,13]+e(b)[1,14]+e(b)[1,2]+e(b)
> [1,15])

. di pr_f_l_phs_0
.5142814

. scalar pr_f_l_phs_1=normal(e(b)[1,1]*1+e(b)[1,13]+e(b)[1,14]+e(b)[1,2]+e(b)
> [1,15])

. di pr_f_l_phs_1
.93297098

. scalar PEA_f_l_phs=pr_f_l_phs_1-pr_f_l_phs_0
```

```
207 . di PEA_f_l_phs
    .41868958

208 . *tecnico
209 . scalar pr_f_t_phs_0=normal(e(b)[1,1]*0+e(b)[1,13]+e(b)[1,14]+e(b)[1,2]+e(b)
    > [1,15]+e(b)[1,4])

210 . di pr_f_t_phs_0
    .34260066

211 . scalar pr_f_t_phs_1=normal(e(b)[1,1]*1+e(b)[1,13]+e(b)[1,14]+e(b)[1,2]+e(b)
    > [1,15]+e(b)[1,4])

212 . di pr_f_t_phs_1
    .85476884

213 . scalar PEA_f_t_phs=pr_f_t_phs_1-pr_f_t_phs_0

214 . di PEA_f_t_phs
    .51216817

215 . *professionale
216 . scalar pr_f_p_phs_0=normal(e(b)[1,1]*0+e(b)[1,13]+e(b)[1,14]+e(b)[1,2]+e(b)
    > [1,15]+e(b)[1,3])

217 . di pr_f_p_phs_0
    .19183076

218 . scalar pr_f_p_phs_1=normal(e(b)[1,1]*1+e(b)[1,13]+e(b)[1,14]+e(b)[1,2]+e(b)
    > [1,15]+e(b)[1,3])

219 . di pr_f_p_phs_1
    .72284499
```

```
220 . scalar PEA_f_p_phs=pr_f_p_phs_1-pr_f_p_phs_0

221 . di PEA_f_p_phs
    .53101423

222 .
223 . *male
224 . *liceo
225 . scalar pr_m_l_phs_0=normal(e(b)[1,1]*0+e(b)[1,14]+e(b)[1,2]+e(b)[1,15])

226 . di pr_m_l_phs_0
    .51475971

227 . scalar pr_m_l_phs_1=normal(e(b)[1,1]*1+e(b)[1,14]+e(b)[1,2]+e(b)[1,15])

228 . di pr_m_l_phs_1
    .93312662

229 . scalar PEA_m_l_phs=pr_m_l_phs_1-pr_m_l_phs_0

230 . di PEA_m_l_phs
    .41836691

231 . *tecnico
232 . scalar pr_m_t_phs_0=normal(e(b)[1,1]*0+e(b)[1,14]+e(b)[1,2]+e(b)[1,15]+e(b)
    > [1,4])

233 . di pr_m_t_phs_0
    .34304165

234 . scalar pr_m_t_phs_1=normal(e(b)[1,1]*1+e(b)[1,14]+e(b)[1,2]+e(b)[1,15]+e(b)
    > [1,4])

235 . di pr_m_t_phs_1
    .85504241
```

```
236 . scalar PEA_m_t_phs=pr_m_t_phs_1-pr_m_t_phs_0

237 . di PEA_m_t_phs
    .51200076

238 . *professionale
239 . scalar pr_m_p_phs_0=normal(e(b)[1,1]*0+e(b)[1,14]+e(b)[1,2]+e(b)[1,15]+e(b)
    > [1,3])

240 . di pr_m_p_phs_0
    .19215842

241 . scalar pr_m_p_phs_1=normal(e(b)[1,1]*1+e(b)[1,14]+e(b)[1,2]+e(b)[1,15]+e(b)
    > [1,3])

242 . di pr_m_p_phs_1
    .7232467

243 . scalar PEA_m_p_phs=pr_m_p_phs_1-pr_m_p_phs_0

244 . di PEA_m_p_phs
    .53108828

245 .
246 . //parents education effect
247 . *female
248 . *both high school
249 . scalar pr_f_l_phs_0=normal(e(b)[1,1]*0+e(b)[1,13]+e(b)[1,14]+e(b)[1,2]+e(b)
    > [1,15])

250 . di pr_f_l_phs_0
    .5142814

251 . scalar pr_f_l_phs_1=normal(e(b)[1,1]*1+e(b)[1,13]+e(b)[1,14]+e(b)[1,2]+e(b)
    > [1,15])
```

```
252 . di pr_f_l_phs_1
    .93297098

253 . scalar PEA_f_l_phs=pr_f_l_phs_1-pr_f_l_phs_0

254 . di PEA_f_l_phs
    .41868958

255 . *both university
256 . scalar pr_f_l_pu_0=normal(e(b)[1,1]*0+e(b)[1,13]+e(b)[1,14]+e(b)[1,2]+e(b)[
    > 1,15]+e(b)[1,7]+e(b)[1,11])

257 . di pr_f_l_pu_0
    .61915586

258 . scalar pr_f_l_pu_1=normal(e(b)[1,1]*1+e(b)[1,13]+e(b)[1,14]+e(b)[1,2]+e(b)[
    > 1,15]+e(b)[1,7]+e(b)[1,11])

259 . di pr_f_l_pu_1
    .96128095

260 . scalar PEA_f_l_pu=pr_f_l_pu_1-pr_f_l_pu_0

261 . di PEA_f_l_pu
    .34212509

262 .
263 . *male
264 . *both high school
265 . scalar pr_m_l_phs_0=normal(e(b)[1,1]*0+e(b)[1,14]+e(b)[1,2]+e(b)[1,15])

266 . di pr_m_l_phs_0
    .51475971
```

```
267 . scalar pr_m_l_phs_1=normal(e(b)[1,1]*1+e(b)[1,14]+e(b)[1,2]+e(b)[1,15])

268 . di pr_m_l_phs_1
    .93312662

269 . scalar PEA_m_l_phs=pr_m_l_phs_1-pr_m_l_phs_0

270 . di PEA_m_l_phs
    .41836691

271 . *both university
272 . scalar pr_m_l_pu_0=normal(e(b)[1,1]*0+e(b)[1,14]+e(b)[1,2]+e(b)[1,15]+e(b)[
    > 1,7]+e(b)[1,11])

273 . di pr_m_l_pu_0
    .6196129

274 . scalar pr_m_l_pu_1=normal(e(b)[1,1]*1+e(b)[1,14]+e(b)[1,2]+e(b)[1,15]+e(b)[
    > 1,7]+e(b)[1,11])

275 . di pr_m_l_pu_1
    .96138153

276 . scalar PEA_m_l_pu=pr_m_l_pu_1-pr_m_l_pu_0

277 . di PEA_m_l_pu
    .34176863

278 .
279 . log close
          name:  <unnamed>
           log:  /Users/samueleborsini/Library/Mobile Documents/com~apple~CloudDo
    > cs/Universita`/Economics and econometrics/II anno/Advanced Microeconometric
    > s/Project/Data analysis/New data application - Advanced Microeconometrics.s
    > mcl
      log type:  smcl
     closed on:  18 Nov 2023, 15:09:43
    ------------------------------------------------------------------------------
```