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6004640576

1. . probit y x1 x2 x3 x4

```
Iteration 0:   log likelihood = -248.43455
Iteration 1:   log likelihood = -150.03919
Iteration 2:   log likelihood = -147.48531
Iteration 3:   log likelihood = -147.46882
Iteration 4:   log likelihood = -147.46881

Probit regression                               Number of obs     =        400
                                                LR chi2(4)        =     201.93
                                                Prob > chi2       =     0.0000
Log likelihood = -147.46881                     Pseudo R2         =     0.4064
```

y	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
x1	.3590739	.0371539	9.66	0.000	.2862536	.4318941
x2	-.8525746	.144481	-5.90	0.000	-1.135752	-.569397
x3	-.5735764	.2202882	-2.60	0.009	-1.005333	-.1418195
x4	-1.248569	.226762	-5.51	0.000	-1.693014	-.8041238
_cons	1.45664	.2037279	7.15	0.000	1.057341	1.85594

```
. findit fitstat

. fitstat

Measures of Fit for probit of y

Log-Lik Intercept Only:      -248.435   Log-Lik Full Model:          -147.469
D(395):                       294.938   LR(4):                        201.931
                                        Prob > LR:                      0.000
McFadden's R2:                  0.406   McFadden's Adj R2:              0.386
Maximum Likelihood R2:          0.396   Cragg & Uhler's R2:             0.557
McKelvey and Zavoina's R2:      0.640   Efron's R2:                     0.446
Variance of y*:                 2.775   Variance of error:              1.000
Count R2:                       0.818   Adj Count R2:                   0.416
AIC:                            0.762   AIC*n:                        304.938
BIC:                        -2071.691   BIC':                        -177.966

. estat clas

Probit model for y
```

Classified	True D	True ~D	Total
+	251	49	300
-	24	76	100
Total	275	125	400

```
Classified + if predicted Pr(D) >= .5
True D defined as y != 0
```

Sensitivity	Pr(+| D)	91.27%
Specificity	Pr(-|~D)	60.80%
Positive predictive value	Pr(D| +)	83.67%
Negative predictive value	Pr(~D| -)	76.00%
False + rate for true ~D	Pr(+|~D)	39.20%
False - rate for true D	Pr(-| D)	8.73%
False + rate for classified +	Pr(~D| +)	16.33%
False - rate for classified -	Pr(D| -)	24.00%
Correctly classified		81.75%

- Overall test
  - ~~LR~~-Chi square test equals to 201.93 with p value equals to 0.000.
  - It can be interpreted that all explanatory variable can use to explain dependent variable
- Individual test
  - All explanatories variable have p value less than 0.05
  - It means that each of variable can use to explain dependent variable.
- pseudo R^2
  - Pseudo R^2 equal to 0.406
  - Higher pseudo R^2 than logit model. It means that probit model has higher likelihood.
- Counted R^2
  - Model can predict outcome by 81.75%.

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```
. logit y x1 x2 x3 x4

Iteration 0:   log likelihood = -248.43455
Iteration 1:   log likelihood = -154.06753
Iteration 2:   log likelihood = -148.00091
Iteration 3:   log likelihood = -147.90887
Iteration 4:   log likelihood = -147.90869
Iteration 5:   log likelihood = -147.90869

Logistic regression                             Number of obs     =        400
                                                LR chi2(4)        =     201.05
                                                Prob > chi2       =     0.0000
Log likelihood = -147.90869                     Pseudo R2         =     0.4046
```

y	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
x1	.6299401	.0708979	8.89	0.000	.4909828	.7688974
x2	-1.488248	.2597744	-5.73	0.000	-1.997396	-.9790992
x3	-.9562902	.3882611	-2.46	0.014	-1.717268	-.1953124
x4	-2.155321	.4055058	-5.32	0.000	-2.950097	-1.360544
_cons	2.5165	.3714373	6.78	0.000	1.788496	3.244503

```
. fitstat

Measures of Fit for logit of y

Log-Lik Intercept Only:       -248.435   Log-Lik Full Model:           -147.909
D(395):                        295.817   LR(4):                         201.052
                                         Prob > LR:                       0.000
McFadden's R2:                   0.405   McFadden's Adj R2:               0.385
Maximum Likelihood R2:           0.395   Cragg & Uhler's R2:              0.555
McKelvey and Zavoina's R2:       0.622   Efron's R2:                      0.445
Variance of y*:                  8.707   Variance of error:               3.290
Count R2:                        0.818   Adj Count R2:                    0.416
AIC:                             0.765   AIC*n:                         305.817
```

- Overall test
  - LR-Chi square test equals to 201.05 with p value equals to 0.000
  - It can be interpreted that all explainatory variable can use to explain dependent variable.
- Individual test
  - All exphinatory variable have p value less than 0.05
  - It means that each of variable can use to explain dependent variable.
- pseudo R^2
  - Pseudo R^2 equal to 0.405
  - Lower pseudo R^2 than probit model. It mean that probit model has lower likelihood.
- counted R^2
  - Model can explain outcome by 81.8%

2. For comparing goodness of fit of two model, probit model is better than logit model since probit model has higher pseudo R^2 than logit model. Probit model can explain the data better than logit model.

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3\. . probit y, nolog

```
Probit regression                               Number of obs     =        400
                                                LR chi2(0)        =       0.00
                                                Prob > chi2       =          .
Log likelihood = -248.43455                     Pseudo R2         =     0.0000
```

y	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_cons	.4887764	.0654634	7.47	0.000	.3604706	.6170822

overall LR-test $= 2(\ln L_{ur} - \ln L_r)$

$= 2(-147.46881 + 248.43455)$

$= 201.93 \quad \leftarrow$ p-value $= 0.000$

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4.

```
. mfx, predict(xb)

Marginal effects after logit
      y  = Linear prediction (log odds) (predict, xb)
         =  1.32418
```

variable	dy/dx	Std. Err.	z	P>|z|	[95%	C.I.]	X
x1	.6299401	.0709	8.89	0.000	.490983	.768897	.454973
x2	-1.488248	.25977	-5.73	0.000	-1.9974	-.979099	.809344
x3	-.9562902	.38826	-2.46	0.014	-1.71727	-.195312	.556712
x4	-2.155321	.40551	-5.32	0.000	-2.9501	-1.36054	-.119684

$\hat{I} = 2.52 + 0.62(0.45) - 1.49(0.81) - 0.96(0.56) + 2.16(0.12)$

$= 1.32$

5.

```
. mfx

Marginal effects after logit
      y  = Pr(y) (predict)
         =  .7898763
```

variable	dy/dx	Std. Err.	z	P>|z|	[95%	C.I.]	X
x1	.1045522	.01146	9.12	0.000	.082083	.127022	.454973
x2	-.247007	.04388	-5.63	0.000	-.333011	-.161003	.809344
x3	-.1587171	.06397	-2.48	0.013	-.2841	-.033334	.556712
x4	-.3577223	.06679	-5.36	0.000	-.488633	-.226812	-.119684

```
. mfx, at(median)

Marginal effects after logit
      y  = Pr(y) (predict)
         =  .84127022
```

variable	dy/dx	Std. Err.	z	P>|z|	[95%	C.I.]	X
x1	.0841188	.00961	8.76	0.000	.065292	.102946	.655749
x2	-.1987326	.03349	-5.93	0.000	-.264373	-.133093	.692745
x3	-.1276979	.04944	-2.58	0.010	-.224597	-.030799	.488768
x4	-.28781	.05616	-5.12	0.000	-.397881	-.177739	-.109732

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6.

```
. mfx, at(0.5 1 0.5 0)

Marginal effects after logit
      y  = Pr(y) (predict)
         =  .70372027
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
x1	.1313413	.01481	8.87	0.000	.102307	.160376	.5
x2	-.3102967	.0596	-5.21	0.000	-.427116	-.193478	1
x3	-.1993846	.07892	-2.53	0.012	-.354074	-.044695	.5
x4	-.4493802	.09126	-4.92	0.000	-.628243	-.270518	0

7.

```
. estat clas

Logistic model for y
```

Classified	True D	True ~D	Total
+	251	49	300
-	24	76	100
Total	275	125	400

Classified + if predicted Pr(D) >= .5
True D defined as y != 0

Sensitivity	Pr(+| D)	91.27%
Specificity	Pr(-|~D)	60.80%
Positive predictive value	Pr(D| +)	83.67%
Negative predictive value	Pr(~D| -)	76.00%
False + rate for true ~D	Pr(+|~D)	39.20%
False - rate for true D	Pr(-| D)	8.73%
False + rate for classified +	Pr(~D| +)	16.33%
False - rate for classified -	Pr(D| -)	24.00%
Correctly classified		81.75%

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8. . estat clas, cut(0.7)

```
Logistic model for y

              -------- True --------
Classified |         D            ~D  |      Total
-----------+--------------------------+-----------
     +     |       217            24  |        241
     -     |        58           101  |        159
-----------+--------------------------+-----------
   Total   |       275           125  |        400

Classified + if predicted Pr(D) >= .7
True D defined as y != 0
--------------------------------------------------
Sensitivity                     Pr( +| D)   78.91%
Specificity                     Pr( -|~D)   80.80%
Positive predictive value       Pr( D| +)   90.04%
Negative predictive value       Pr(~D| -)   63.52%
--------------------------------------------------
False + rate for true ~D        Pr( +|~D)   19.20%
False - rate for true D         Pr( -| D)   21.09%
False + rate for classified +   Pr(~D| +)    9.96%
False - rate for classified -   Pr( D| -)   36.48%
--------------------------------------------------
Correctly classified                        79.50%
--------------------------------------------------
```