

**Economics 312**  
**Daily Problem #36**

**Spring 2013**  
**April 22**

The output below was generated using a dataset on Reed students in the 1988–2002 period. The variables are defined as:

- grad = 1 if the student received a BA degree, zero otherwise.
- satm100 and satv100 are SAT scores divided by 100.
- hsgpa = high-school GPA.
- irdr = inverted admission office reader rating, on a scale with 5 being the top and 1 the bottom. (Note that this measure includes their assessment of SAT and high-school record.)
- humfresh = 1 if the student enrolled in Hum 110 as a freshman during his or her first full-time semester (to exclude transfers, part-time students, visiting students, etc.)

The Stata probit command reports the  $\beta$  coefficients of the probit function

$\Pr[y = 1 | x] = G[\beta_1 + \beta_2 x_2 + \dots]$ , where  $G$  is the cumulative normal probability function. The dprobit

command reports the “partial effects”  $\left. \frac{\partial \Pr[y = 1]}{\partial x_j} \right|_{x_j = \bar{x}_j} = \beta_j G'[\beta_1 + \beta_2 \bar{x}_2 + \dots]$ .

```
. summarize grad satm100 satv100 hsgpa irdr if e(sample)
```

Variable	Obs	Mean	Std. Dev.	Min	Max
grad	2230	.6941704	.4608613	0	1
satm100	2230	6.445291	.717163	3.8	8
satv100	2230	6.824126	.7158408	3.6	8
hsgpa	2230	3.665368	.3823644	2.294	4.933
irdr	2230	3.274865	.500862	1.5	5

```
. probit grad satm100 satv100 hsgpa irdr if humfresh
```

```
Iteration 0:   log likelihood = -1373.0625
Iteration 1:   log likelihood = -1340.2387
Iteration 2:   log likelihood = -1340.1944
Iteration 3:   log likelihood = -1340.1944
```

Probit regression	Number of obs	=	2230
	LR chi2(4)	=	65.74
	Prob > chi2	=	0.0000
Log likelihood = -1340.1944	Pseudo R2	=	0.0239

grad	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
satm100	.0818228	.0429514	1.91	0.057	-.0023604 .1660059
satv100	.0240013	.0431685	0.56	0.578	-.0606074 .10861
hsgpa	.3064659	.0893162	3.43	0.001	.1314094 .4815224
irdr	.2144542	.0735848	2.91	0.004	.0702307 .3586777
_cons	-1.995731	.3894392	-5.12	0.000	-2.759018 -1.232445

```
. dprobit grad satm100 satv100 hsgpa irdr if humfresh
```

```
Iteration 0:  log likelihood = -1373.0625
Iteration 1:  log likelihood = -1340.2387
Iteration 2:  log likelihood = -1340.1944
Iteration 3:  log likelihood = -1340.1944
```

```
Probit regression, reporting marginal effects
```

```
Number of obs = 2230
LR chi2(4)     = 65.74
Prob > chi2    = 0.0000
Pseudo R2     = 0.0239
```

```
Log likelihood = -1340.1944
```

grad	dF/dx	Std. Err.	z	P> z	x-bar	[	95% C.I.	]
satm100	.0284991	.0149558	1.91	0.057	6.44529	-.000814	.057812	
satv100	.0083597	.0150356	0.56	0.578	6.82413	-.02111	.037829	
hsgpa	.1067429	.0310972	3.43	0.001	3.66537	.045793	.167692	
irdr	.074695	.0256149	2.91	0.004	3.27487	.024491	.124899	
obs. P	.6941704							
pred. P	.6988331	(at x-bar)						

z and P>|z| correspond to the test of the underlying coefficient being 0

1. The summarize command at the top was run after the probit commands. What does the if e(sample) clause in this statement do?
2. Why does Stata report  $z$  statistics rather than  $t$  statistics in these regressions? What distribution do they follow? Why are they identical between the probit and dprobit commands?
3. Other things being equal, how much would an increase of 0.5 units (about one standard deviation) in reader rating change the probability of a student completing a Reed degree? Around what values of the regressors are you evaluating this change? Would this effect be larger or smaller at the tails than at the means of the distribution? Why?
4. Assess the overall regression. What can we infer from it about the what admission variables help predict Reed students' persistence during this period?