

GVPT 722

Examples of Ordered Logit Models in Stata

(1) Model of abortion attitudes

```
. ologit abortion partyid ideology commit wordgod sex educ income age
```

```
Iteration 0: log likelihood = -895.24594
Iteration 1: log likelihood = -770.33849
Iteration 2: log likelihood = -767.09491
Iteration 3: log likelihood = -767.06636
Iteration 4: log likelihood = -767.06636
```

```
Ordered logit estimates                    Number of obs   =          697
                                           LR chi2(8)      =        256.36
                                           Prob > chi2     =          0.0000
Log likelihood = -767.06636                Pseudo R2      =          0.1432
```

abortion	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
partyid	.1516362	.0442135	3.43	0.001	.0649793	.2382931
ideology	.2226395	.0704109	3.16	0.002	.0846366	.3606424
commit	2.430468	.3013375	8.07	0.000	1.839857	3.021079
wordgod	.7640663	.2685994	2.84	0.004	.2376212	1.290511
sex	-.4400455	.1556031	-2.83	0.005	-.745022	-.135069
educ	-.8631719	.3141681	-2.75	0.006	-1.47893	-.2474137
income	-.0620026	.0147886	-4.19	0.000	-.0909877	-.0330175
age	-.0023825	.0045039	-0.53	0.597	-.01121	.006445

_cut1	1.196675	.413593	(Ancillary parameters)			
_cut2	2.174735	.4193221				
_cut3	4.154289	.4369926				

```
. fitstat
```

Measures of Fit for ologit of abortion

```
Log-Lik Intercept Only:    -895.246    Log-Lik Full Model:    -767.066
D(686):                    1534.133    LR(8):                 256.359
                                           Prob > LR:             0.000
McFadden's R2:            0.143    McFadden's Adj R2:    0.131
Maximum Likelihood R2:    0.308    Cragg & Uhler's R2:   0.333
McKelvey and Zavoina's R2: 0.354
Variance of y*:           5.094    Variance of error:    3.290
Count R2:                  0.508    Adj Count R2:         0.155
AIC:                       2.233    AIC*n:                1556.133
BIC:                       -2956.962    BIC':                 -203.985
```

```
. ologit abortion partyid ideology commit wordgod sex educ income age, or
```

```
Iteration 0: log likelihood = -895.24594
Iteration 1: log likelihood = -770.33849
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Iteration 4: log likelihood = -767.06636
```

```
Ordered logit estimates                    Number of obs   =          697
                                           LR chi2(8)      =        256.36
                                           Prob > chi2     =          0.0000
Log likelihood = -767.06636                Pseudo R2      =          0.1432
```

abortion	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]	
partyid	1.163737	.0514529	3.43	0.001	1.067137	1.269081
ideology	1.24937	.0879693	3.16	0.002	1.088321	1.43425
commit	11.3642	3.42446	8.07	0.000	6.295641	20.51341
wordgod	2.146989	.5766799	2.84	0.004	1.268229	3.634645
sex	.6440071	.1002095	-2.83	0.005	.4747239	.8736557
educ	.421822	.132523	-2.75	0.006	.2278814	.7808176
income	.9398805	.0138995	-4.19	0.000	.9130289	.9675217
age	.9976204	.0044932	-0.53	0.597	.9888526	1.006466

(2) Predicted probabilities

(a) "By hand"

```
. predict ystar if e(sample), xb
(515 missing values generated)

. gen palways=1/(1+exp(ystar-1.196675))
(515 missing values generated)

. gen pclearneed=(1/(1+exp(ystar-2.174735)))-(1/(1+exp(ystar-1.196675)))
(515 missing values generated)

. gen prapeincest=(1/(1+exp(ystar-4.154289)))-(1/(1+exp(ystar-2.174735)))
(515 missing values generated)

. gen pnever=1-(1/(1+exp(ystar-4.154289)))
(515 missing values generated)

. summ palways-pnever
```

Variable	Obs	Mean	Std. Dev.	Min	Max
palways	697	.4135526	.2566543	.0264185	.9592935
pclearneed	697	.1790302	.0573758	.0250003	.2397557
prapeincest	697	.2868318	.1433888	.0135069	.4580877
pnever	697	.1205854	.1132535	.0021993	.6568536

(b) Done by Stata

```
. predict palways2 pclearneed2 prapeincest2 pnever2 if e(sample)
(option p assumed; predicted probabilities)
(515 missing values generated)

. summ palways2-pnever2
```

Variable	Obs	Mean	Std. Dev.	Min	Max
palways2	697	.4135526	.2566543	.0264185	.9592935
pclearneed2	697	.1790301	.0573758	.0250003	.2397556
prapeincest2	697	.2868319	.1433888	.0135069	.4580877
pnever2	697	.1205854	.1132536	.0021993	.6568537

(c) Compare to actual values:

```
. tab abortion
```

abortion	Freq.	Percent	Cum.
1. always allow	391	37.34	37.34
2. allow when clear need	185	17.67	55.01
3. allow when rape/incest/danger	332	31.71	86.72
4. never allow	139	13.28	100.00
Total	1,047	100.00	

(3) Predicted probabilities at particular values of a variable, while holding other variables constant at their means:

(a) "Word of God" dummy

. prvalue, x(wordgod=0) rest(mean)

ologit: Predictions for abortion_shortlabel

Pr(y=always|x): 0.5519
Pr(y=clear_ne|x): 0.2142
Pr(y=rape,_et|x): 0.1934
Pr(y=never|x): 0.0405

	partyid	ideology	commit	wordgod	sex	educ	income	age
x=	4.0416069	4.2568149	.51033284	0	.49497848	.59995218	15.578192	46.583931

. prvalue, x(wordgod=1) rest(mean)

ologit: Predictions for abortion_shortlabel

Pr(y=always|x): 0.3645
Pr(y=clear_ne|x): 0.2395
Pr(y=rape,_et|x): 0.3129
Pr(y=never|x): 0.0830

	partyid	ideology	commit	wordgod	sex	educ	income	age
x=	4.0416069	4.2568149	.51033284	1	.49497848	.59995218	15.578192	46.583931

(b) Dummy for women

. prvalue, x(sex=0) rest(mean)

ologit: Predictions for abortion_shortlabel

Pr(y=always|x): 0.3458
Pr(y=clear_ne|x): 0.2385
Pr(y=rape,_et|x): 0.3262
Pr(y=never|x): 0.0895

	partyid	ideology	commit	wordgod	sex	educ	income	age
x=	4.0416069	4.2568149	.51033284	.82209469	0	.59995218	15.578192	46.583931

. prvalue, x(sex=1) rest(mean)

ologit: Predictions for abortion_shortlabel

Pr(y=always|x): 0.4508
Pr(y=clear_ne|x): 0.2350
Pr(y=rape,_et|x): 0.2547
Pr(y=never|x): 0.0595

	partyid	ideology	commit	wordgod	sex	educ	income	age
x=	4.0416069	4.2568149	.51033284	.82209469	1	.59995218	15.578192	46.583931

(4) Change in predicted probabilities for a change in each independent variable, while all other independent variables are held constant at their means:

. prchange, help

ologit: Changes in Predicted Probabilities for abortion_shortlabel

partyid	Avg Chg	always	clear_ne	rape,_et	never
Min->Max	.10738177	-.21476355	.00727771	.14480336	.06268247
+1/2	.01813561	-.03627121	.00118148	.02478981	.01029993
+sd/2	.03885145	-.07770291	.002519	.05304033	.02214359
MargEfct	.01814318	-.03628636	.00118356	.02480871	.01029409

ideology	Avg Chg	always	clear_ne	rape,_et	never
Min->Max	.15637748	-.31275496	.01661335	.20592879	.09021284
+1/2	.02661472	-.05322945	.00173122	.03636545	.01513276
+sd/2	.03950818	-.07901636	.00256103	.05393395	.02252138
MargEfct	.02663867	-.05327735	.00173776	.03642532	.01511427

commit	Avg Chg	always	clear_ne	rape,_et	never
Min->Max	.2638747	-.52774939	.01685379	.32699462	.18390098
+1/2	.26292566	-.52585132	.01237445	.32598955	.18748731
+sd/2	.09078476	-.18156952	.00572506	.12303406	.05281041
MargEfct	.290804	-.581608	.01897042	.39764096	.16499661

wordgod	Avg Chg	always	clear_ne	rape,_et	never
0->1	.09367985	-.18735972	.02530144	.11949462	.04256364

sex	Avg Chg	always	clear_ne	rape,_et	never
0->1	.0524904	.1049808	-.00349234	-.07152903	-.02995945

educ	Avg Chg	always	clear_ne	rape,_et	never
Min->Max	.1007933	.20001099	.00157562	-.13745421	-.06413238
+1/2	.10190116	.20380232	-.00636856	-.13776594	-.05966781
+sd/2	.02718529	.05437058	-.00176811	-.03714386	-.01545861
MargEfct	.10327798	.20655596	-.00673728	-.14122074	-.05859795

income	Avg Chg	always	clear_ne	rape,_et	never
Min->Max	.16011282	.29988168	.02034396	-.20444526	-.11578038
+1/2	.00741804	.0148361	-.00048381	-.01014271	-.00420955
+sd/2	.04279767	.08559534	-.00277121	-.05840772	-.0244164
MargEfct	.00741857	.01483714	-.00048395	-.01014404	-.00420915

age	Avg Chg	always	clear_ne	rape,_et	never
Min->Max	.02058695	.04117388	-.0016757	-.02801916	-.01147906
+1/2	.00028506	.00057012	-.0000186	-.00038978	-.00016174
+sd/2	.00479599	.00959197	-.00031283	-.00655782	-.00272134
MargEfct	.00028506	.00057012	-.0000186	-.00038979	-.00016174

	always	clear_ne	rape,_et	never
Pr(y x)	.39655319	.23948543	.29070866	.07325272

	partyid	ideology	commit	wordgod	sex	educ	income	age
x=	4.04161	4.25681	.510333	.822095	.494978	.599952	15.5782	46.5839
sd(x)=	2.1455	1.48606	.315516	.382708	.500334	.263472	5.78245	16.8249

Pr(y|x): probability of observing each y for specified x values
 Avg|Chg|: average of absolute value of the change across categories
 Min->Max: change in predicted probability as x changes from its minimum to its maximum
 0->1: change in predicted probability as x changes from 0 to 1
 +1/2: change in predicted probability as x changes from 1/2 unit below base value to 1/2 unit above
 +sd/2: change in predicted probability as x changes from 1/2 standard dev below base to 1/2 standard dev above
 MargEfct: the partial derivative of the predicted probability/rate with respect to a given independent variable

(5) Graphing predicted probabilities across the range of an independent variable, while holding all other variables constant at their means:

```
. prgen commit, generate(rc)
```

```
ologit: Predicted values as commit varies from 0 to 1.
```

```

      partyid  ideology    commit    wordgod      sex      educ      income
age
x= 4.0416069  4.2568149  .51033284  .82209469  .49497848  .59995218  15.578192
46.583931

```

```
. summ rc*
```

Variable	Obs	Mean	Std. Dev.	Min	Max
rcx	11	.5	.3316625	0	1
rcp1	11	.4144515	.180588	.166593	.6943424
rcl1	11	.4144515	.180588	.166593	.6943424
rcp2	11	.2107067	.0257153	.163631	.239254
rcl2	11	.6251581	.174523	.3470778	.8579735
rcp3	11	.2862448	.1151536	.1196719	.4466665
rcl3	11	.911403	.0610435	.7937443	.9776454
rcp4	11	.088597	.0610435	.0223546	.2062556
rcl4	11	1	1.80e-08	.9999999	1

```
. tab rcx
```

Changing value of commit	Freq.	Percent	Cum.
0	1	9.09	9.09
.1	1	9.09	18.18
.2	1	9.09	27.27
.3	1	9.09	36.36
.4	1	9.09	45.45
.5	1	9.09	54.55
.6	1	9.09	63.64
.7	1	9.09	72.73
.8	1	9.09	81.82
.9	1	9.09	90.91
1	1	9.09	100.00
Total	11	100.00	

(6) Ordered logit model of attitudes toward affirmative action in hiring and promotion for African-Americans:

```
. ologit prefhire4 partyid ideology blktherm white hispanic otherrace sex age income educ
```

```
Iteration 0: log likelihood = -724.1131
Iteration 1: log likelihood = -641.58667
Iteration 2: log likelihood = -635.82565
Iteration 3: log likelihood = -635.78976
Iteration 4: log likelihood = -635.78976
```

```
Ordered logit estimates                               Number of obs   =          683
                                                       LR chi2(10)    =       176.65
                                                       Prob > chi2    =         0.0000
Log likelihood = -635.78976                          Pseudo R2      =         0.1220
```

prefhire4	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
partyid	.0970128	.0493113	1.97	0.049	.0003644 .1936612
ideology	.3687977	.0717964	5.14	0.000	.2280794 .509516
blktherm	-.0078585	.0045591	-1.72	0.085	-.0167942 .0010772
white	2.223933	.2831604	7.85	0.000	1.668949 2.778918
hispanic	2.102936	.3866424	5.44	0.000	1.345131 2.860742
otherrace	1.567781	.4370952	3.59	0.000	.7110897 2.424472
sex	.0097138	.164741	0.06	0.953	-.3131725 .3326002
age	-.0072862	.004933	-1.48	0.140	-.0169546 .0023823
income	.0261183	.0152596	1.71	0.087	-.0037899 .0560265
educ	-.4766212	.3386704	-1.41	0.159	-1.140403 .1871605

_cut1	.4743759	.5793852	(Ancillary parameters)		
_cut2	1.31898	.5781897			
_cut3	2.719651	.5863224			

```
. fitstat
```

Measures of Fit for ologit of prefhire4

```
Log-Lik Intercept Only:    -724.113    Log-Lik Full Model:      -635.790
D(670):                    1271.580    LR(10):                  176.647
                               Prob > LR:              0.000
McFadden's R2:            0.122    McFadden's Adj R2:      0.104
Maximum Likelihood R2:    0.228    Cragg & Uhler's R2:     0.259
McKelvey and Zavoina's R2: 0.270
Variance of y*:           4.509    Variance of error:      3.290
Count R2:                  0.633    Adj Count R2:           0.067
AIC:                       1.900    AIC*n:                  1297.580
BIC:                       -3101.172    BIC':                   -111.382
```

```
. prvalue, x(white=0 hispanic=0 otherrace=0) rest(mean)
```

ologit: Predictions for prefhire4

```
Pr(y=strong_s|x): 0.3246
Pr(y=weak_sup|x): 0.2033
Pr(y=weak_opp|x): 0.2915
Pr(y=strong_o|x): 0.1806
```

```
. prvalue, x(white=1 hispanic=0 otherrace=0) rest(mean)
```

ologit: Predictions for prefhire4

```
Pr(y=strong_s|x): 0.0494
Pr(y=weak_sup|x): 0.0585
Pr(y=weak_opp|x): 0.2214
Pr(y=strong_o|x): 0.6707
```

```
. prvalue, x(white=0 hispanic=1 otherrace=0) rest(mean)
```

ologit: Predictions for prefhire4

```
Pr(y=strong_s|x): 0.0554
Pr(y=weak_sup|x): 0.0647
Pr(y=weak_opp|x): 0.2364
Pr(y=strong_o|x): 0.6434
```

. prvalue, x(white=0 hispanic=0 otherrace=1) rest(mean)

ologit: Predictions for prefhire4

Pr(y=strong_s|x): 0.0911
Pr(y=weak_sup|x): 0.0980
Pr(y=weak_opp|x): 0.2971
Pr(y=strong_o|x): 0.5138

. prchange

ologit: Changes in Predicted Probabilities for prefhire4

partyid

	Avg Chg	strong_s	weak_sup	weak_opp	strong_o
Min->Max	.06914758	-.03556687	-.03426933	-.06845896	.13829517
+1/2	.01157099	-.00583026	-.00568868	-.01162302	.02314198
+sd/2	.02490744	-.01256929	-.01225159	-.02499402	.04981488
MargEfct	.01157294	-.0058288	-.00568884	-.01162823	.02314588

ideology

	Avg Chg	strong_s	weak_sup	weak_opp	strong_o
Min->Max	.24659863	-.16340462	-.13121489	-.19857776	.49319723
+1/2	.04388765	-.02223865	-.02161714	-.04391953	.08777529
+sd/2	.06497168	-.03316212	-.03207857	-.06470264	.12994337
MargEfct	.04399494	-.02215841	-.02162635	-.04420513	.08798989

blktherm

	Avg Chg	strong_s	weak_sup	weak_opp	strong_o
Min->Max	.08891165	.04132631	.04159409	.09490287	-.17782331
+1/2	.00093746	.00047216	.00046083	.00094193	-.00187492
+sd/2	.01772001	.00893361	.00871339	.017793	-.03544003
MargEfct	.00093746	.00047216	.00046082	.00094194	-.00187492

white

	Avg Chg	strong_s	weak_sup	weak_opp	strong_o
0->1	.25108875	-.23709054	-.14616143	-.11892554	.50217748

hispanic

	Avg Chg	strong_s	weak_sup	weak_opp	strong_o
0->1	.17297782	-.06442225	-.07033962	-.21119378	.34595561

otherrace

	Avg Chg	strong_s	weak_sup	weak_opp	strong_o
0->1	.14194325	-.0535996	-.0584452	-.17184171	.28388649

sex

	Avg Chg	strong_s	weak_sup	weak_opp	strong_o
0->1	.00115875	-.00058359	-.00056959	-.00116435	.00231749

age

	Avg Chg	strong_s	weak_sup	weak_opp	strong_o
Min->Max	.06292658	.03323244	.03164652	.0609742	-.12585318
+1/2	.00086918	.00043777	.00042726	.00087333	-.00173837
+sd/2	.01460945	.00736309	.00718309	.01467271	-.02921891
MargEfct	.00086919	.00043777	.00042726	.00087334	-.00173837

income

	Avg Chg	strong_s	weak_sup	weak_opp	strong_o
Min->Max	.06937076	-.03781549	-.0354504	-.06547564	.13874149
+1/2	.00311569	-.00156929	-.00153158	-.00313053	.00623137
+sd/2	.0180428	-.00909669	-.00887223	-.01811668	.03608561
MargEfct	.00311573	-.00156926	-.00153158	-.00313062	.00623146

educ

	Avg Chg	strong_s	weak_sup	weak_opp	strong_o
Min->Max	.05604216	.02765958	.02718722	.05723749	-.11208433
+1/2	.05662632	.02880981	.02792883	.05651399	-.11325264
+sd/2	.01503332	.00757702	.0073916	.01509801	-.03006667
MargEfct	.05685752	.02863675	.02794913	.05712915	-.11371503

. prvalue, x(sex=1) rest(mean)

ologit: Predictions for hommil

Pr(y=opp_str x):	0.6476
Pr(y=oppose x):	0.2390
Pr(y=favor x):	0.0448
Pr(y=favor_st x):	0.0686

	partyid	ideology	commit	wordgod	sex	educ	income
age							
x=	4.0261248	4.2409289	.5083238	.81712627	1	.602806	15.609579
	46.513788						

. prchange, help

ologit: Changes in Predicted Probabilities for hommil

partyid					
	Avg Chg	opp_str	oppose	favor	favor_st
Min->Max	.0905895	-.18117902	.08285113	.03298093	.06534693
-+1/2	.01526547	-.03053093	.01418108	.00554464	.01080522
-+sd/2	.03263628	-.06527257	.03026301	.01185837	.02315118
MargEfct	.01527014	-.03054029	.01419261	.00554575	.01080193

ideology					
	Avg Chg	opp_str	oppose	favor	favor_st
Min->Max	.15307817	-.30615631	.13934046	.05526714	.11154876
-+1/2	.02649456	-.05298913	.02458739	.00962522	.01877651
-+sd/2	.03938848	-.07877696	.03648534	.01431486	.02797676
MargEfct	.02651905	-.0530381	.02464773	.00963109	.01875927

commit					
	Avg Chg	opp_str	oppose	favor	favor_st
Min->Max	.16971053	-.33942106	.14852072	.06206127	.12883906
-+1/2	.16992739	-.33985478	.14748196	.06234019	.13003263
-+sd/2	.05568326	-.11136651	.05140355	.0202505	.0397125
MargEfct	.1768621	-.35372419	.16438184	.06423211	.12511024

wordgod					
	Avg Chg	opp_str	oppose	favor	favor_st
0->1	.03456275	-.06912547	.03385684	.01218674	.02308195

sex					
	Avg Chg	opp_str	oppose	favor	favor_st
0->1	.09068563	.18137127	-.08272862	-.03305567	-.06558695

educ					
	Avg Chg	opp_str	oppose	favor	favor_st
Min->Max	.08023244	.16046488	-.07014638	-.02985126	-.06046722
-+1/2	.07970204	.15940407	-.07304406	-.02902515	-.05733487
-+sd/2	.02112486	.04224974	-.01961514	-.00767358	-.01496099
MargEfct	.08037762	.16075525	-.07470578	-.02919124	-.05685822

income					
	Avg Chg	opp_str	oppose	favor	favor_st
Min->Max	.10447259	.20894518	-.08532925	-.03977347	-.08384244
-+1/2	.00476355	.00952709	-.00442719	-.00173003	-.00336988
-+sd/2	.02754318	.05508637	-.02555737	-.01000642	-.01952255
MargEfct	.00476369	.00952739	-.00442754	-.00173006	-.00336978

age					
	Avg Chg	opp_str	oppose	favor	favor_st
Min->Max	.03802604	.07605207	-.03596666	-.01367148	-.02641395
-+1/2	.0005313	.00106263	-.00049379	-.00019296	-.00037583
-+sd/2	.00883341	.01766682	-.00820869	-.0032082	-.00624993
MargEfct	.0005313	.0010626	-.00049381	-.00019296	-.00037583

Pr(y x)	opp_str	oppose	favor	favor_st
	.55906206	.28451708	.05991834	.09650252

	partyid	ideology	commit	wordgod	sex	educ	income	age
x=	4.02612	4.24093	.508324	.817126	.500726	.602806	15.6096	46.5138
sd(x)=	2.14026	1.48833	.316132	.386844	.500363	.262974	5.78766	16.6278