

gologit2: Generalized Logistic Regression/ Partial Proportional Odds Models for Ordinal Dependent Variables

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. use "https://academicweb.nd.edu/~rwilliam/gologit2/ordwarm2.dta"
(77 & 89 General Social Survey)
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. * Proportional Odds/ ologit model
. ologit warm yr89 male white age ed prst
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Ordered logistic regression	Number of obs	=	2293
	LR chi2(6)	=	301.72
	Prob > chi2	=	0.0000
Log likelihood = -2844.9123	Pseudo R2	=	0.0504

warm	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
yr89	.5239025	.0798988	6.56	0.000	.3673037 .6805013
male	-.7332997	.0784827	-9.34	0.000	-.8871229 -.5794766
white	-.3911595	.1183808	-3.30	0.001	-.6231815 -.1591374
age	-.0216655	.0024683	-8.78	0.000	-.0265032 -.0168278
ed	.0671728	.015975	4.20	0.000	.0358624 .0984831
prst	.0060727	.0032929	1.84	0.065	-.0003813 .0125267
/cut1	-2.465362	.2389126			-2.933622 -1.997102
/cut2	-.630904	.2333155			-1.088194 -.173614
/cut3	1.261854	.2340179			.8031873 1.720521

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. * Brant test shows assumptions of ologit are violated
. brant, detail
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Estimated coefficients from j-1 binary regressions

	y>1	y>2	y>3
yr89	.9647422	.56540626	.31907316
male	-.30536425	-.69054232	-1.0837888
white	-.55265759	-.31427081	-.39299842
age	-.0164704	-.02533448	-.01859051
ed	.10479624	.05285265	.05755466
prst	-.00141118	.00953216	.00553043
_cons	1.8584045	.73032873	-1.0245168

Brant Test of Parallel Regression Assumption

Variable	chi2	p>chi2	df
All	49.18	0.000	12
yr89	13.01	0.001	2
male	22.24	0.000	2
white	1.27	0.531	2
age	7.38	0.025	2
ed	4.31	0.116	2
prst	4.33	0.115	2

A significant test statistic provides evidence that the parallel regression assumption has been violated.

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. * Original gologit - relaxes the proportional odds / parallel lines assumption but
. * isn't very parsimonious; almost identical to the J-1 binary regressions from Brant
. * gologit2 produces the same results as gologit if no options are specified
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. gologit warm yr89 male white age ed prst
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Generalized Ordered Logit Estimates                                Number of obs   =    2293
                                                                Model chi2(18)   =   350.92
                                                                Prob > chi2      =    0.0000
Log Likelihood = -2820.3109918                                    Pseudo R2       =    0.0586
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	warm	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
mleq1							
	yr89	.95575	.1547185	6.18	0.000	.6525073	1.258993
	male	-.3009775	.1287712	-2.34	0.019	-.5533645	-.0485906
	white	-.5287267	.2278446	-2.32	0.020	-.975294	-.0821595
	age	-.0163486	.0039508	-4.14	0.000	-.0240921	-.0086051
	ed	.1032469	.0247377	4.17	0.000	.0547618	.151732
	prst	-.0016912	.0055997	-0.30	0.763	-.0126665	.009284
	_cons	1.856951	.3872576	4.80	0.000	1.09794	2.615962
mleq2							
	yr89	.5363707	.0919074	5.84	0.000	.3562355	.716506
	male	-.7179949	.0894852	-8.02	0.000	-.8933827	-.5426072
	white	-.3492339	.1391882	-2.51	0.012	-.6220378	-.07643
	age	-.0249764	.0028053	-8.90	0.000	-.0304747	-.0194782
	ed	.0558691	.0183654	3.04	0.002	.0198737	.0918646
	prst	.0098476	.0038216	2.58	0.010	.0023575	.0173377
	_cons	.7198119	.265235	2.71	0.007	.1999609	1.239663
mleq3							
	yr89	.3312184	.1127882	2.94	0.003	.1101577	.5522792
	male	-1.085618	.1217755	-8.91	0.000	-1.324294	-.8469423
	white	-.3775375	.1568429	-2.41	0.016	-.684944	-.070131
	age	-.0186902	.0037291	-5.01	0.000	-.025999	-.0113814
	ed	.0566852	.0251836	2.25	0.024	.0073263	.1060441
	prst	.0049225	.0048543	1.01	0.311	-.0045918	.0144368
	_cons	-1.002225	.3446354	-2.91	0.004	-1.677698	-.3267524

```
. * gologit2 - the autofit option causes gologit2 to identify and estimate a
. * partial proportional odds model that fits the data. The gamma option also
. * causes it to print out the alternative Peterson/Harrell parameterization.

. gologit2 warm yr89 male white age ed prst, autofit gamma lrforce store(gologit2)
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Testing parallel lines assumption using the .05 level of significance...

```
Step 1: white meets the pl assumption (P Value = 0.7136)
Step 2: ed meets the pl assumption (P Value = 0.1589)
Step 3: prst meets the pl assumption (P Value = 0.2046)
Step 4: age meets the pl assumption (P Value = 0.0743)
Step 5: The following variables do not meet the pl assumption:
        yr89 (P Value = 0.00093)
        male (P Value = 0.00002)
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Generalized Ordered Logit Estimates                                Number of obs   =      2293
                                                                LR chi2(10)      =      338.30
                                                                Prob > chi2      =      0.0000
Log likelihood = -2826.6182                                       Pseudo R2       =      0.0565
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```
( 1) [SD]white - [D]white = 0
( 2) [SD]ed - [D]ed = 0
( 3) [SD]prst - [D]prst = 0
( 4) [SD]age - [D]age = 0
( 5) [D]white - [A]white = 0
( 6) [D]ed - [A]ed = 0
( 7) [D]prst - [A]prst = 0
( 8) [D]age - [A]age = 0
```

	warm	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	

SD							
	yr89	.98368	.1530091	6.43	0.000	.6837876	1.283572
	male	-.3328209	.1275129	-2.61	0.009	-.5827417	-.0829002
	white	-.3832583	.1184635	-3.24	0.001	-.6154424	-.1510742
	age	-.0216325	.0024751	-8.74	0.000	-.0264835	-.0167814
	ed	.0670703	.0161311	4.16	0.000	.0354539	.0986866
	prst	.0059146	.0033158	1.78	0.074	-.0005843	.0124135
	_cons	2.12173	.2467146	8.60	0.000	1.638178	2.605282

D							
	yr89	.534369	.0913937	5.85	0.000	.3552406	.7134974
	male	-.6932772	.0885898	-7.83	0.000	-.8669099	-.5196444
	white	-.3832583	.1184635	-3.24	0.001	-.6154424	-.1510742
	age	-.0216325	.0024751	-8.74	0.000	-.0264835	-.0167814
	ed	.0670703	.0161311	4.16	0.000	.0354539	.0986866
	prst	.0059146	.0033158	1.78	0.074	-.0005843	.0124135
	_cons	.6021625	.2358361	2.55	0.011	.1399323	1.064393

A							
	yr89	.3258098	.1125481	2.89	0.004	.1052197	.5464
	male	-1.097615	.1214597	-9.04	0.000	-1.335671	-.8595579
	white	-.3832583	.1184635	-3.24	0.001	-.6154424	-.1510742
	age	-.0216325	.0024751	-8.74	0.000	-.0264835	-.0167814
	ed	.0670703	.0161311	4.16	0.000	.0354539	.0986866
	prst	.0059146	.0033158	1.78	0.074	-.0005843	.0124135
	_cons	-1.048137	.2393568	-4.38	0.000	-1.517268	-.5790061

Alternative parameterization: Gammas are deviations from proportionality

	warm	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	

Beta							
	yr89	.98368	.1530091	6.43	0.000	.6837876	1.283572
	male	-.3328209	.1275129	-2.61	0.009	-.5827417	-.0829002
	white	-.3832583	.1184635	-3.24	0.001	-.6154424	-.1510742
	age	-.0216325	.0024751	-8.74	0.000	-.0264835	-.0167814
	ed	.0670703	.0161311	4.16	0.000	.0354539	.0986866
	prst	.0059146	.0033158	1.78	0.074	-.0005843	.0124135

Gamma_2							
	yr89	-.449311	.1465627	-3.07	0.002	-.7365686	-.1620533
	male	-.3604562	.1233732	-2.92	0.003	-.6022633	-.1186492

Gamma_3							
	yr89	-.6578702	.1768034	-3.72	0.000	-1.004399	-.3113418
	male	-.7647937	.1631536	-4.69	0.000	-1.084569	-.4450186

Alpha							
	_cons_1	2.12173	.2467146	8.60	0.000	1.638178	2.605282
	_cons_2	.6021625	.2358361	2.55	0.011	.1399323	1.064393
	_cons_3	-1.048137	.2393568	-4.38	0.000	-1.517268	-.5790061

. * gologit2 can clone ologit by using the pl parameter
. gologit2 warm yr89 male white age ed prst, pl lrforce store(ologit)

Generalized Ordered Logit Estimates	Number of obs	=	2293
	LR chi2(6)	=	301.72
	Prob > chi2	=	0.0000
Log likelihood = -2844.9123	Pseudo R2	=	0.0504

	warm	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
SD							
	yr89	.5239025	.0798989	6.56	0.000	.3673036	.6805014
	male	-.7332998	.0784827	-9.34	0.000	-.887123	-.5794765
	white	-.3911595	.1183808	-3.30	0.001	-.6231816	-.1591373
	age	-.0216655	.0024683	-8.78	0.000	-.0265032	-.0168278
	ed	.0671728	.015975	4.20	0.000	.0358624	.0984831
	prst	.0060727	.0032929	1.84	0.065	-.0003813	.0125267
	_cons	2.465362	.2389128	10.32	0.000	1.997102	2.933622
D							
	yr89	.5239025	.0798989	6.56	0.000	.3673036	.6805014
	male	-.7332998	.0784827	-9.34	0.000	-.887123	-.5794765
	white	-.3911595	.1183808	-3.30	0.001	-.6231816	-.1591373
	age	-.0216655	.0024683	-8.78	0.000	-.0265032	-.0168278
	ed	.0671728	.015975	4.20	0.000	.0358624	.0984831
	prst	.0060727	.0032929	1.84	0.065	-.0003813	.0125267
	_cons	.630904	.2333156	2.70	0.007	.1736138	1.088194
A							
	yr89	.5239025	.0798989	6.56	0.000	.3673036	.6805014
	male	-.7332998	.0784827	-9.34	0.000	-.887123	-.5794765
	white	-.3911595	.1183808	-3.30	0.001	-.6231816	-.1591373
	age	-.0216655	.0024683	-8.78	0.000	-.0265032	-.0168278
	ed	.0671728	.015975	4.20	0.000	.0358624	.0984831
	prst	.0060727	.0032929	1.84	0.065	-.0003813	.0125267
	_cons	-1.261854	.234018	-5.39	0.000	-1.720521	-.8031871