

LISREL

- Mels, G. (2006). *LISREL for Windows: Getting Started Guide*. Lincolnwood, IL: Scientific Software International, Inc.
- LISREL:
 - Structural Equation Modeling,
 - Multilevel Structural Equation Modeling,
 - Multilevel Linear and Nonlinear Modeling,
 - Formal Inference-based Recursive Modeling, and
 - Generalized Linear Modeling.

Kazalo

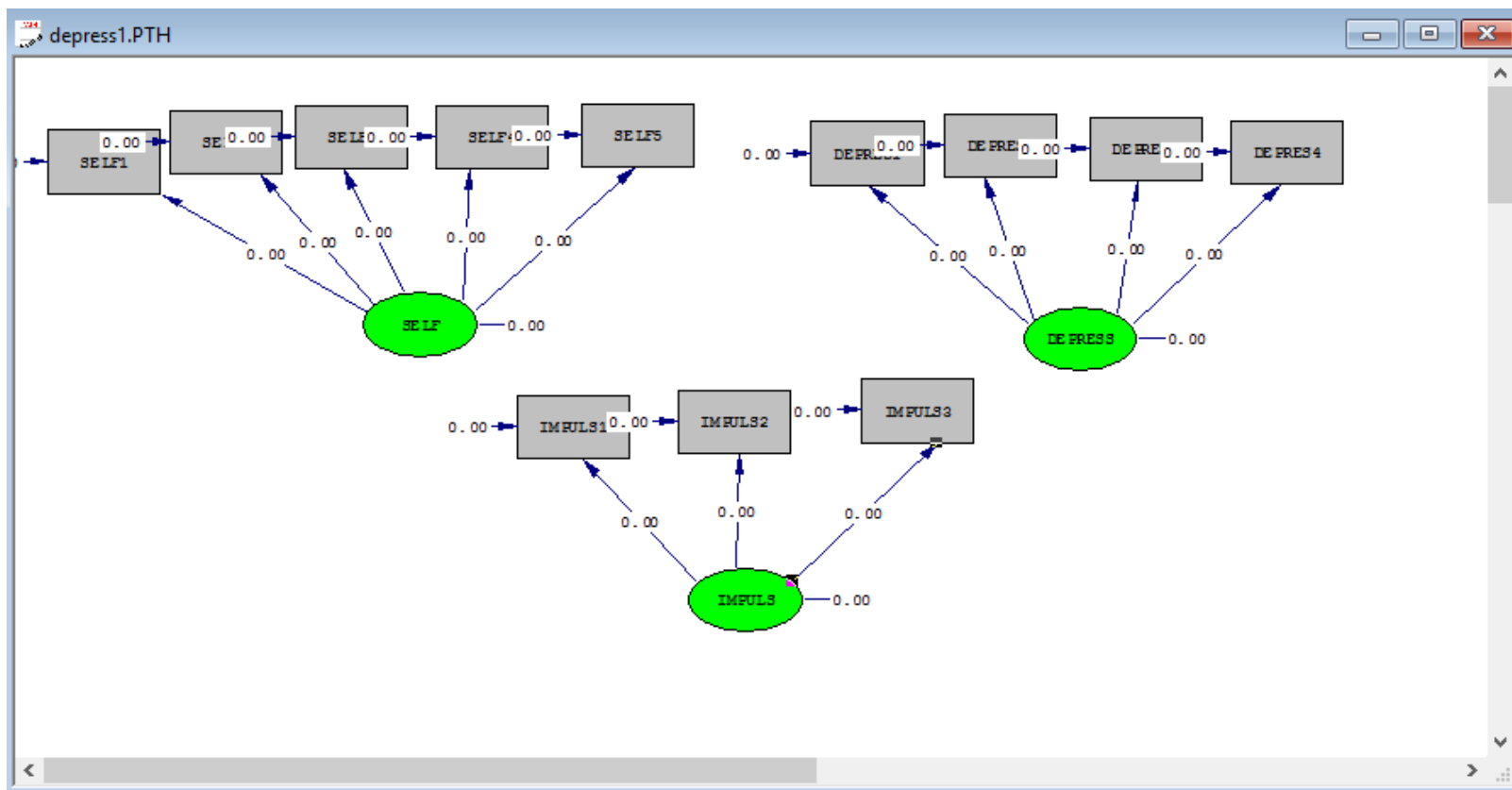
1. Uvod
2. Datoteke
3. Kreiranje (Prileganje) mernega modela SPSS podatkom
(*Fitting a measurement model to SPSS data*)
4. Kreiranje (Prileganje) modela strukturnih enačb SPSS podatkom
(*Fitting a structural equation model to SPSS data*)
5. Robustni maksimum verjetja (*Robust maximum likelihood*)
6. Tehtani najmanjši kvadrati (*Weighted least squares – WLS*)
7. Več-nivojska konfirmativna/potrjevalna faktorska analiza
(*Multilevel confirmatory factor analysis – CFA*)
8. Kreiranje vrednosti latentnih spremenljivk in ostankov/rezidualov opazovanih spremenljivk
(*Latent variable scores and observational residuals*)
9. Uporaba vrednosti latentnih spremenljivk (*Using latent variable scores*)
10. Navzkrižno preverjanje (*Cross validation*)
11. Logistična regresija (*Logistic regression analysis*)
12. Cenzurirana regresija (*Censored regression analysis*)
13. Latentne krivulje rasti (*Latent growth curves – LGC*)
14. Posplošeni linearni model (*Generalized linear models – GLIM*)

1 Uvod

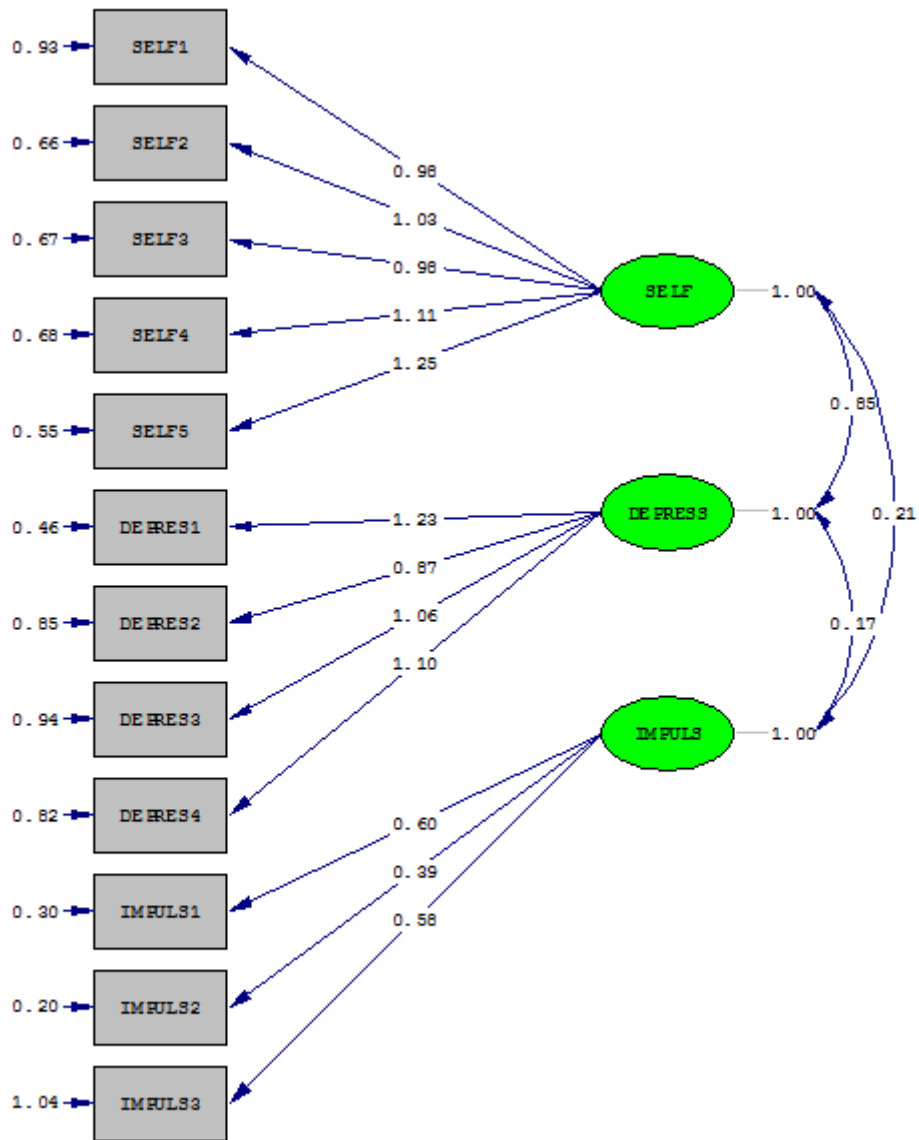
- Aplikacije:
 - LISREL: Standard and Multilevel Structural Equation Modeling + Full Information Maximum Likelihood (FIML) method for missing data.
 - PRELIS: Application for manipulating data, transforming data, generating data, computing moment matrices, computing asymptotic covariance matrices, performing regression analyses, performing exploratory factor analyses of ordinal and continuous variables, etc.
 - MULTILEV: Multilevel linear and nonlinear models.
 - CATFIRM: Formal Inference-based Recursive Modelling (categorical data).
 - CONFIRM: Formal Inference-based Recursive Modelling (continuous data).
 - SURVEYGLIM: Generalized Linear Models (GLIMs).
 - MAPGLIM: Fits GLIMs to multilevel data.
- Vhodni podatki: SPSS, SAS, STATA, Statistica, Microsoft Excel, SYSTAT, BMDP, etc. kot PRELIS System File (PSF).

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- Kreiranje diagrama poti:



- Kreiranje SIMPLIS sintakse:
 - Setup → Build SIMPLIS Syntax
 - RUN LISREL.
- Nestandardizirane faktorske uteži



Chi-Square=123.45, df=51, P-value=0.00000, RMSEA=0.083

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- Sintakstna SIMPLIS datoteka depres3.SPL

Raw Data from file 'C:\LISREL9 Student Examples\TUTORIAL\depress.lsf'

Asymptotic Covariance Matrix from file Depress.acm

Latent Variables Self Impuls Depress

Relationships

SELF1-SELF5 = Self

DEPRES1-DEPRES4 = Depress

IMPULS1-IMPULS3 = Impuls

Self = Impuls Depress

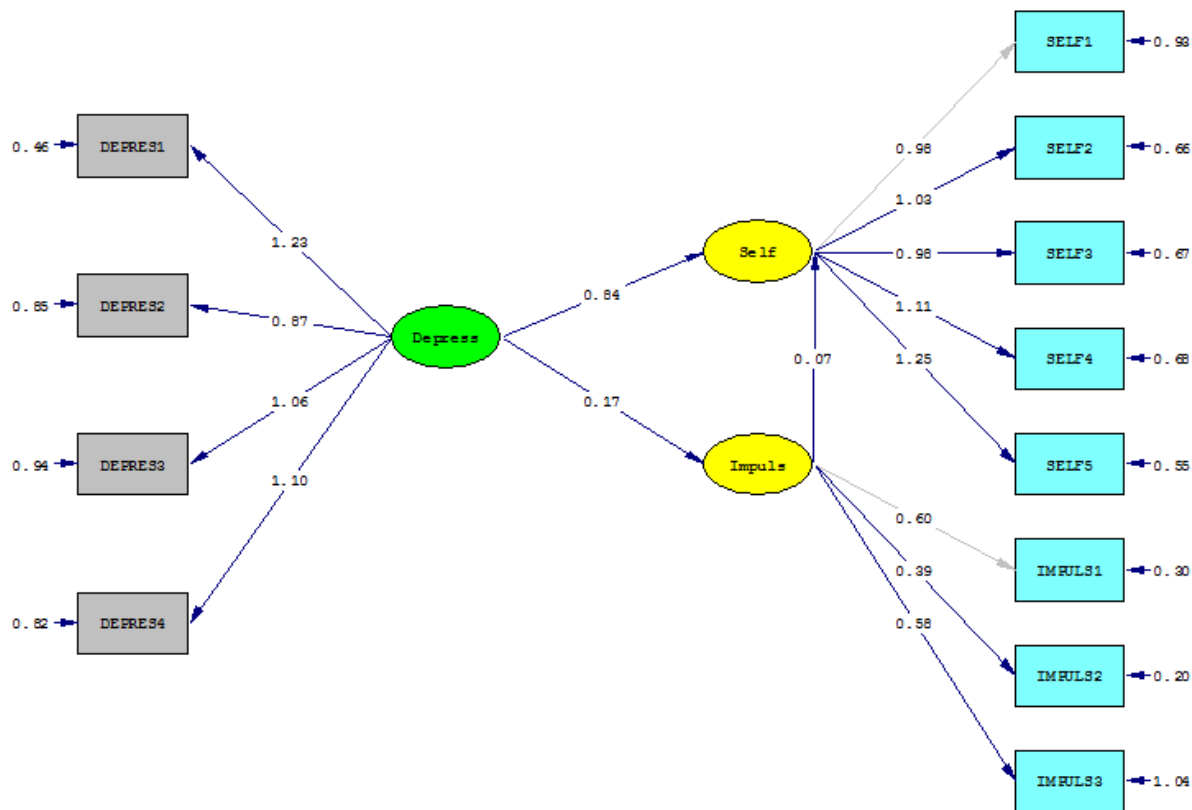
Impuls = Depress

Path Diagram

End of Problem

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- Rezultat: HI-kvadrat je drugačen



Chi-Square=107.77, df=51, P-value=0.00001, RMSEA=0.083

6. Tehtani najmanjši kvadrati (*Weighted least squares – WLS*)

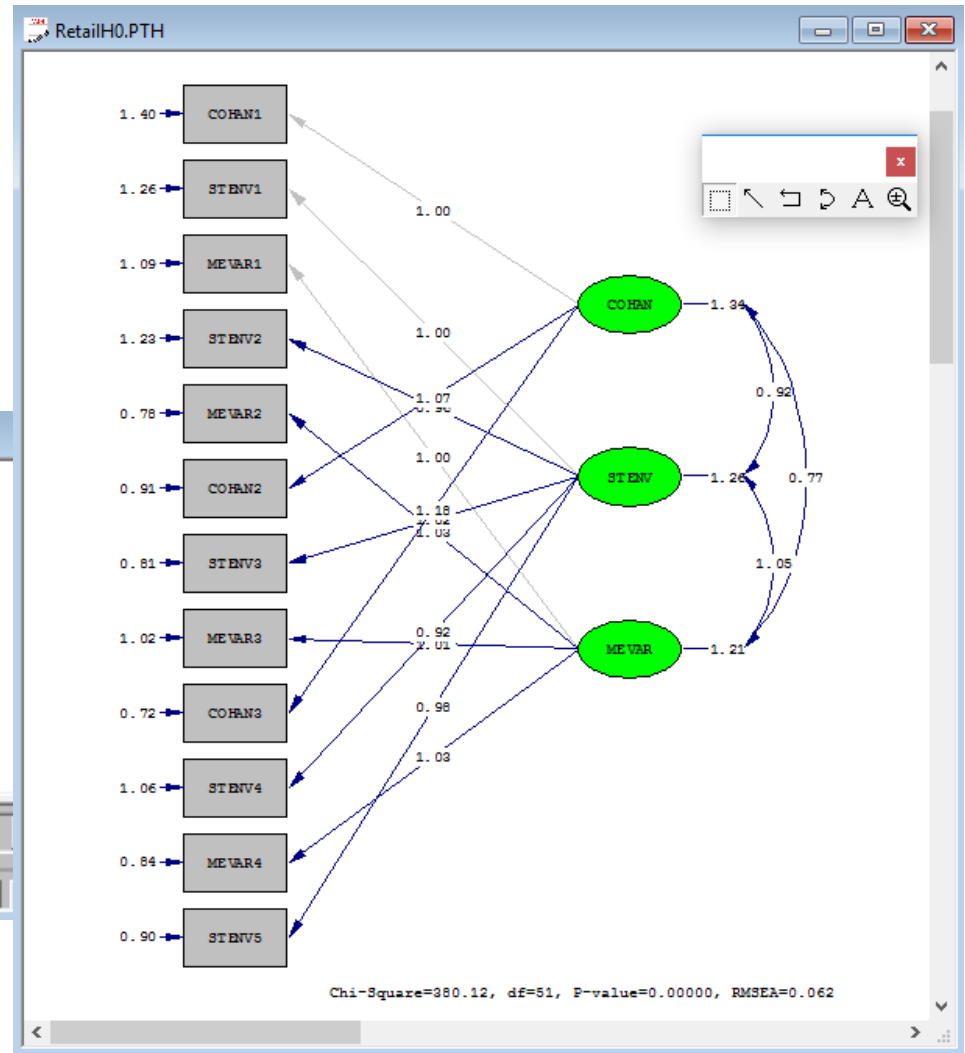
- Osnova je svobodna asimptotična distribucija (*Asymptotically Distribution Free – ADF*), kar je implementirano v LISREL kot tehtani najmanjši kvadrati (*Weighted Least Squares – WLS*).
- Potrebno je:
 - Asymptotic Covariance Matrix (ACM).
 - Kovariance ali korelacije.

The screenshot shows the 'Output' dialog box in LISREL. It is divided into several sections:

- Moment Matrix:** A dropdown menu is set to 'Covariances'. Below it, the 'Save to file' checkbox is checked, and the filename 'depress.cov' is entered in the text field. The 'LISREL system data' checkbox is unchecked.
- Means:** The 'Save to file' checkbox is unchecked, and the text field is empty.
- Standard Deviations:** The 'Save to file' checkbox is unchecked, and the text field is empty.
- Asymptotic Covariance Matrix:** The 'Save to file' checkbox is checked, and the filename 'depress.acm' is entered in the text field. The 'Print in output' checkbox is unchecked.
- Asymptotic Variances:** The 'Save to file' checkbox is unchecked, and the text field is empty.
- Data:** The 'Save the transformed data to file' checkbox is unchecked. Below it, 'Width of fields' is set to 15 and 'Number of decimals' is set to 6. 'Number of repetitions' is set to 1.
- Other options:** 'Rewind data after each repetition', 'Print bivariate frequency tables', 'Print tests of underlying bivariate normality', and 'Perform tests of multivariate normality' are all unchecked. 'Wide print' is also unchecked. 'Random seed' is selected with a radio button, and the seed value '123456' is entered in the text field.

At the bottom right, there are 'OK' and 'Cancel' buttons.

- Path diagram



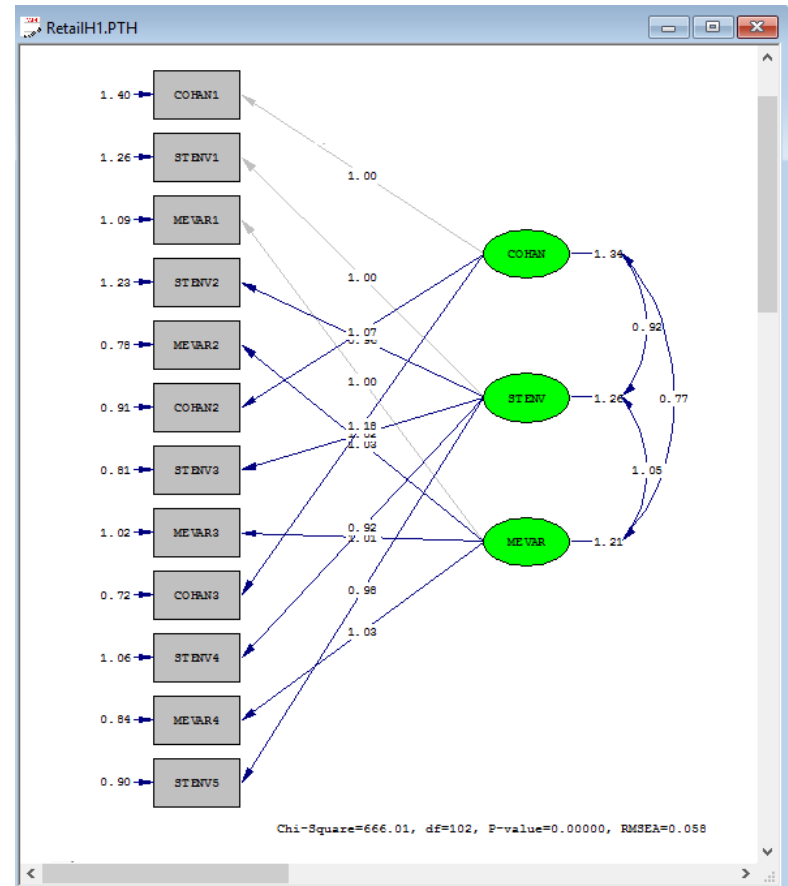
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- RetailH1.SPL in Path diagram:
 - Definirane so variance faktorjev, kovariance faktorjev in merjene napake varianc.

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RetailH1.spl
Group 1: Original Sample
Raw Data from File SAMPLE1.LSF
Latent Variables: COHAN STENV MEVAR
Relationships
COHAN1 = 1*COHAN
COHAN2 COHAN3 = COHAN
STENV1 = 1*STENV
STENV2 STENV3 STENV4 STENV5 = STENV
MEVAR1 = 1*MEVAR
MEVAR2 MEVAR3 MEVAR4 = MEVAR
Group 2: Cross Validation Sample
Raw Data from File SAMPLE2.LSF
Relationships
COHAN1 = 1*COHAN
COHAN2 COHAN3 = COHAN
STENV1 = 1*STENV
STENV2 STENV3 STENV4 STENV5 = STENV
MEVAR1 = 1*MEVAR
MEVAR2 MEVAR3 MEVAR4 = MEVAR
Set the Variance of COHAN Free
Set the Variance of STENV Free
Set the Variance of MEVAR Free
Set the Covariance of COHAN-MEVAR Free
Set the Error Variance of COHAN1-COHAN3 Free
Set the Error Variance of STENV1-STENV5 Free
Set the Error Variance of MEVAR1-MEVAR4 Free
Path Diagram
End of Problem

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- HI-kvadrat test obeh modelov (Retail.XLS):

The screenshot shows an Excel spreadsheet with the following data:

	MINIMUM FIT FUNCTION CHI-SQUARE			NORMAL-THEORY WLS CHI-SQUARE		
HYPOTHESIS	CHISQ	DF	P-VALUE	CHISQ	DF	P-VALUE
EQUAL	741,92	129	8,47538E-87	754,37	129	4,81E-89
UNEQUAL	665,8	102	1,33781E-83	682,49	102	1,09137E-86
DIFFERENCE	76,12	27	1,44194E-06	71,88	27	6,02468E-06

The formula bar shows the formula $=E3-E4$ for cell E5.

11 Logistična regresija

(Logistic regression analysis)

- Podatki: usa.lsf.
 - Odvisna spremenljivka: NOSAY (Politična primernost).
 - Neodvisne spremenljivke:
 - EDUCAT: Izobrazba.
 - AGE: Starost.
 - GENDER: Spol.

LISREL for Windows - usa.lsf

File Edit Data Transformation **Statistics** Graphs Multilevel SurveyGLIM View Window Help

usa.lsf

	NOSAY	VOTING	COMPLEX	NOCARE	TOUCH	INTEREST	GENDER	LEFTRIGH	EDUCAT	AGE
1	2.00	2.00	1.00	1.00	1.00	1.00	2.00	5.00	2.00	20.00
00	2.00	3.00	2.00	6.00	1.00	23.00				
00	3.00	3.00	1.00	10.00	1.00	64.00				
00	1.00	2.00	2.00	5.00	3.00	70.00				
00	1.00	1.00	1.00	5.00	2.00	25.00				
00	1.00	1.00	1.00	5.00	2.00	19.00				
00	2.00	2.00	1.00	6.00	1.00	47.00				
00	1.00	3.00	1.00	5.00	2.00	31.00				
00	2.00	2.00	1.00	1.00	2.00	22.00				

Logistic Regression

Variables:

- NOSAY
- VOTING
- COMPLEX
- NOCARE
- TOUCH
- INTEREST
- GENDER
- LEFTRIGH
- EDUCAT
- AGE

Ordinal Variables:

- NOSAY

Covariates:

- GENDER
- EDUCAT
- AGE

Alternative Parameterization

Syntax Run Cancel

To select more than one variable at a time, hold down the CTRL key while clicking on the variables to be selected

usa.OUT

Univariate Logit Regression for NOSAY

Standard Parameterization

Thresholds: -0.639 1.068 4.090

$$\text{NOSAY} = 0.0 - 0.00976 \cdot \text{GENDER} + 0.630 \cdot \text{EDUCAT} + 0.00998 \cdot \text{AGE}$$

	GENDER	EDUCAT	AGE
Standerr	(0.119)	(0.0917)	(0.00354)
Z-values	-0.0823	6.869	2.820
P-values	0.934	0.000	0.005

+ Error, $R_c = 0.154$

Ready