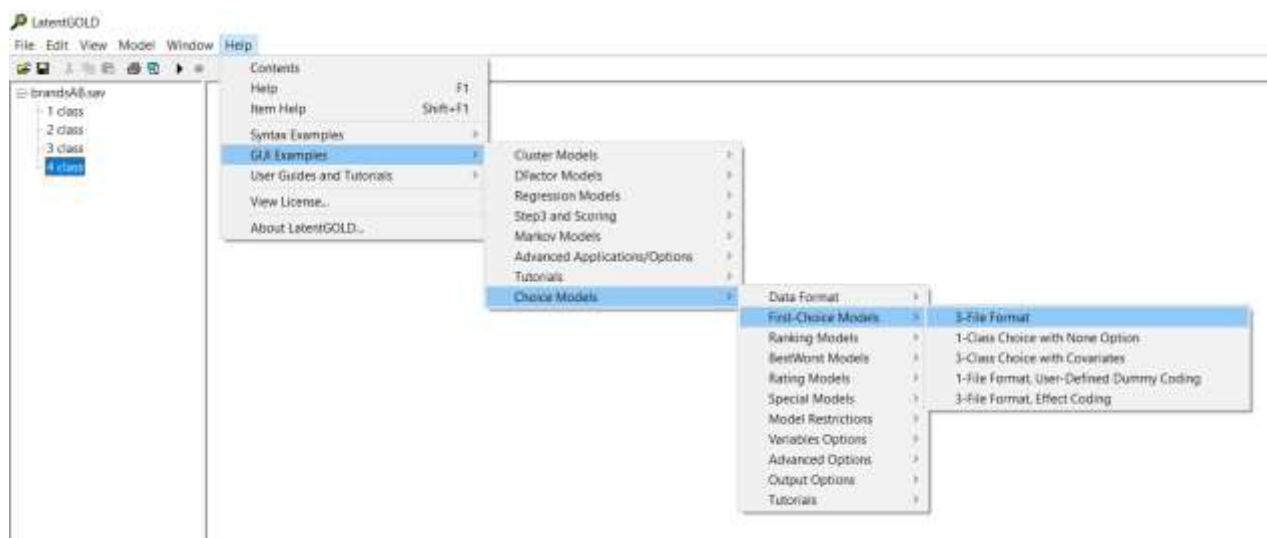


## Choice Tutorial 3A: Using Random Regret Models with Brand Choice Data

In this tutorial we will show how Latent GOLD can be used to estimate Random Regret Models (RRM), and we also compare these models to Random Utility Models (RUM). You will use the data from Choice Tutorial 3 (Brand/Choice example).

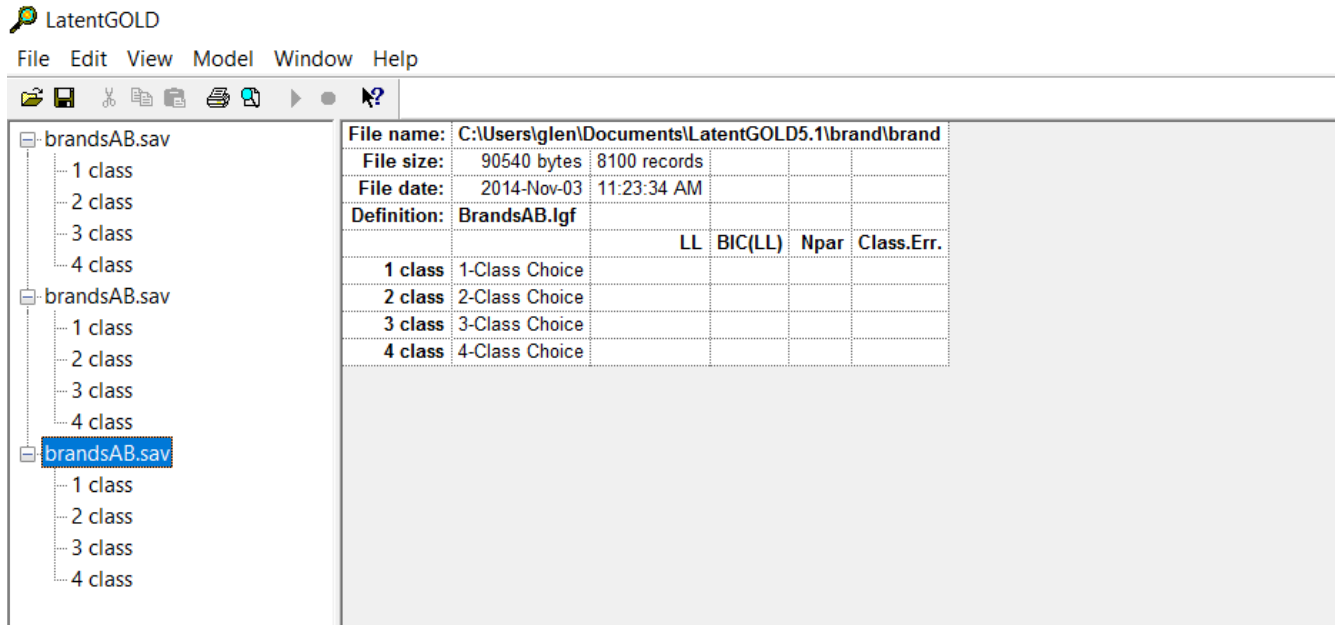
To access the Tutorial 3 data and set up the model for this example, you will use the Help menu in Latent GOLD

- Click ‘Help → GUI Examples → Choice Models → First Choice Models → 3-file Format’ and the outline pane will automatically populate with four models with different numbers of latent classes.



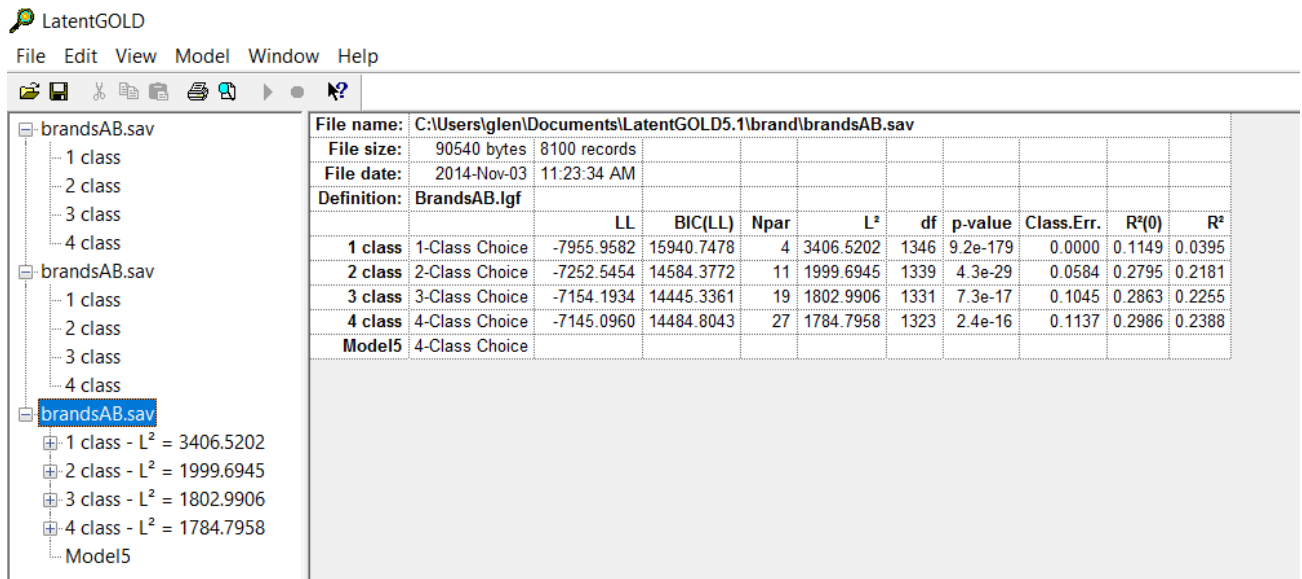
You will first generate two sets of syntax models which you will use to make the RUM and RRM comparisons.

- Right click on the name of the data file ‘brandsAB.sav’ and select Generate Syntax. This will add four syntax models to the outline pane, above the four GUI models. Syntax models differ from GUI models in that they are defined using syntax statements rather than generated using the dialog menu.
- Repeat the process to generate a second set of syntax models.



The first task is to estimate the same models with both the GUI and syntax.

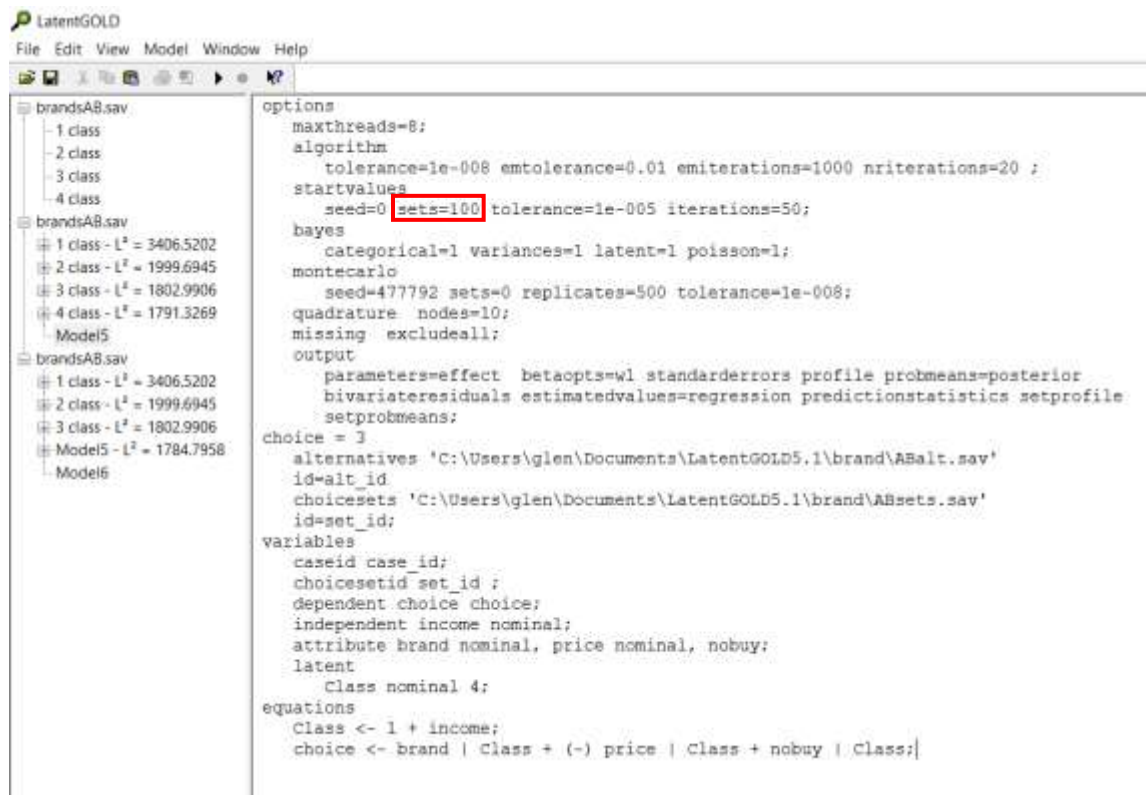
- Click on the data file name shown for the GUI version of the model in the outline pane.
- Select ‘Model→Estimate All’ from the menu to estimate all four models simultaneously.



- Next, estimate the first set of syntax models generated by highlighting ‘brandsAB.sav’ for these models and clicking ‘Model→Estimate All.’

The results of these GUI and syntax analyses should be identical. However, it is possible that the log likelihoods (LL) for the two 4-class models you estimated differ, which would indicate that the 4-class syntax results in a local solution. If you have a local solution, you should edit the syntax and re-estimate the model with an increased number of random start sets.

- Click on the new model 'Model5' and view the syntax in the contents pane at the right.
- Locate the 'sets=' statement in the 'options' section of the syntax and change the numerical value to a larger number (100 is probably sufficient).
- Click the triangular 'play' button at the top of the window to estimate the model.



```
LatentGOLD
File Edit View Model Window Help

brandsAB.sav
├── 1 class
├── 2 class
├── 3 class
└── 4 class
brandsAB.sav
├── 1 class - L2 = 3406.5202
├── 2 class - L2 = 1999.6945
├── 3 class - L2 = 1802.9906
├── 4 class - L2 = 1791.3269
└── Model5
brandsAB.sav
├── 1 class - L2 = 3406.5202
├── 2 class - L2 = 1999.6945
├── 3 class - L2 = 1802.9906
└── Model5 - L2 = 1784.7958
    Model6

options
maxthreads=8;
algorithm
tolerance=1e-008 emtolerance=0.01 emiterations=1000 nriterations=20 ;
startvalues
seed=0 sets=100 tolerance=1e-005 iterations=50;
bayes
categorical=1 variances=1 latent=1 poisson=1;
montecarlo
seed=477792 sets=0 replicates=500 tolerance=1e-008;
quadrature nodes=10;
missing excludeall;
output
parameters=effect betaopts=w1 standarderrors profile probmeans=posterior
bivariateresiduals estimatedvalues=regression predictionstatistics setprofile
setprobmeans;
choice = 3
alternatives 'C:\Users\glen\Documents\LatentGOLD5.1\brand\ABalt.sav'
id=alt_id
choicesets 'C:\Users\glen\Documents\LatentGOLD5.1\brand\ABsets.sav'
id=set_id;
variables
caseid case_id;
choicesetid set_id ;
dependent choice choice;
independent income nominal;
attribute brand nominal, price nominal, nobuy;
latent
Class nominal 4;
equations
Class <- 1 + income;
choice <- brand | Class + (-) price | Class + nobuy | Class;
```

Given enough random starting values, both the GUI and syntax methods should reproduce the LL provided in the GUI for all four models.

Once confirmed, you are ready to convert these Random Utility Models into Random Regret Models.

- Go to the second set of syntax models that you generated. To keep the project clearly labeled, you may want to rename these models. Click on a model name to highlight it and then again to enter edit mode to rename it as shown in the figure below.
- In each syntax, locate the line under the ‘variables’ section that begins with ‘dependent.’ Add ‘RRM’ to the end of that line.
- For the 4-class solution, you may want to increase the number of random starts, as described above, to avoid obtaining local solutions.



```
options
maxthreads=8;
algorithm
tolerance=1e-008 emtolerance=0.01 emiterations=1000 nriterations=20 ;
startvalues
seed=0 sets=16 tolerance=1e-005 iterations=50;
bayes
categorical=1 variances=1 latent=1 poisson=1;
montecarlo
seed=102792 sets=0 replicates=500 tolerance=1e-008;
quadrature nodes=10;
missing excludeall;
output
parameters=effect betaopts=wl standarderrors profile probmeans=posterior
bivariateresiduals estimatedvalues=regression predictionstatistics setprofile
setprobmeans;
choice = 3
alternatives 'C:\Users\glen\Documents\LatentGOLD5.1\brand\ABalt.sav'
id=alt_id
choicesets 'C:\Users\glen\Documents\LatentGOLD5.1\brand\ABsets.sav'
id=set_id;
variables
caseid case_id;
choicesetid_set_id ;
dependent choice choice RRM;
independent income nominal;
attribute brand nominal, price nominal, nobuy;
latent
Class nominal 1;
equations
Class <- 1 + income;
choice <- brand | Class + (-) price | Class + nobuy | Class;
```

- Repeat for each of the four models and then ‘Estimate All.’

The screenshot shows the LatentGOLD software interface. On the left is a file browser for 'brandsAB.sav' showing a tree structure of models (1 class, 2 class, 3 class, 4 class, Model5, Model6) with their respective L<sup>2</sup> values. On the right is a table comparing RRM and RUM models for 1, 2, 3, and 4 classes. The table includes columns for File name, File size, File date, LL, BIC(LL), Npar, L<sup>2</sup>, df, p-value, Class.Err., R<sup>2</sup>(0), and R<sup>2</sup>.

	File name:	C:\Users\lglen\Documents\LatentGOLD5.1\brand\brandsAB.sav									
	File size:	90540 bytes	8100 records								
	File date:	2014-Nov-03	11:23:34 AM								
		LL	BIC(LL)	Npar	L <sup>2</sup>	df	p-value	Class.Err.	R <sup>2</sup> (0)	R <sup>2</sup>	
1 class RRM	Syntax (1)	-7959.4472	15947.7259	4	3413.4983	1346	1.1e-179	0.0000	0.1145	0.0391	
2 class RRM	Syntax (2)	-7259.6139	14598.5143	11	2013.8316	1339	4.1e-30	0.0585	0.2782	0.2167	
3 class RRM	Syntax (3)	-7166.5934	14470.1361	19	1827.7906	1331	2.5e-18	0.0998	0.2835	0.2224	
4 class RRM	Syntax (4)	-7156.5171	14507.6464	27	1807.6379	1323	1.1e-17	0.1081	0.2962	0.2362	
Model5	Syntax (5)										

Click on the data file name for the RRM models and compare the LLs and BIC with the corresponding statistics based on the RUM models. Note that the RUM models for all four models are slightly better. This is consistent with the fact that the data were simulated based on RUM models. Despite this, the RRM model identifies the correct number of classes (the BIC associated with the 3-class model is smallest), and the classes are very similar to those obtained using the RUM model.