Data Mining with IBM SPSS AMOS 20.0
(IBM: Statistical Package for Social Sciences AMOS 20)

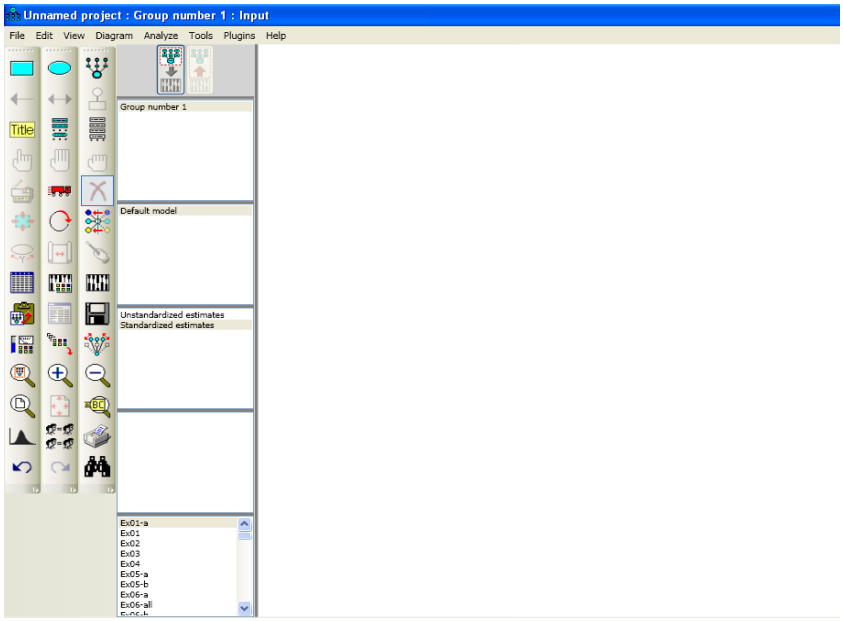
Case Study

This is a simple regression model where one observed variable, SAT, is predicted as a linear combination of the other two observed variables, Education and Income.

i. Average SAT score 'sat'- **DV**
ii. Per capita income expressed in $1,000 units- **$IV_1$**
iii. Median education for residents 25 years of age or older-**IV_2**

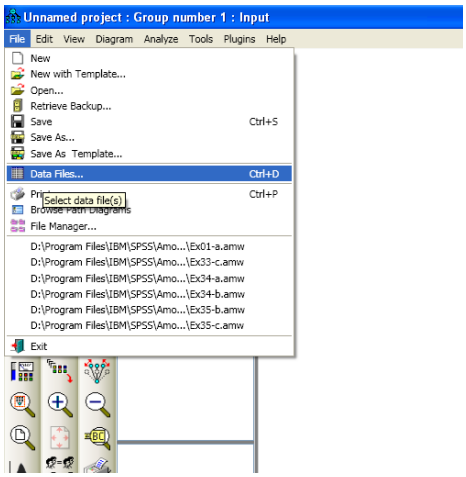
SAT	Income	Education
899	14.345	12.7
896	16.37	12.6
897	13.537	12.5
889	12.552	12.5
823	11.441	12.2
857	12.757	12.7
860	11.799	12.4
890	10.683	12.5
889	14.112	12.5
888	14.573	12.6
925	13.144	12.6
869	15.281	12.5
896	14.121	12.5
827	10.758	12.2
908	11.583	12.7
885	12.343	12.4
887	12.729	12.3
790	10.075	12.1
868	12.636	12.4
904	10.689	12.6
888	13.065	12.4

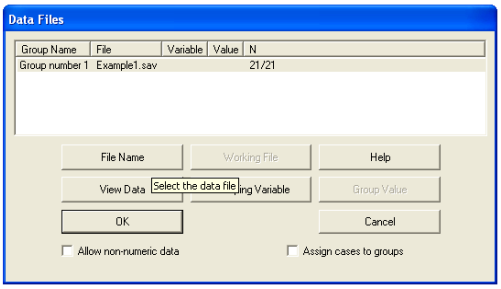
Click on IBM SPSS AMOS 20.0
Select Amos Graphics
OK



Specifying the Data File

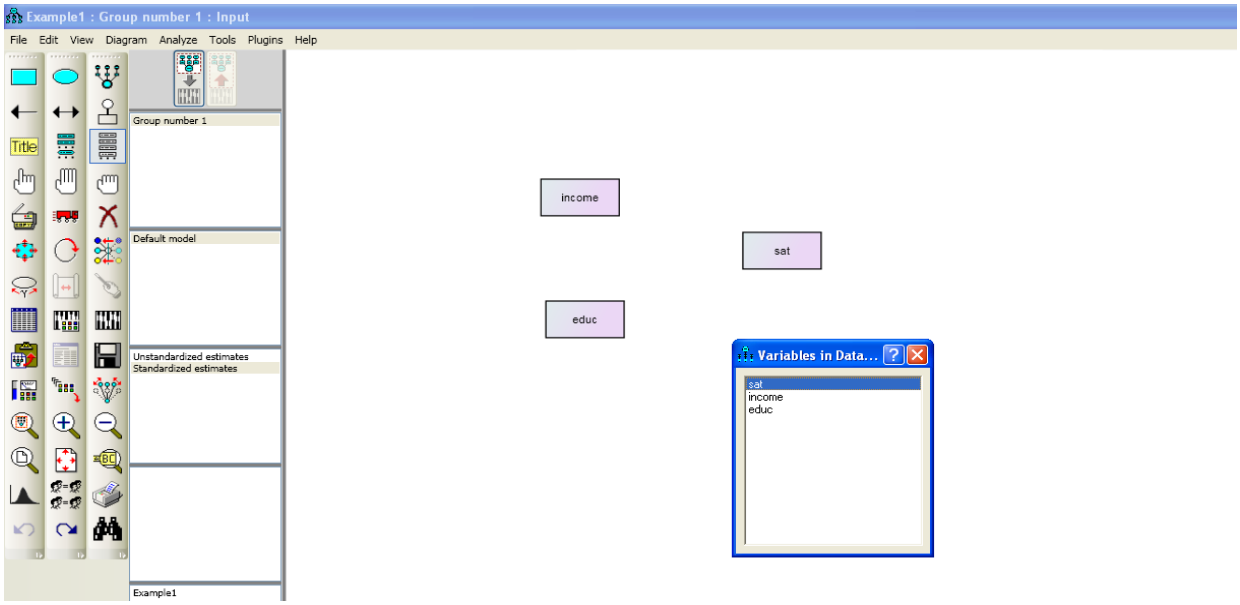
From the menus, choose File → Data Files.
In the Data Files dialog box, click File Name.
Browse to the required file, click OK.





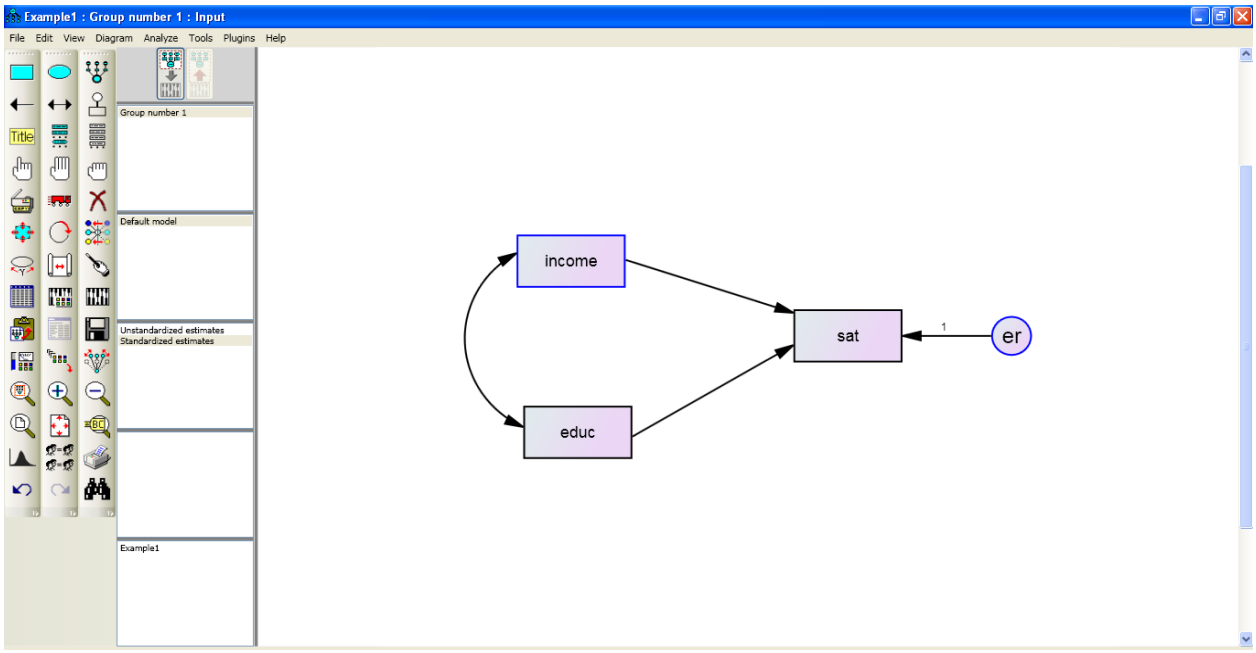
Specifying the Model and Drawing Variables

- The next step is to draw the variables in your model. First, you'll draw three rectangles to represent the observed variables, and then you'll draw an ellipse to represent the unobserved variable.
- From the menus, choose Diagram → Draw Observed.
- In the drawing area, move your mouse pointer to where you want the Education rectangle to appear. Click and drag to draw the rectangle. Don't worry about the exact size or placement of the rectangle because you can change it later.
- Use the same method to draw two more rectangles for Income and SAT.
- The model in your drawing area should now look similar to the following:



Naming the Variables and drawing arrows

- From the menu, select view-variables in the data set
- From the variable list drag the corresponding variables to the rectangles
- Draw an eclipse for the residual term and to name the variable double click the eclipse an object properties dialog box will be opened. Name the variable.
- Click the Parameters tab.
- In the Regression weight text box, type 1.
- Close the Object Properties dialog box.
- Now you will add arrows to the path diagram, using the following model as your guide:
- From the menus, choose Diagram → Draw Path.
- Click and drag to draw an arrow between Education and SAT.
- Use this method to add each of the remaining single-headed arrows.
- From the menus, choose Diagram → Draw Co-variances.
- Click and drag to draw a double-headed arrow between Income and Education. Don't worry about the curve of the arrow because you can adjust it later.
- Your path diagram is now complete, other than any changes you may wish to make to its appearance. It should look something like this:



Altering the Appearance of a Path Diagram

- You can change the appearance of your path diagram by moving and resizing objects. These changes are visual only; they do not affect the model specification.

To Move an Object

- From the menus, choose Edit → Move.
- In the drawing area, click and drag the object to its new location.

To Reshape an Object or Double-Headed Arrow

- From the menus, choose Edit → Shape of Object.
- In the drawing area, click and drag the object until you are satisfied with its size and shape.

To Delete an Object

- From the menus, choose Edit → Erase.
- In the drawing area, click the object you wish to delete.

To Undo an Action

- From the menus, choose Edit → Undo.

To Redo an Action

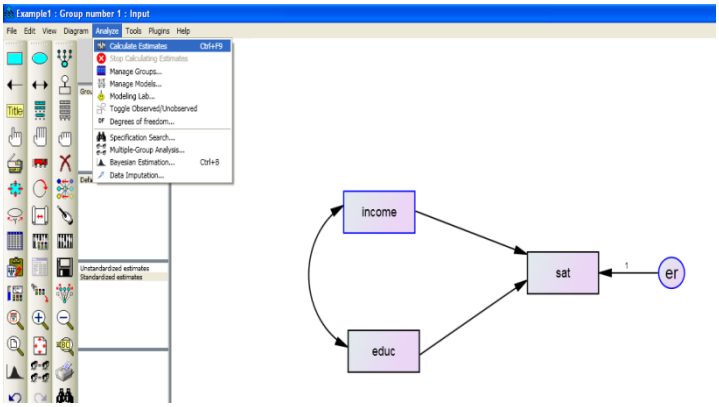
- From the menus, choose Edit → Redo.

Setting up Optional Output

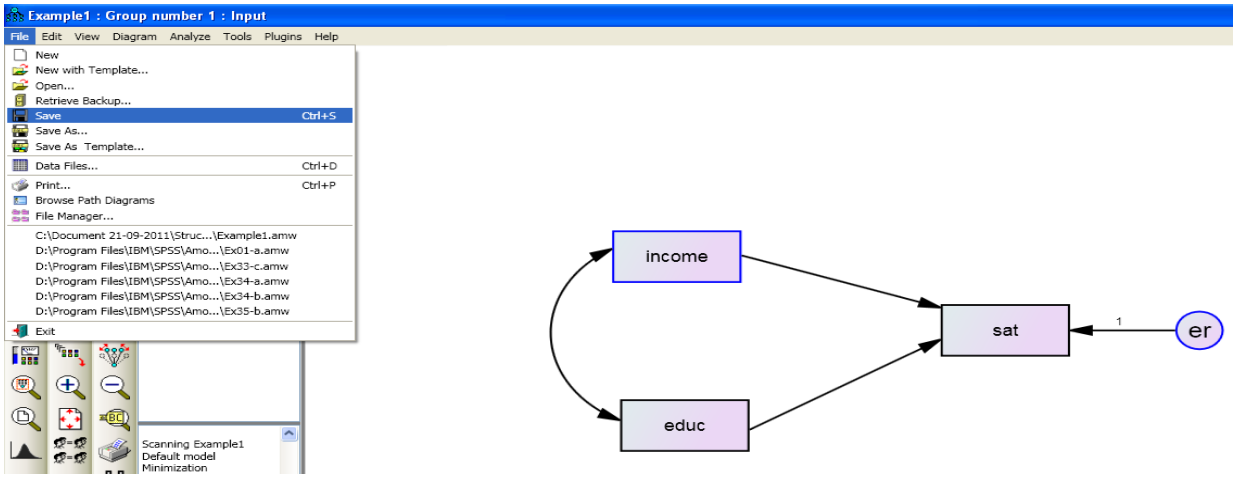
- Some of the output in Amos is optional. In this step, you will choose which portions of the optional output you want Amos to display after the analysis.
- From the menus, choose View → Analysis Properties.
- Click the Output tab.
- Select the Minimization history, Standardized estimates, and squared multiple correlations check boxes.

Performing the Analysis

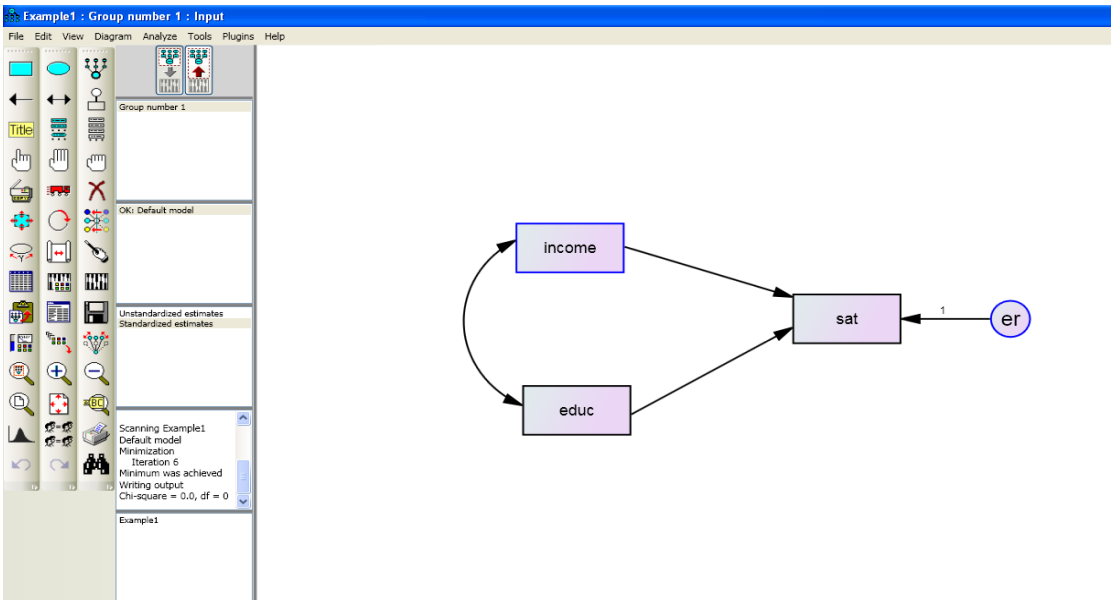
- The only thing left to do is perform the calculations for fitting the model. Note that in order to keep the parameter estimates up to date, you must do this every time you change the model, the data, or the options in the Analysis Properties dialog box.
- From the menus, click Analyze → Calculate Estimates.



Because you have not yet saved the file, the Save As dialog box appears. Type a name for the file and click Save.



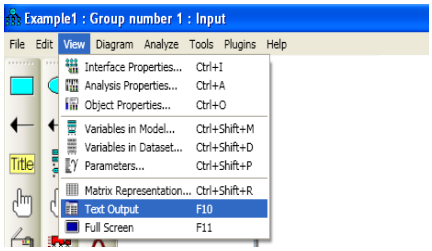
- Amos calculates the model estimates. The panel to the left of the path diagram displays a summary of the calculations.



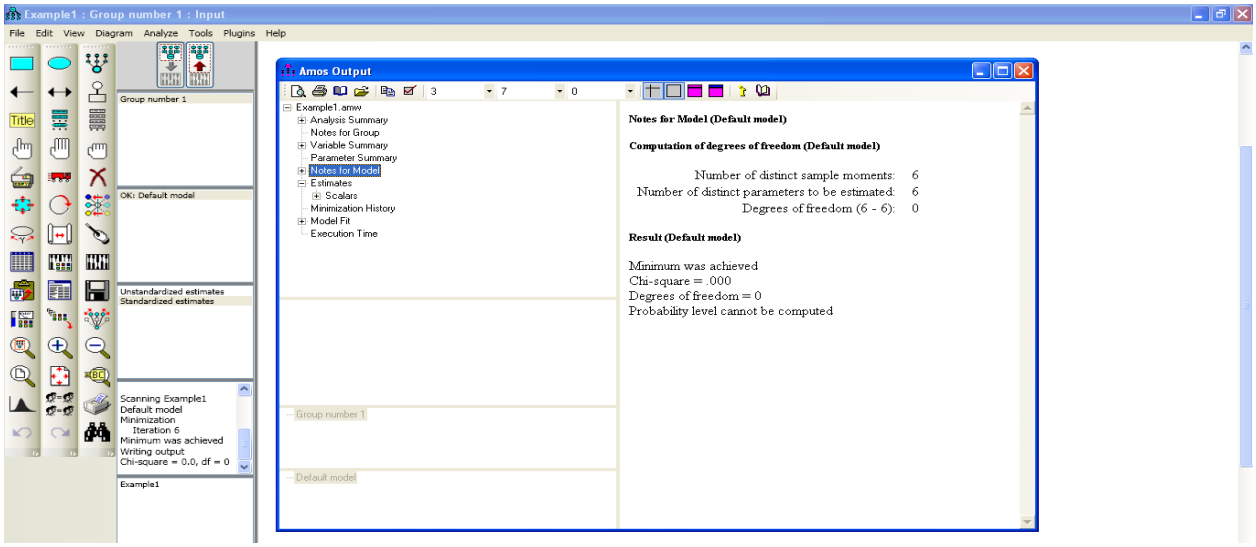
Viewing Output

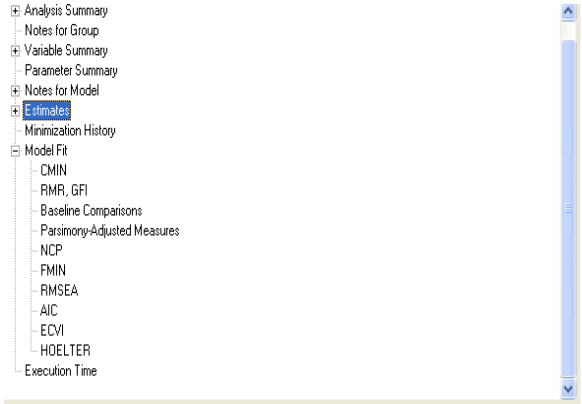
- When Amos has completed the calculations, you have two options for viewing the output: text and graphics.

To View Text Output



- From the menus, choose View → Text Output.
- The tree diagram in the upper left pane of the Amos Output window allows you to choose a portion of the text output for viewing.
- Click Estimates to view the parameter estimates.





Estimates (Group number 1 - Default model)

Scalar Estimates (Group number 1 - Default model)

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
sat	<---	income	2.156	3.125	.690	.490	
sat	<---	educ	136.022	30.555	4.452	***	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
sat	<---	income	.111
sat	<---	educ	.717

Covariances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
income	<-->	educ	.127	.065	1.952	.051	

Correlations: (Group number 1 - Default model)

			Estimate
income	<-->	educ	.485

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
income	2.562	.810	3.162	.002	
educ	.027	.008	3.162	.002	
er	382.736	121.032	3.162	.002	

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	6	.000	0		
Saturated model	6	.000	0		
Independence model	3	23.861	3	.000	7.954

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.000	1.000		
Saturated model	.000	1.000		
Independence model	9.448	.591	.181	.295

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	1.000		1.000		1.000
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.000	.000	.000
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	.000	.000	.000
Saturated model	.000	.000	.000
Independence model	20.861	8.867	40.317

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.000	.000	.000	.000
Saturated model	.000	.000	.000	.000
Independence model	1.193	1.043	.443	2.016

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Independence model	.590	.384	.820	.000

AIC

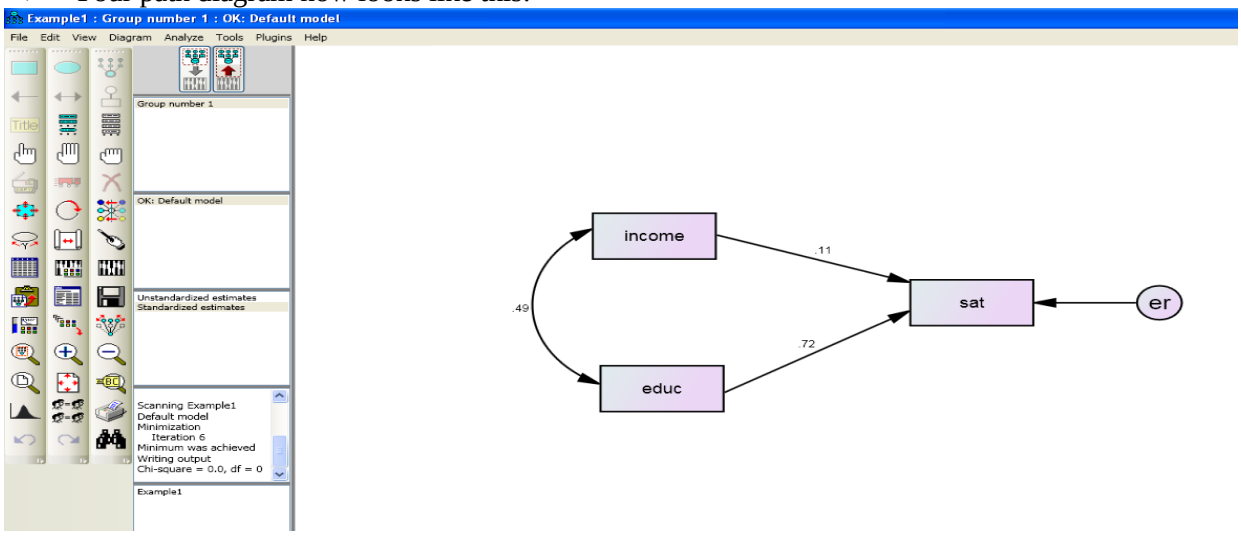
Model	AIC	BCC	BIC	CAIC
Default model	12.000	15.000	18.267	24.267
Saturated model	12.000	15.000	18.267	24.267
Independence model	29.861	31.361	32.995	35.995

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.600	.600	.600	.750
Saturated model	.600	.600	.600	.750
Independence model	1.493	.893	2.466	1.568

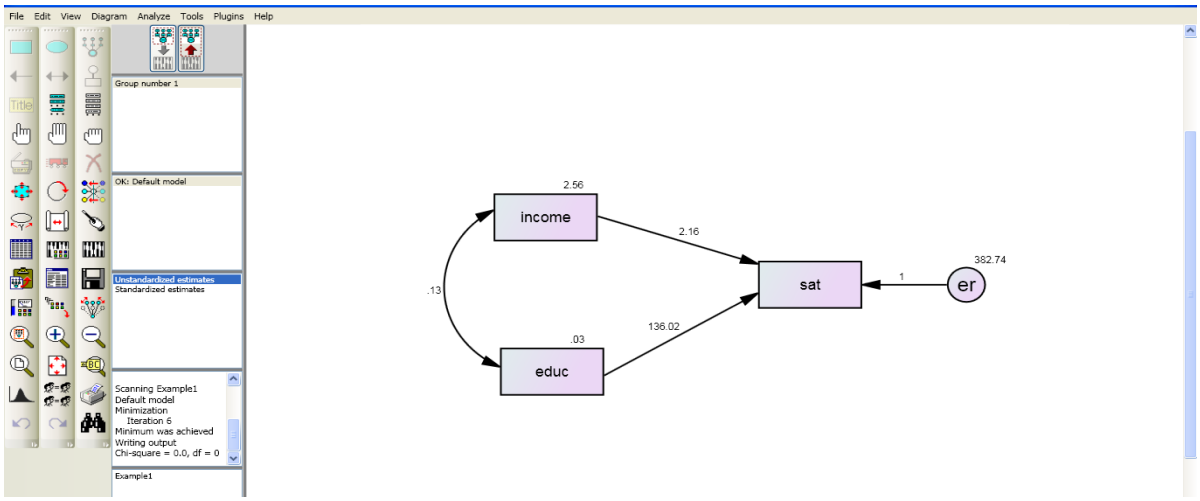
To View Graphics Output

- Click the Show the output path diagram button.
- In the Parameter Formats pane to the left of the drawing area, click *Standardized estimates.*
- Your path diagram now looks like this:



The value 0.49 is the correlation between Education and Income. The values 0.72 and 0.11 are standardized regression weights. The value 0.60 is the squared multiple correlation of SAT with Education and Income.

In the Parameter Formats pane to the left of the drawing area, click Unstandardized estimates. Your path diagram should now look like this:



Printing the Path Diagram

- From the menus, choose File → Print.
- The Print dialog box appears.
- Click Print.

Copying the Path Diagram

- Amos Graphics lets you easily export your path diagram to other applications such as Microsoft Word.
- From the menus, choose Edit → Copy (to Clipboard).
- Switch to the other application and use the Paste function to insert the path diagram.