

```
1302 0 OUTPUT ACTIVATE VARModelOutput.  
1302 0 M> OUTPUT ACTIVATE VARModelOutput.  
1303 0 TITLE 'VAR Model'.  
1303 0 M> TITLE 'VAR Model'.
```

VAR Model

```
1304 0 GET DATA /TYPE=TXT /FILE='D:\DATA ANALYSIS\N Time Series Tests and Fo
recasting\VAR Model\dataset.csv' /ENCODING='UTF8' /DEL
CASE=LINE /DELIMITERS=', ' /QUALIFIER='"' /ARRANGEMENT=DELIMITED /F
IRSTCASE=2
1304 0 M> GET DATA /TYPE=TXT /FILE='D:\DATA ANALYSIS\N Time Series Tests and
Forecasting\VAR Model\dataset.csv' /ENCODING='UTF8' /
DELCASE=LINE /DELIMITERS=', ' /QUALIFIER='"' /ARRANGEMENT=DELIMI
TED /FIRSTCASE=2
1305 0 /VARIABLES=school A8 sex A8 age F8.0 address A8 famsize A8 Pstatus A
8 Medu F8.0 Fedu F8.0 Mjob A16 Fjob A16 reason A16 gua
rdian A16 traveltime F8.0 studytime F8.0 failures F8.0 schoolsup A
8 famsup A8 paid A8 activities A8 nursery A8 higher A8
internet A8 romantic A8 famrel F8.0 freetime F8.0 goout F8.0 Dalc
F8.0 Walc F8.0 health F8.0 absences F8.0 G1 F8.0 G2 F
8.0 G3 F8.0.
1305 0 M> /VARIABLES=school A8 sex A8 age F8.0 address A8 famsize A8 Pstatu
s A8 Medu F8.0 Fedu F8.0 Mjob A16 Fjob A16 reason A16
guardian A16 traveltime F8.0 studytime F8.0 failures F8.0 schoo
lsup A8 famsup A8 paid A8 activities A8 nursery A8 hig
her A8 internet A8 romantic A8 famrel F8.0 freetime F8.0 goout
F8.0 Dalc F8.0 Walc F8.0 health F8.0 absences F8.0 G1
F8.0 G2 F8.0 G3 F8.0.
1306 0 DATASET NAME VARModelData.
1306 0 M> DATASET NAME VARModelData.
1307 0 COMPUTE time_index=$CASENUM.
1307 0 M> COMPUTE time_index=$CASENUM.
1308 0 EXECUTE.
1308 0 M> EXECUTE.
1309 0 * BEGIN METHOD-SPECIFIC SPSS WORKFLOW.
1309 0 M> * BEGIN METHOD-SPECIFIC SPSS WORKFLOW.
1310 0 COMPUTE g1_l1=LAG(G1,1).
1310 0 M> COMPUTE g1_l1=LAG(G1,1).
1311 0 COMPUTE g1_l2=LAG(G1,2).
1311 0 M> COMPUTE g1_l2=LAG(G1,2).
1312 0 EXECUTE.
1312 0 M> EXECUTE.
1313 0 COMPUTE g2_l1=LAG(G2,1).
1313 0 M> COMPUTE g2_l1=LAG(G2,1).
1314 0 COMPUTE g2_l2=LAG(G2,2).
```

VAR Model

```

1314  0 M>  COMPUTE g2_l2=LAG(G2,2) .
1315  0  EXECUTE .
1315  0 M>  EXECUTE .
1316  0  COMPUTE g3_l1=LAG(G3,1) .
1316  0 M>  COMPUTE g3_l1=LAG(G3,1) .
1317  0  COMPUTE g3_l2=LAG(G3,2) .
1317  0 M>  COMPUTE g3_l2=LAG(G3,2) .
1318  0  EXECUTE .
1318  0 M>  EXECUTE .
1319  0  REGRESSION /STATISTICS=COEFF OUTS R ANOVA CI(95) /DEPENDENT G1 /METHO
D=ENTER time_index g1_l1 g2_l1 g3_l1 g1_l2 g2_l2 g3_l2
.
1319  0 M>  REGRESSION /STATISTICS=COEFF OUTS R ANOVA CI(95) /DEPENDENT G1 /ME
THOD=ENTER time_index g1_l1 g2_l1 g3_l1 g1_l2 g2_l2 g3
_l2.

```

Regression

Notes

Output Created		18-JUL-2026 15:54:38
Comments		
Input	Data	D:\DATA ANALYSIS\N Time Series Tests and Forecasting\VAR Model\dataset.csv
	Active Dataset	VARModelData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	649
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any variable used.

VAR Model

Notes

Syntax	REGRESSION /STATISTICS=COEFF OUTS R ANOVA CI(95) /DEPENDENT G1 /METHOD=ENTER time_index g1_l1 g2_l1 g3_l1 g1_l2 g2_l2 g3_l2.	
Resources	Processor Time	00:00:00.05
	Elapsed Time	00:00:00.04
	Memory Required	7776 bytes
	Additional Memory Required for Residual Plots	0 bytes

[VARModelData]

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	g3_l2, g2_l1, time_index, g1_l2, g1_l1, g3_l1, g2_l2 ^b	.	Enter

a. Dependent Variable: G1

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.376 ^a	.141	.132	2.526

a. Predictors: (Constant), g3_l2, g2_l1, time_index, g1_l2, g1_l1, g3_l1, g2_l2

VAR Model

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	669.947	7	95.707	14.998	.000 ^b
	Residual	4077.704	639	6.381		
	Total	4747.651	646			

a. Dependent Variable: G1

b. Predictors: (Constant), g3_l2, g2_l1, time_index, g1_l2, g1_l1, g3_l1, g2_l2

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.205	.642		12.780	.000
	time_index	-.002	.001	-.157	-4.075	.000
	g1_l1	.272	.080	.273	3.389	.001
	g2_l1	-.132	.100	-.142	-1.318	.188
	g3_l1	.024	.079	.029	.302	.763
	g1_l2	.094	.076	.095	1.234	.218
	g2_l2	-.061	.099	-.065	-.614	.540
	g3_l2	.145	.079	.173	1.835	.067

Coefficients^a

Model		95.0% Confidence Interval for B	
		Lower Bound	Upper Bound
1	(Constant)	6.944	9.466
	time_index	-.003	-.001
	g1_l1	.115	.430
	g2_l1	-.329	.065
	g3_l1	-.132	.179
	g1_l2	-.055	.243
	g2_l2	-.255	.133
	g3_l2	-.010	.300

a. Dependent Variable: G1

VAR Model

```
1320 0 REGRESSION /STATISTICS=COEFF OUTS R ANOVA CI(95) /DEPENDENT G2 /METHOD=ENTER time_index g1_l1 g2_l1 g3_l1 g1_l2 g2_l2 g3_l2
```

```
1320 0 M> REGRESSION /STATISTICS=COEFF OUTS R ANOVA CI(95) /DEPENDENT G2 /METHOD=ENTER time_index g1_l1 g2_l1 g3_l1 g1_l2 g2_l2 g3_l2.
```

Regression

Notes

Output Created		18-JUL-2026 15:54:38
Comments		
Input	Data	D:\DATA ANALYSIS\N Time Series Tests and Forecasting\VAR Model\dataset.csv
	Active Dataset	VARModelData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	649
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any variable used.
Syntax		REGRESSION /STATISTICS=COEFF OUTS R ANOVA CI(95) /DEPENDENT G2 /METHOD=ENTER time_index g1_l1 g2_l1 g3_l1 g1_l2 g2_l2 g3_l2.
Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.12
	Memory Required	7776 bytes
	Additional Memory Required for Residual Plots	0 bytes

VAR Model

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	g3_l2, g2_l1, time_index, g1_l2, g1_l1, g3_l1, g2_l2 ^b	.	Enter

a. Dependent Variable: G2

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.287 ^a	.082	.072	2.811

a. Predictors: (Constant), g3_l2, g2_l1, time_index, g1_l2, g1_l1, g3_l1, g2_l2

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	452.665	7	64.666	8.186	.000 ^b
	Residual	5047.743	639	7.899		
	Total	5500.408	646			

a. Dependent Variable: G2

b. Predictors: (Constant), g3_l2, g2_l1, time_index, g1_l2, g1_l1, g3_l1, g2_l2

VAR Model

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.494	.714		11.891	.000
	time_index	-.002	.001	-.108	-2.708	.007
	g1_l1	.120	.089	.111	1.341	.181
	g2_l1	-.020	.112	-.020	-.180	.857
	g3_l1	.034	.088	.037	.382	.703
	g1_l2	.006	.084	.006	.074	.941
	g2_l2	.125	.110	.125	1.133	.258
	g3_l2	.048	.088	.054	.551	.582

Coefficients^a

Model		95.0% Confidence Interval for B	
		Lower Bound	Upper Bound
1	(Constant)	7.091	9.896
	time_index	-.003	.000
	g1_l1	-.056	.296
	g2_l1	-.239	.199
	g3_l1	-.139	.207
	g1_l2	-.160	.172
	g2_l2	-.091	.340
	g3_l2	-.124	.221

a. Dependent Variable: G2

```
1321  0  REGRESSION /STATISTICS=COEFF OUTS R ANOVA CI(95) /DEPENDENT G3 /METHOD=ENTER time_index g1_l1 g2_l1 g3_l1 g1_l2 g2_l2 g3_l2
```

```
1321  0  M> REGRESSION /STATISTICS=COEFF OUTS R ANOVA CI(95) /DEPENDENT G3 /METHOD=ENTER time_index g1_l1 g2_l1 g3_l1 g1_l2 g2_l2 g3_l2.
```

Regression

VAR Model

Notes

Output Created		18-JUL-2026 15:54:38
Comments		
Input	Data	D:\DATA ANALYSIS\N Time Series Tests and Forecasting\VAR Model\dataset.csv
	Active Dataset	VARModelData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	649
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any variable used.
Syntax		REGRESSION /STATISTICS=COEFF OUTS R ANOVA CI(95) /DEPENDENT G3 /METHOD=ENTER time_index g1_l1 g2_l1 g3_l1 g1_l2 g2_l2 g3_l2.
Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.08
	Memory Required	7776 bytes
	Additional Memory Required for Residual Plots	0 bytes

VAR Model

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	g3_l2, g2_l1, time_index, g1_l2, g1_l1, g3_l1, g2_l2 ^b	.	Enter

a. Dependent Variable: G3

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.311 ^a	.096	.087	3.092

a. Predictors: (Constant), g3_l2, g2_l1, time_index, g1_l2, g1_l1, g3_l1, g2_l2

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	652.426	7	93.204	9.749	.000 ^b
	Residual	6109.194	639	9.561		
	Total	6761.620	646			

a. Dependent Variable: G3

b. Predictors: (Constant), g3_l2, g2_l1, time_index, g1_l2, g1_l1, g3_l1, g2_l2

VAR Model

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.336	.786		10.608	.000
	time_index	-.002	.001	-.111	-2.802	.005
	g1_l1	.109	.098	.091	1.106	.269
	g2_l1	-.050	.123	-.045	-.408	.684
	g3_l1	.097	.097	.097	1.001	.317
	g1_l2	.047	.093	.040	.508	.612
	g2_l2	-.041	.121	-.037	-.339	.735
	g3_l2	.194	.097	.194	2.010	.045

Coefficients^a

Model		95.0% Confidence Interval for B	
		Lower Bound	Upper Bound
1	(Constant)	6.793	9.879
	time_index	-.003	-.001
	g1_l1	-.084	.302
	g2_l1	-.291	.191
	g3_l1	-.093	.287
	g1_l2	-.135	.230
	g2_l2	-.279	.197
	g3_l2	.004	.384

a. Dependent Variable: G3

```

1322 0 * END METHOD-SPECIFIC SPSS WORKFLOW.
1322 0 M> * END METHOD-SPECIFIC SPSS WORKFLOW.
1323 0 SAVE OUTFILE='D:\DATA ANALYSIS\N Time Series Tests and Forecasting\VAR
R Model\SPSS_Output\sav\var-model_spss_ready_data.sav'
/COMPRESSED.
1323 0 M> SAVE OUTFILE='D:\DATA ANALYSIS\N Time Series Tests and Forecasting
\VAR Model\SPSS_Output\sav\var-model_spss_ready_data.s
av' /COMPRESSED.
1324 0 ECHO 'VAR Model'.
1324 0 M> ECHO 'VAR Model'.

```

VAR Model

VAR Model

```
1325 0 ECHO 'Method type: multivariate_time_series_model'.
1325 0 M> ECHO 'Method type: multivariate_time_series_model'.
Method type: multivariate_time_series_model
1326 0 ECHO 'Design: Three-variable VAR(2) for G1, G2, and G3 with intercept
and trend.'.
1326 0 M> ECHO 'Design: Three-variable VAR(2) for G1, G2, and G3 with interc
ept and trend.'.
Design: Three-variable VAR(2) for G1, G2, and G3 with intercept and trend.
1327 0 ECHO 'Formula:  $Y_t=c+D*t+A_1*Y_{(t-1)}+A_2*Y_{(t-2)}+e_t$ '.
1327 0 M> ECHO 'Formula:  $Y_t=c+D*t+A_1*Y_{(t-1)}+A_2*Y_{(t-2)}+e_t$ '.
Formula:  $Y_t=c+D*t+A_1*Y_{(t-1)}+A_2*Y_{(t-2)}+e_t$ 
1328 0 ECHO 'Series order: source-row order'.
1328 0 M> ECHO 'Series order: source-row order'.
Series order: source-row order
1329 0 ECHO 'lags = 2'.
1329 0 M> ECHO 'lags = 2'.
lags = 2
1330 0 ECHO 'n_series = 3'.
1330 0 M> ECHO 'n_series = 3'.
n_series = 3
1331 0 ECHO 'aic = 2.9824458039686785'.
1331 0 M> ECHO 'aic = 2.9824458039686785'.
aic = 2.9824458039686785
1332 0 ECHO 'bic = 3.1483442754803037'.
1332 0 M> ECHO 'bic = 3.1483442754803037'.
bic = 3.1483442754803037
1333 0 ECHO 'hqic = 3.0468072519977345'.
1333 0 M> ECHO 'hqic = 3.0468072519977345'.
hqic = 3.0468072519977345
1334 0 ECHO 'forecast_12_G1 = 10.21516486459818'.
1334 0 M> ECHO 'forecast_12_G1 = 10.21516486459818'.
forecast_12_G1 = 10.21516486459818
1335 0 ECHO 'forecast_12_G2 = 10.677644281271641'.
1335 0 M> ECHO 'forecast_12_G2 = 10.677644281271641'.
forecast_12_G2 = 10.677644281271641
1336 0 ECHO 'forecast_12_G3 = 10.856431359011971'.
1336 0 M> ECHO 'forecast_12_G3 = 10.856431359011971'.
forecast_12_G3 = 10.856431359011971
```

VAR Model

```
1337 0 ECHO 'Cross-check status: pass'.
1337 0 M> ECHO 'Cross-check status: pass'.
Cross-check status: pass
1338 0 OUTPUT SAVE OUTFILE='D:\DATA ANALYSIS\N Time Series Tests and Forecas
ting\VAR Model\SPSS_Output\spv\var-model_spss_output.s
pv'.
1338 0 M> OUTPUT SAVE OUTFILE='D:\DATA ANALYSIS\N Time Series Tests and Fore
casting\VAR Model\SPSS_Output\spv\var-model_spss_outpu
t.spv'.
1339 0 OUTPUT EXPORT /CONTENTS EXPORT=ALL LAYERS=PRINTSETTING MODELVIEWS=PRI
NTSETTING /PDF DOCUMENTFILE='D:\DATA ANALYSIS\N Time S
eries Tests and Forecasting\VAR Model\SPSS_Output\pdf\var-model_sp
ss_output.pdf'.
1339 0 M> OUTPUT EXPORT /CONTENTS EXPORT=ALL LAYERS=PRINTSETTING MODELVIEWS=
PRINTSETTING /PDF DOCUMENTFILE='D:\DATA ANALYSIS\N Tim
e Series Tests and Forecasting\VAR Model\SPSS_Output\pdf\var-mo
del_spss_output.pdf'.
```