```
578  0  OUTPUT ACTIVATE GrangerCausalityTestOutput.
578  0 M>  OUTPUT ACTIVATE GrangerCausalityTestOutput.
579  0  TITLE 'Granger Causality Test'.
579  0 M>  TITLE 'Granger Causality Test'.
```

```
 580  0  GET DATA /TYPE=TXT /FILE='D:\DATA ANALYSIS\N Time Series Tests and Fo
recasting\Granger Causality Test\dataset.csv' /ENCODIN
            G='UTF8' /DELCASE=LINE /DELIMITERS=',' /QUALIFIER='"' /ARRANGEMENT
=DELIMITED /FIRSTCASE=2
 580  0 M>  GET DATA /TYPE=TXT /FILE='D:\DATA ANALYSIS\N Time Series Tests and
 Forecasting\Granger Causality Test\dataset.csv' /ENCO
              DING='UTF8' /DELCASE=LINE /DELIMITERS=',' /QUALIFIER='"' /ARRAN
GEMENT=DELIMITED /FIRSTCASE=2
 581  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.
 581  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.
 582  0  DATASET NAME GrangerCausalityTestData.
 582  0 M>  DATASET NAME GrangerCausalityTestData.
 583  0  COMPUTE time_index=$CASENUM.
 583  0 M>  COMPUTE time_index=$CASENUM.
 584  0  EXECUTE.
 584  0 M>  EXECUTE.
 585  0  * BEGIN METHOD-SPECIFIC SPSS WORKFLOW.
 585  0 M>  * BEGIN METHOD-SPECIFIC SPSS WORKFLOW.
 586  0  COMPUTE g3_l1=LAG(G3,1).
 586  0 M>  COMPUTE g3_l1=LAG(G3,1).
 587  0  COMPUTE g3_l2=LAG(G3,2).
 587  0 M>  COMPUTE g3_l2=LAG(G3,2).
 588  0  EXECUTE.
 588  0 M>  EXECUTE.
 589  0  COMPUTE g2_l1=LAG(G2,1).
 589  0 M>  COMPUTE g2_l1=LAG(G2,1).
 590  0  COMPUTE g2_l2=LAG(G2,2).
```

```
 590  0 M>  COMPUTE g2_l2=LAG(G2,2).
 591  0  EXECUTE.
 591  0 M>  EXECUTE.
 592  0  REGRESSION /STATISTICS=COEFF OUTS R ANOVA CI(95) /DEPENDENT G3 /METHO
D=ENTER g3_l1 g3_l2 g2_l1 g2_l2.
 592  0 M>  REGRESSION /STATISTICS=COEFF OUTS R ANOVA CI(95) /DEPENDENT G3 /ME
THOD=ENTER g3_l1 g3_l2 g2_l1 g2_l2.
```

Regression

Notes

Output Created		18-JUL-2026 15:52:33
Comments		
Input	Data	D:\DATA ANALYSIS\N Time Series Tests and Forecasting\Granger Causality Test\dataset.csv
	Active Dataset	GrangerCausalityTestData
	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 g3_l1 g3_l2 g2_l1 g2_l2.
Resources	Processor Time	00:00:00.05
	Elapsed Time	00:00:00.12

Notes

Memory Required	5552 bytes
Additional Memory Required for Residual Plots	0 bytes

[GrangerCausalityTestData]

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	g2_l2, g2_l1, g3_l2, g3_l1[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	.283[a]	.080	.074	3.113

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

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	540.500	4	135.125	13.944	.000[b]
	Residual	6221.119	642	9.690		
	Total	6761.620	646			

a. Dependent Variable: G3

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

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	7.555	.650		11.625	.000
	g3_l1	.128	.096	.128	1.325	.186
	g3_l2	.219	.096	.219	2.282	.023
	g2_l1	.026	.106	.024	.246	.805
	g2_l2	-.007	.106	-.006	-.068	.946

Coefficients[a]

Model		95.0% Confidence Interval for B	
		Lower Bound	Upper Bound
1	(Constant)	6.279	8.832
	g3_l1	-.061	.317
	g3_l2	.031	.408
	g2_l1	-.183	.235
	g2_l2	-.216	.202

a. Dependent Variable: G3

```
 593  0  ECHO 'The joint G2 lag block tests the direction G2 to G3'.
 593  0 M>  ECHO 'The joint G2 lag block tests the direction G2 to G3'.
The joint G2 lag block tests the direction G2 to G3
 594  0  * END METHOD-SPECIFIC SPSS WORKFLOW.
 594  0 M>  * END METHOD-SPECIFIC SPSS WORKFLOW.
 595  0  SAVE OUTFILE='D:\DATA ANALYSIS\N Time Series Tests and Forecasting\Gr
anger Causality Test\SPSS_Output\sav\granger-causality
           -test_spss_ready_data.sav' /COMPRESSED.
 595  0 M>  SAVE OUTFILE='D:\DATA ANALYSIS\N Time Series Tests and Forecasting
\Granger Causality Test\SPSS_Output\sav\granger-causal
              ity-test_spss_ready_data.sav' /COMPRESSED.
 596  0  ECHO 'Granger Causality Test'.
 596  0 M>  ECHO 'Granger Causality Test'.
Granger Causality Test
 597  0  ECHO 'Method type: hypothesis_test'.
 597  0 M>  ECHO 'Method type: hypothesis_test'.
```

```
Method type: hypothesis_test
 598  0  ECHO 'Design: Two-lag Granger test of whether G2 improves forecasts o
f G3 beyond G3 lags.'.
 598  0 M>  ECHO 'Design: Two-lag Granger test of whether G2 improves forecast
s of G3 beyond G3 lags.'.
Design: Two-lag Granger test of whether G2 improves forecasts of G3 beyond G3
lags.
 599  0  ECHO 'Formula: F=((SSE_restricted-SSE_unrestricted)/q)/(SSE_unrestric
ted/(n-k)), q=2'.
 599  0 M>  ECHO 'Formula: F=((SSE_restricted-SSE_unrestricted)/q)/(SSE_unrest
ricted/(n-k)), q=2'.
Formula: F=((SSE_restricted-SSE_unrestricted)/q)/(SSE_unrestricted/(n-k)), q=2
 600  0  ECHO 'Series order: source-row order'.
 600  0 M>  ECHO 'Series order: source-row order'.
Series order: source-row order
 601  0  ECHO 'ssr_f_statistic = 0.03193085259742438'.
 601  0 M>  ECHO 'ssr_f_statistic = 0.03193085259742438'.
ssr_f_statistic = 0.03193085259742438
 602  0  ECHO 'f_p_value = 0.9685750922289401'.
 602  0 M>  ECHO 'f_p_value = 0.9685750922289401'.
f_p_value = 0.9685750922289401
 603  0  ECHO 'df_numerator = 2'.
 603  0 M>  ECHO 'df_numerator = 2'.
df_numerator = 2
 604  0  ECHO 'df_denominator = 642.0'.
 604  0 M>  ECHO 'df_denominator = 642.0'.
df_denominator = 642.0
 605  0  ECHO 'likelihood_ratio = 0.06435586971520024'.
 605  0 M>  ECHO 'likelihood_ratio = 0.06435586971520024'.
likelihood_ratio = 0.06435586971520024
 606  0  ECHO 'lr_p_value = 0.9683342663293744'.
 606  0 M>  ECHO 'lr_p_value = 0.9683342663293744'.
lr_p_value = 0.9683342663293744
 607  0  ECHO 'lags = 2'.
 607  0 M>  ECHO 'lags = 2'.
lags = 2
 608  0  ECHO 'Cross-check status: pass'.
 608  0 M>  ECHO 'Cross-check status: pass'.
Cross-check status: pass
```

```
 609  0  OUTPUT SAVE OUTFILE='D:\DATA ANALYSIS\N Time Series Tests and Forecas
ting\Granger Causality Test\SPSS_Output\spv\granger-ca
            usality-test_spss_output.spv'.
 609  0 M>  OUTPUT SAVE OUTFILE='D:\DATA ANALYSIS\N Time Series Tests and Fore
casting\Granger Causality Test\SPSS_Output\spv\granger
               -causality-test_spss_output.spv'.
 610  0  OUTPUT EXPORT /CONTENTS EXPORT=ALL LAYERS=PRINTSETTING MODELVIEWS=PRI
NTSETTING /PDF DOCUMENTFILE='D:\DATA ANALYSIS\N Time S
            eries Tests and Forecasting\Granger Causality Test\SPSS_Output\pdf
\granger-causality-test_spss_output.pdf'.
 610  0 M>  OUTPUT EXPORT /CONTENTS EXPORT=ALL LAYERS=PRINTSETTING MODELVIEWS=
PRINTSETTING /PDF DOCUMENTFILE='D:\DATA ANALYSIS\N Tim
               e Series Tests and Forecasting\Granger Causality Test\SPSS_Outp
ut\pdf\granger-causality-test_spss_output.pdf'.
```