

```
1269 0 OUTPUT ACTIVATE TrendAnalysisOutput.  
1269 0 M> OUTPUT ACTIVATE TrendAnalysisOutput.  
1270 0 TITLE 'Trend Analysis'.  
1270 0 M> TITLE 'Trend Analysis'.
```

Trend Analysis

```
1271 0 GET DATA /TYPE=TXT /FILE='D:\DATA ANALYSIS\N Time Series Tests and Fo
recasting\Trend Analysis\dataset.csv' /ENCODING='UTF8'
      /DELCASE=LINE /DELIMITERS=', ' /QUALIFIER='"' /ARRANGEMENT=DELIMIT
ED /FIRSTCASE=2
1271 0 M> GET DATA /TYPE=TXT /FILE='D:\DATA ANALYSIS\N Time Series Tests and
Forecasting\Trend Analysis\dataset.csv' /ENCODING='UT
      F8' /DELCASE=LINE /DELIMITERS=', ' /QUALIFIER='"' /ARRANGEMENT=D
ELIMITED /FIRSTCASE=2
1272 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.
1272 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.
1273 0 DATASET NAME TrendAnalysisData.
1273 0 M> DATASET NAME TrendAnalysisData.
1274 0 COMPUTE time_index=$CASENUM.
1274 0 M> COMPUTE time_index=$CASENUM.
1275 0 EXECUTE.
1275 0 M> EXECUTE.
1276 0 * BEGIN METHOD-SPECIFIC SPSS WORKFLOW.
1276 0 M> * BEGIN METHOD-SPECIFIC SPSS WORKFLOW.
1277 0 REGRESSION /STATISTICS=COEFF OUTS R ANOVA CI(95) /DEPENDENT G3 /METHO
D=ENTER time_index /SAVE PRED(linear_trend) RESID(tren
      d_resid).
1277 0 M> REGRESSION /STATISTICS=COEFF OUTS R ANOVA CI(95) /DEPENDENT G3 /ME
THOD=ENTER time_index /SAVE PRED(linear_trend) RESID(t
      rend_resid).
```

Regression

Trend Analysis

Notes

Output Created		18-JUL-2026 15:54:32
Comments		
Input	Data	D:\DATA ANALYSIS\N Time Series Tests and Forecasting\Trend Analysis\dataset.csv
	Active Dataset	TrendAnalysisData
	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 /SAVE PRED (linear_trend) RESID (trend_resid).
Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.11
	Memory Required	3840 bytes
	Additional Memory Required for Residual Plots	0 bytes
Variables Created or Modified	linear_trend	Unstandardized Predicted Value
	trend_resid	Unstandardized Residual

[TrendAnalysisData]

Trend Analysis

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	time_index ^b	.	Enter

a. Dependent Variable: G3

b. All requested variables entered.

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.177 ^a	.031	.030	3.182

a. Predictors: (Constant), time_index

b. Dependent Variable: G3

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	211.509	1	211.509	20.887	.000 ^b
	Residual	6551.757	647	10.126		
	Total	6763.267	648			

a. Dependent Variable: G3

b. Predictors: (Constant), time_index

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	12.896	.250		51.562	.000
	time_index	-.003	.001	-.177	-4.570	.000

Trend Analysis

Coefficients^a

Model		95.0% Confidence Interval for B	
		Lower Bound	Upper Bound
1	(Constant)	12.405	13.387
	time_index	-.004	-.002

a. Dependent Variable: G3

Residuals Statistics^a

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	10.92	12.89	11.91	.571	649
Residual	-12.397	8.045	.000	3.180	649
Std. Predicted Value	-1.728	1.728	.000	1.000	649
Std. Residual	-3.896	2.528	.000	.999	649

a. Dependent Variable: G3

```

1278  0  COMPUTE abs_resid=ABS(trend_resid).
1278  0  M>  COMPUTE abs_resid=ABS(trend_resid).
1279  0  DESCRIPTIVES VARIABLES=linear_trend trend_resid abs_resid /STATISTICS
=MEAN STDDEV MIN MAX.
1279  0  M>  DESCRIPTIVES VARIABLES=linear_trend trend_resid abs_resid /STATIST
ICS=MEAN STDDEV MIN MAX.

```

Descriptives

Trend Analysis

Notes

Output Created		18-JUL-2026 15:54:32
Comments		
Input	Data	D:\DATA ANALYSIS\N Time Series Tests and Forecasting\Trend Analysis\dataset.csv
	Active Dataset	TrendAnalysisData
	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	All non-missing data are used.
Syntax		DESCRIPTIVES VARIABLES=linear_trend trend_resid abs_resid /STATISTICS=MEAN STDDEV MIN MAX.
Resources	Processor Time	00:00:00.05
	Elapsed Time	00:00:00.10

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Unstandardized Predicted Value	649	10.91874	12.89327	11.9060092	.57131734
Unstandardized Residual	649	-12.39659	8.04469	.0000000	3.17973839
abs_resid	649	.01	12.40	2.3748	2.11245
Valid N (listwise)	649				

```

1280  0  * END METHOD-SPECIFIC SPSS WORKFLOW.
1280  0 M> * END METHOD-SPECIFIC SPSS WORKFLOW.
1281  0  SAVE OUTFILE='D:\DATA ANALYSIS\N Time Series Tests and Forecasting\Trend Analysis\SPSS_Output\sav\trend-analysis_spss_ready_data.sav' /COMPRESSED.

```

Trend Analysis

```
1281  0 M>  SAVE OUTFILE='D:\DATA ANALYSIS\N Time Series Tests and Forecasting
\Trend Analysis\SPSS_Output\sav\trend-analysis_spss_re
          ady_data.sav' /COMPRESSED.
1282  0  ECHO 'Trend Analysis'.
1282  0 M>  ECHO 'Trend Analysis'.
Trend Analysis
1283  0  ECHO 'Method type: trend_analysis'.
1283  0 M>  ECHO 'Method type: trend_analysis'.
Method type: trend_analysis
1284  0  ECHO 'Design: Linear time trend for G3 with HC3 robust standard error
s.'.
1284  0 M>  ECHO 'Design: Linear time trend for G3 with HC3 robust standard er
rors.'.
Design: Linear time trend for G3 with HC3 robust standard errors.
1285  0  ECHO 'Formula: y_t=beta_0+beta_1*t+e_t'.
1285  0 M>  ECHO 'Formula: y_t=beta_0+beta_1*t+e_t'.
Formula: y_t=beta_0+beta_1*t+e_t
1286  0  ECHO 'Series order: source-row order'.
1286  0 M>  ECHO 'Series order: source-row order'.
Series order: source-row order
1287  0  ECHO 'intercept = 12.896321976830471'.
1287  0 M>  ECHO 'intercept = 12.896321976830471'.
intercept = 12.896321976830471
1288  0  ECHO 'trend_slope = -0.0030471160979635326'.
1288  0 M>  ECHO 'trend_slope = -0.0030471160979635326'.
trend_slope = -0.0030471160979635326
1289  0  ECHO 'robust_se_slope = 0.0007290710490518141'.
1289  0 M>  ECHO 'robust_se_slope = 0.0007290710490518141'.
robust_se_slope = 0.0007290710490518141
1290  0  ECHO 'trend_t = -4.179450139909448'.
1290  0 M>  ECHO 'trend_t = -4.179450139909448'.
trend_t = -4.179450139909448
1291  0  ECHO 'trend_p_value = 2.9221477608882612e-05'.
1291  0 M>  ECHO 'trend_p_value = 2.9221477608882612e-05'.
trend_p_value = 2.9221477608882612e-05
1292  0  ECHO 'r_squared = 0.031273271237824196'.
1292  0 M>  ECHO 'r_squared = 0.031273271237824196'.
r_squared = 0.031273271237824196
1293  0  ECHO 'forecast_next = 10.915696513154176'.
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Trend Analysis

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1293  0 M> ECHO 'forecast_next = 10.915696513154176'.
forecast_next = 10.915696513154176
1294  0 ECHO 'Cross-check status: pass'.
1294  0 M> ECHO 'Cross-check status: pass'.
Cross-check status: pass
1295  0 OUTPUT SAVE OUTFILE='D:\DATA ANALYSIS\N Time Series Tests and Forecas
ting\Trend Analysis\SPSS_Output\spv\trend-analysis_sps
s_output.spv'.
1295  0 M> OUTPUT SAVE OUTFILE='D:\DATA ANALYSIS\N Time Series Tests and Fore
casting\Trend Analysis\SPSS_Output\spv\trend-analysis_
spss_output.spv'.
1296  0 OUTPUT EXPORT /CONTENTS EXPORT=ALL LAYERS=PRINTSETTING MODELVIEWS=PRI
NTSETTING /PDF DOCUMENTFILE='D:\DATA ANALYSIS\N Time S
eries Tests and Forecasting\Trend Analysis\SPSS_Output\pdf\trend-a
nalysis_spss_output.pdf'.
1296  0 M> OUTPUT EXPORT /CONTENTS EXPORT=ALL LAYERS=PRINTSETTING MODELVIEWS=
PRINTSETTING /PDF DOCUMENTFILE='D:\DATA ANALYSIS\N Tim
e Series Tests and Forecasting\Trend Analysis\SPSS_Output\pdf\t
rend-analysis_spss_output.pdf'.
```