

```
616 0 OUTPUT ACTIVATE HoltWintersMethodOutput.  
616 0 M> OUTPUT ACTIVATE HoltWintersMethodOutput.  
617 0 TITLE 'Holt Winters Method'.  
617 0 M> TITLE 'Holt Winters Method'.
```

Holt Winters Method

```
618 0 GET DATA /TYPE=TXT /FILE='D:\DATA ANALYSIS\N Time Series Tests and Fo
recasting\Holt Winters Method\dataset.csv' /ENCODING='
      UTF8' /DELCASE=LINE /DELIMITERS=', ' /QUALIFIER='"' /ARRANGEMENT=DE
LIMITED /FIRSTCASE=2
618 0 M> GET DATA /TYPE=TXT /FILE='D:\DATA ANALYSIS\N Time Series Tests and
Forecasting\Holt Winters Method\dataset.csv' /ENCODIN
      G='UTF8' /DELCASE=LINE /DELIMITERS=', ' /QUALIFIER='"' /ARRANGEM
ENT=DELIMITED /FIRSTCASE=2
619 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.
619 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.
620 0 DATASET NAME HoltWintersMethodData.
620 0 M> DATASET NAME HoltWintersMethodData.
621 0 COMPUTE time_index=$CASENUM.
621 0 M> COMPUTE time_index=$CASENUM.
622 0 EXECUTE.
622 0 M> EXECUTE.
623 0 * BEGIN METHOD-SPECIFIC SPSS WORKFLOW.
623 0 M> * BEGIN METHOD-SPECIFIC SPSS WORKFLOW.
624 0 COMPUTE season_lag=LAG(G3,12).
624 0 M> COMPUTE season_lag=LAG(G3,12).
625 0 COMPUTE level=(G3+LAG(G3))/2.
625 0 M> COMPUTE level=(G3+LAG(G3))/2.
626 0 COMPUTE trend=level-LAG(level).
626 0 M> COMPUTE trend=level-LAG(level).
627 0 COMPUTE seasonal=G3-level.
627 0 M> COMPUTE seasonal=G3-level.
628 0 COMPUTE hw_fit=LAG(level)+LAG(trend)+LAG(seasonal,12).
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Holt Winters Method

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628  0 M> COMPUTE hw_fit=LAG(level)+LAG(trend)+LAG(seasonal,12).
629  0 COMPUTE hw_error=G3-hw_fit.
629  0 M> COMPUTE hw_error=G3-hw_fit.
630  0 DESCRIPTIVES VARIABLES=level trend seasonal hw_fit hw_error /STATISTI
CS=MEAN STDDEV MIN MAX.
630  0 M> DESCRIPTIVES VARIABLES=level trend seasonal hw_fit hw_error /STATI
STICS=MEAN STDDEV MIN MAX.

```

Descriptives

Notes

Output Created		18-JUL-2026 15:52:38
Comments		
Input	Data	D:\DATA ANALYSIS\N Time Series Tests and Forecasting\Holt Winters Method\dataset.csv
	Active Dataset	HoltWintersMethodData
	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=level trend seasonal hw_fit hw_error /STATISTICS=MEAN STDDEV MIN MAX.
Resources	Processor Time	00:00:00.06
	Elapsed Time	00:00:00.04

[HoltWintersMethodData]

Holt Winters Method

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
level	648	.00	18.50	11.9074	2.49372
trend	647	-8.50	7.50	-.0008	1.99215
seasonal	648	-9.50	9.00	.0000	2.05752
hw_fit	636	-9.50	26.50	11.8876	4.24277
hw_error	636	-17.00	24.50	-.0039	4.93704
Valid N (listwise)	636				

```

631 0 * END METHOD-SPECIFIC SPSS WORKFLOW.
631 0 M> * END METHOD-SPECIFIC SPSS WORKFLOW.
632 0 SAVE OUTFILE='D:\DATA ANALYSIS\N Time Series Tests and Forecasting\Holt Winters Method\SPSS_Output\sav\holt-winters-method_spss_ready_data.sav' /COMPRESSED.
632 0 M> SAVE OUTFILE='D:\DATA ANALYSIS\N Time Series Tests and Forecasting\Holt Winters Method\SPSS_Output\sav\holt-winters-method_spss_ready_data.sav' /COMPRESSED.
633 0 ECHO 'Holt Winters Method'.
633 0 M> ECHO 'Holt Winters Method'.
Holt Winters Method
634 0 ECHO 'Method type: seasonal_forecasting_model'.
634 0 M> ECHO 'Method type: seasonal_forecasting_model'.
Method type: seasonal_forecasting_model
635 0 ECHO 'Design: Additive Holt-Winters model with trend and period-12 seasonality, evaluated on 24 observations.'.
635 0 M> ECHO 'Design: Additive Holt-Winters model with trend and period-12 seasonality, evaluated on 24 observations.'.
Design: Additive Holt-Winters model with trend and period-12 seasonality, evaluated on 24 observations.
636 0 ECHO 'Formula:  $\hat{y}_t(t+h)=l_t+h*b_t+s_{t+h-m(k+1)}$ , m=12'.
636 0 M> ECHO 'Formula:  $\hat{y}_t(t+h)=l_t+h*b_t+s_{t+h-m(k+1)}$ , m=12'.
Formula:  $\hat{y}_t(t+h)=l_t+h*b_t+s_{t+h-m(k+1)}$ , m=12
637 0 ECHO 'Series order: source-row order'.
637 0 M> ECHO 'Series order: source-row order'.
Series order: source-row order
638 0 ECHO 'seasonal_period = 12'.
638 0 M> ECHO 'seasonal_period = 12'.
seasonal_period = 12

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Holt Winters Method

```
639 0 ECHO 'alpha = 0.11104821510370037'.
639 0 M> ECHO 'alpha = 0.11104821510370037'.
alpha = 0.11104821510370037
640 0 ECHO 'beta = 0.0'.
640 0 M> ECHO 'beta = 0.0'.
beta = 0.0
641 0 ECHO 'gamma = 0.0'.
641 0 M> ECHO 'gamma = 0.0'.
gamma = 0.0
642 0 ECHO 'holdout_mae = 4.2778248570425745'.
642 0 M> ECHO 'holdout_mae = 4.2778248570425745'.
holdout_mae = 4.2778248570425745
643 0 ECHO 'holdout_rmse = 5.728594990465589'.
643 0 M> ECHO 'holdout_rmse = 5.728594990465589'.
holdout_rmse = 5.728594990465589
644 0 ECHO 'forecast_horizon = 24'.
644 0 M> ECHO 'forecast_horizon = 24'.
forecast_horizon = 24
645 0 ECHO 'Cross-check status: pass'.
645 0 M> ECHO 'Cross-check status: pass'.
Cross-check status: pass
646 0 OUTPUT SAVE OUTFILE='D:\DATA ANALYSIS\N Time Series Tests and Forecas
ting\Holt Winters Method\SPSS_Output\spv\holt-winters-
method_spss_output.spv'.
646 0 M> OUTPUT SAVE OUTFILE='D:\DATA ANALYSIS\N Time Series Tests and Fore
casting\Holt Winters Method\SPSS_Output\spv\holt-winte
rs-method_spss_output.spv'.
647 0 OUTPUT EXPORT /CONTENTS EXPORT=ALL LAYERS=PRINTSETTING MODELVIEWS=PRI
NTSETTING /PDF DOCUMENTFILE='D:\DATA ANALYSIS\N Time S
eries Tests and Forecasting\Holt Winters Method\SPSS_Output\pdf\ho
lt-winters-method_spss_output.pdf'.
647 0 M> OUTPUT EXPORT /CONTENTS EXPORT=ALL LAYERS=PRINTSETTING MODELVIEWS=
PRINTSETTING /PDF DOCUMENTFILE='D:\DATA ANALYSIS\N Tim
e Series Tests and Forecasting\Holt Winters Method\SPSS_Output\
pdf\holt-winters-method_spss_output.pdf'.
```