The SAS System

The UCM Procedure

Input Data Set	
Name	WORK.TEMP
Time ID Variable	mytime

Estimation Span Summary

Variable	Type	First Obs	Last Obs	NObs	NMiss	Min	Max	Mean	Standard Deviation
djclose	Dependent	02JAN1960	18OCT1960	291	0	3537.00000	3978.00000	3754.86254	105.46697

Forecast Span Summary

Variable	Type	First Obs	Last Obs	NObs	NMiss	Min	Max	Mean	Standard Deviation
djclose	Dependent	02JAN1960	18OCT1960	291	0	3537.00000	3978.00000	3754.86254	105.46697

Preliminary Estimates of the Free Parameters

Component	Parameter	Estimate
Irregular	Error Variance	2842934
Level	Error Variance	1066100
Slope	Error Variance	1066100
Cycle	Damping Factor	0.90000
Cycle	Period	85.33333
Cycle	Error Variance	1776834

Likelihood Based Fit Statistics

Statistic	Value
Full Log Likelihood	-1314
Diffuse Part of Log Likelihood	0
Non-Missing Observations Used	291
Estimated Parameters	6
Initialized Diffuse State Elements	2
Normalized Residual Sum of Squares	289
AIC (smaller is better)	2639.3
BIC (smaller is better)	2661.3
AICC (smaller is better)	2639.6
HQIC (smaller is better)	2648.1
CAIC (smaller is better)	2667.3

Likelihood Optimization Algorithm Converged in 14 Iterations.

Final Estimates of the Free Parameters					
Component	Parameter	Estimate	Approx Std Error	t Value	Approx Pr > |t|
Irregular	Error Variance	0.00003732	0.00005176	0.72	0.4709
Level	Error Variance	509.44489	42.38721	12.02	<.0001
Slope	Error Variance	0.00043634	.	.	.
Cycle	Damping Factor	0.92560	.	.	.
Cycle	Period	6783.29959	.	.	.
Cycle	Error Variance	3.959859E-7	.	.	.

Fit Statistics Based on Residuals	
Mean Squared Error	516.93549
Root Mean Squared Error	22.73622
Mean Absolute Percentage Error	0.45594
Maximum Percent Error	1.83180
R-Square	0.95327
Adjusted R-Square	0.95244
Random Walk R-Square	-0.01738
Amemiya's Adjusted R-Square	0.95129
Number of non-missing residuals used for computing the fit statistics = 289	

Significance Analysis of Components (Based on the Final State)			
Component	DF	Chi-Square	Pr > ChiSq
Irregular	1	0.00	0.9996
Level	1	3.71E11	<.0001
Slope	1	0.29	0.5893
Cycle	2	0.00	1.0000

Trend Information (Based on the Final State)		
Name	Estimate	Standard Error
Level	3855.000003	0.0063312
Slope	0.72413235	1.3412321

Summary of Cycles								
Name	Type	Period	Frequency	Damping Factor	Final Amplitude	Percent Relative to Level	Cycle Variance	Error Variance
Cycle	Stationary	6783.29959	0.00092627	0.92560	1.10362E-8	2.86283E-10	0.00000276	3.959859E-7

Outlier Summary							
Obs	mytime	Break Type	Estimate	Standard Error	Chi-Square	DF	Pr > ChiSq

109	**19APR1960**	**Additive Outlier**	-66.00009	15.960032	17.10	1	<.0001
205	**24JUL1960**	**Additive Outlier**	-55.49996	15.960032	12.09	1	0.0005
108	**18APR1960**	**Additive Outlier**	44.49991	15.960032	7.77	1	0.0053

The SAS System

The UCM Procedure

Input Data Set	
Name	WORK.TEMP
Time ID Variable	mytime

Estimation Span Summary

Variable	Type	First Obs	Last Obs	NObs	NMiss	Min	Max	Mean	Standard Deviation
beer	Dependent	02JAN1960	22FEB1960	52	0	18705	36207	26859	4580.60007

Forecast Span Summary

Variable	Type	First Obs	Last Obs	NObs	NMiss	Min	Max	Mean	Standard Deviation
beer	Dependent	02JAN1960	22FEB1960	52	0	18705	36207	26859	4580.60007

Preliminary Estimates of the Free Parameters

Component	Parameter	Estimate
Irregular	Error Variance	178151053
Level	Error Variance	66806645
Slope	Error Variance	66806645
Cycle	Damping Factor	0.90000
Cycle	Period	17.33333
Cycle	Error Variance	111344408

Likelihood Based Fit Statistics

Statistic	Value
Full Log Likelihood	-446.4
Diffuse Part of Log Likelihood	0
Non-Missing Observations Used	52
Estimated Parameters	6
Initialized Diffuse State Elements	2
Normalized Residual Sum of Squares	50
AIC (smaller is better)	904.73
BIC (smaller is better)	916.2
AICC (smaller is better)	906.68
HQIC (smaller is better)	909.1
CAIC (smaller is better)	922.2

Likelihood Optimization Algorithm Converged in 29 Iterations.

Final Estimates of the Free Parameters					
Component	Parameter	Estimate	Approx Std Error	t Value	Approx Pr > |t|
Irregular	Error Variance	2075317	423627.2	4.90	<.0001
Level	Error Variance	0.00011450	3.39433	0.00	1.0000
Slope	Error Variance	3.618119E-7	0.01063	0.00	1.0000
Cycle	Damping Factor	1.00000	0.00001158	86360.1	<.0001
Cycle	Period	12.96175	0.10190	127.20	<.0001
Cycle	Error Variance	9.15280	9.20348	0.99	0.3200

Fit Statistics Based on Residuals	
Mean Squared Error	3307177
Root Mean Squared Error	1818.56452
Mean Absolute Percentage Error	5.27975
Maximum Percent Error	12.72710
R-Square	0.82690
Adjusted R-Square	0.80723
Random Walk R-Square	0.52881
Amemiya's Adjusted R-Square	0.77970
Number of non-missing residuals used for computing the fit statistics = 50	

Significance Analysis of Components (Based on the Final State)			
Component	DF	Chi-Square	Pr > ChiSq
Irregular	1	4.54	0.0331
Level	1	5841.31	<.0001
Slope	1	112.34	<.0001
Cycle	2	338.50	<.0001

Trend Information (Based on the Final State)		
Name	Estimate	Standard Error
Level	30542.54875	399.62263
Slope	143.8552867	13.572599

Summary of Cycles								
Name	Type	Period	Frequency	Damping Factor	Final Amplitude	Percent Relative to Level	Cycle Variance	Error Variance
Cycle	Stationary	12.96175	0.48475	1.00000	5181.68013	16.96545	13497861	9.15280

Outlier Summary							
Obs	mytime	Break Type	Estimate	Standard Error	Chi-Square	DF	Pr > ChiSq

23	**24JAN1960**	**Additive Outlier**	-3902.36958	1488.0508	6.88	1	0.0087

The SAS System

The UCM Procedure

Input Data Set	
Name	WORK.TEMP
Time ID Variable	mytime

Estimation Span Summary

Variable	Type	First Obs	Last Obs	NObs	NMiss	Min	Max	Mean	Standard Deviation
beer	Dependent	02JAN1960	22FEB1960	52	0	18705	36207	26859	4580.60007

Forecast Span Summary

Variable	Type	First Obs	Last Obs	NObs	NMiss	Min	Max	Mean	Standard Deviation
beer	Dependent	02JAN1960	22FEB1960	52	0	18705	36207	26859	4580.60007

Preliminary Estimates of the Free Parameters

Component	Parameter	Estimate
Irregular	Error Variance	178151053
Level	Error Variance	66806645
Slope	Error Variance	66806645
Cycle	Damping Factor	0.90000
Cycle	Period	17.33333
Cycle	Error Variance	111344408

Likelihood Based Fit Statistics

Statistic	Value
Full Log Likelihood	-446.4
Diffuse Part of Log Likelihood	0
Non-Missing Observations Used	52
Estimated Parameters	6
Initialized Diffuse State Elements	2
Normalized Residual Sum of Squares	50
AIC (smaller is better)	904.73
BIC (smaller is better)	916.2
AICC (smaller is better)	906.68
HQIC (smaller is better)	909.1
CAIC (smaller is better)	922.2

Likelihood Optimization Algorithm Converged in 29 Iterations.

Final Estimates of the Free Parameters					
Component	Parameter	Estimate	Approx Std Error	t Value	Approx Pr > |t|
Irregular	Error Variance	2075317	423627.2	4.90	<.0001
Level	Error Variance	0.00011450	3.39433	0.00	1.0000
Slope	Error Variance	3.618119E-7	0.01063	0.00	1.0000
Cycle	Damping Factor	1.00000	0.00001158	86360.1	<.0001
Cycle	Period	12.96175	0.10190	127.20	<.0001
Cycle	Error Variance	9.15280	9.20348	0.99	0.3200

Fit Statistics Based on Residuals	
Mean Squared Error	3307177
Root Mean Squared Error	1818.56452
Mean Absolute Percentage Error	5.27975
Maximum Percent Error	12.72710
R-Square	0.82690
Adjusted R-Square	0.80723
Random Walk R-Square	0.52881
Amemiya's Adjusted R-Square	0.77970
Number of non-missing residuals used for computing the fit statistics = 50	

Significance Analysis of Components (Based on the Final State)			
Component	DF	Chi-Square	Pr > ChiSq
Irregular	1	4.54	0.0331
Level	1	5841.31	<.0001
Slope	1	112.34	<.0001
Cycle	2	338.50	<.0001

Trend Information (Based on the Final State)		
Name	Estimate	Standard Error
Level	30542.54875	399.62263
Slope	143.8552867	13.572599

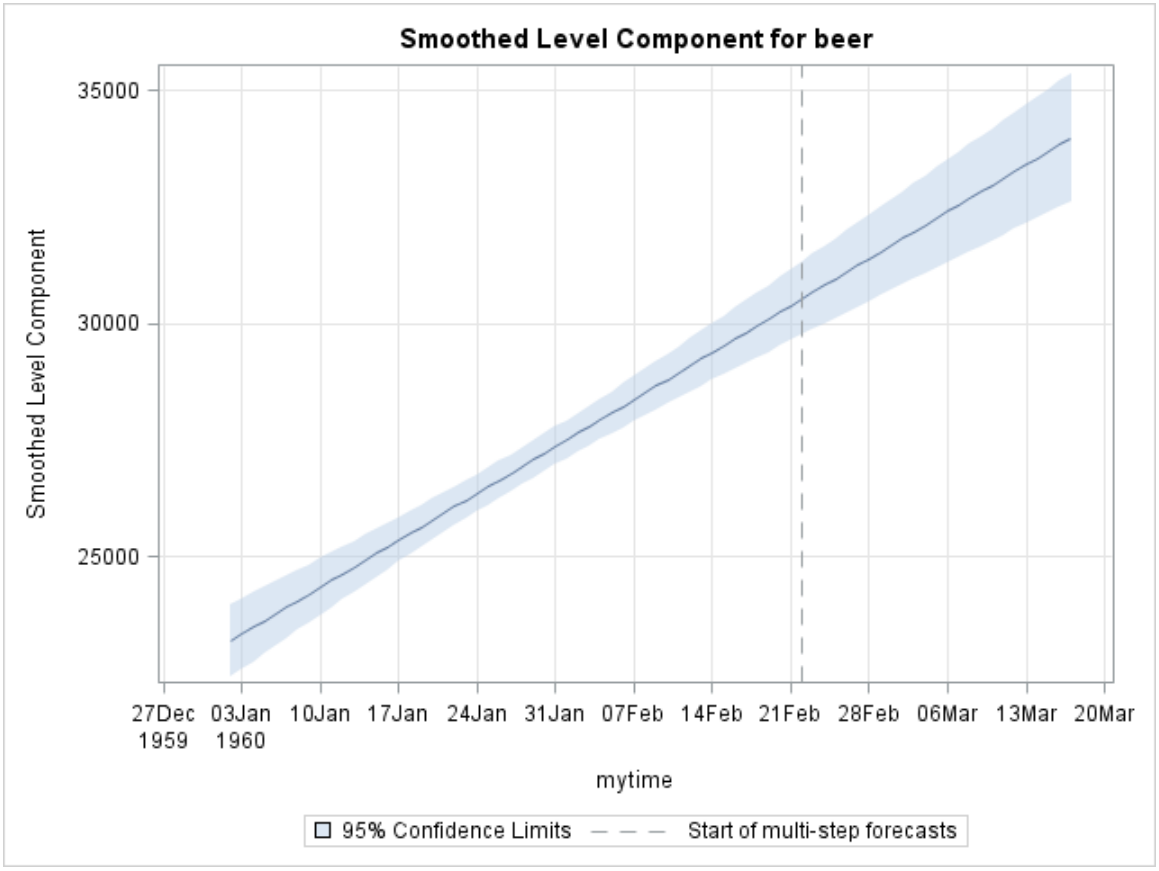
Summary of Cycles								
Name	Type	Period	Frequency	Damping Factor	Final Amplitude	Percent Relative to Level	Cycle Variance	Error Variance
Cycle	Stationary	12.96175	0.48475	1.00000	5181.68013	16.96545	13497861	9.15280

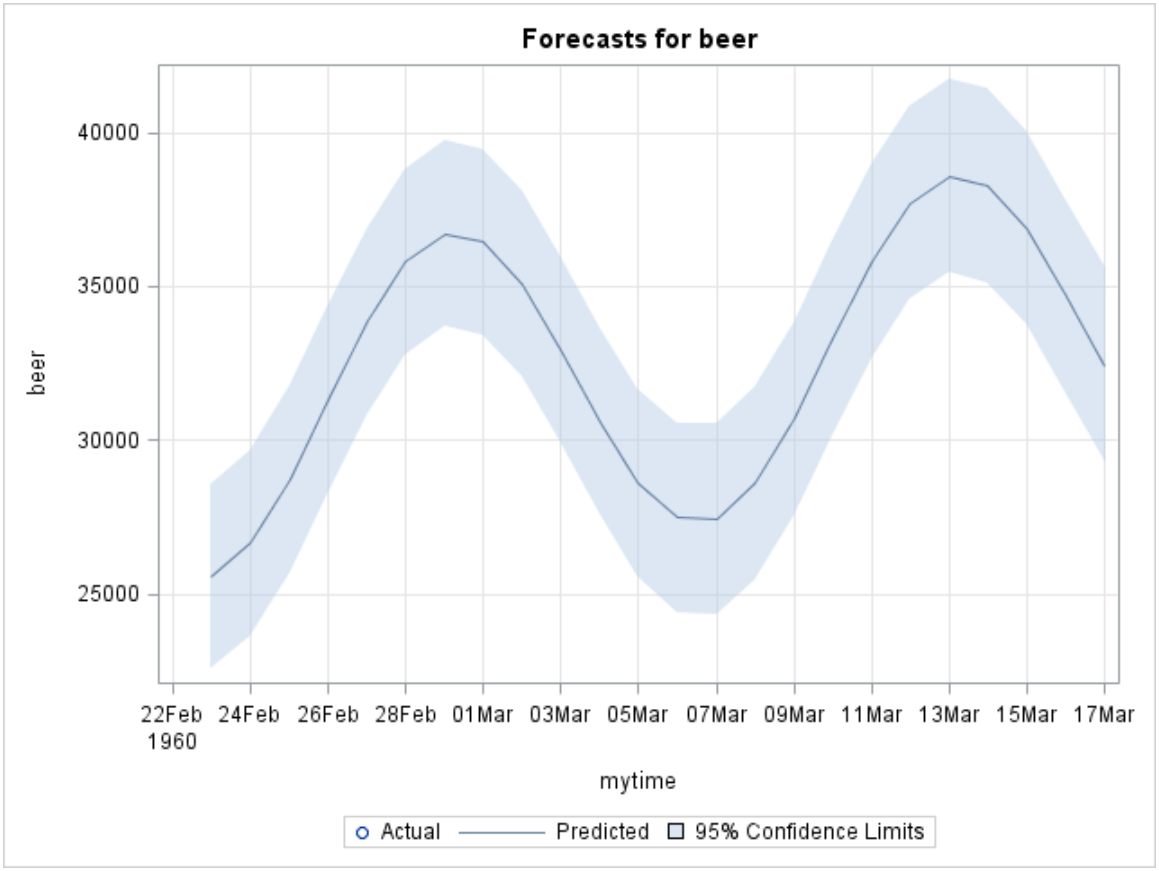
Outlier Summary							
Obs	mytime	Break Type	Estimate	Standard Error	Chi-Square	DF	Pr > ChiSq

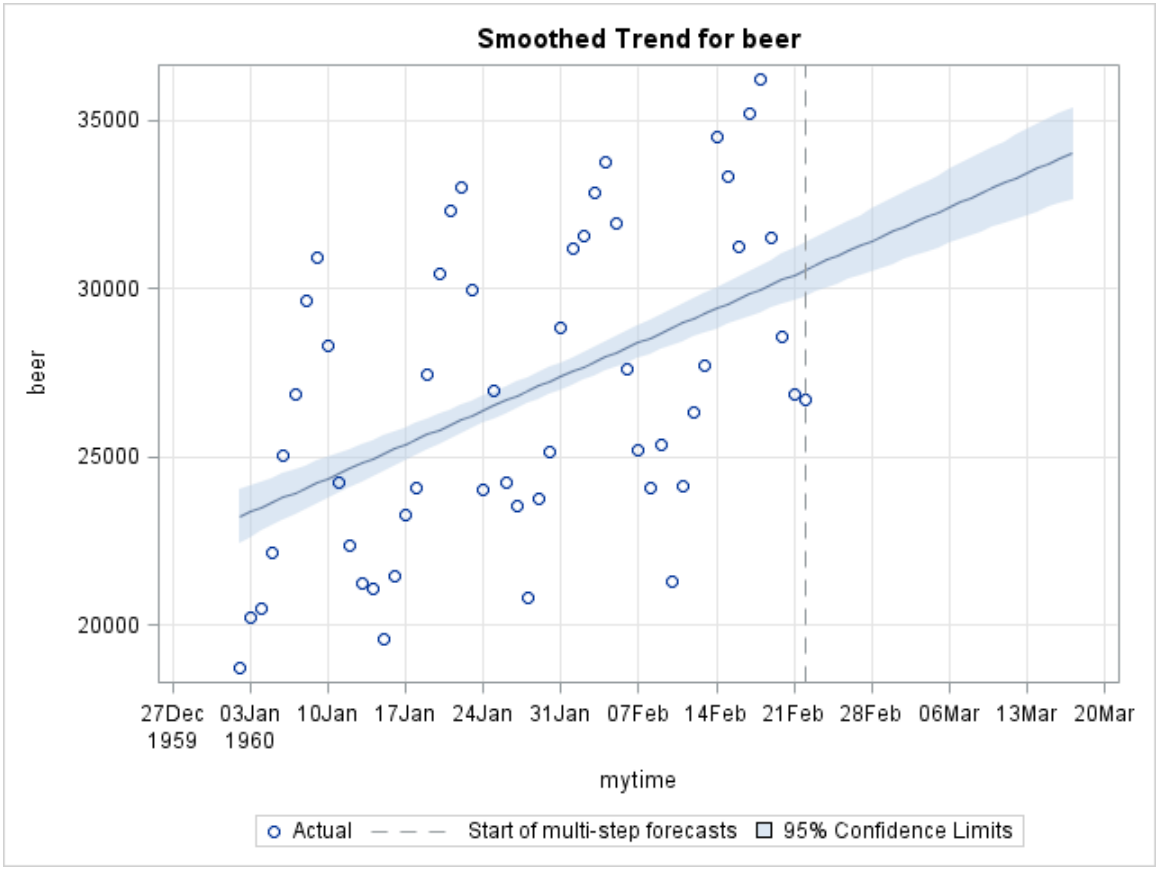
23	24JAN1960	Additive Outlier	-3902.36958	1488.0508	6.88	1	0.0087

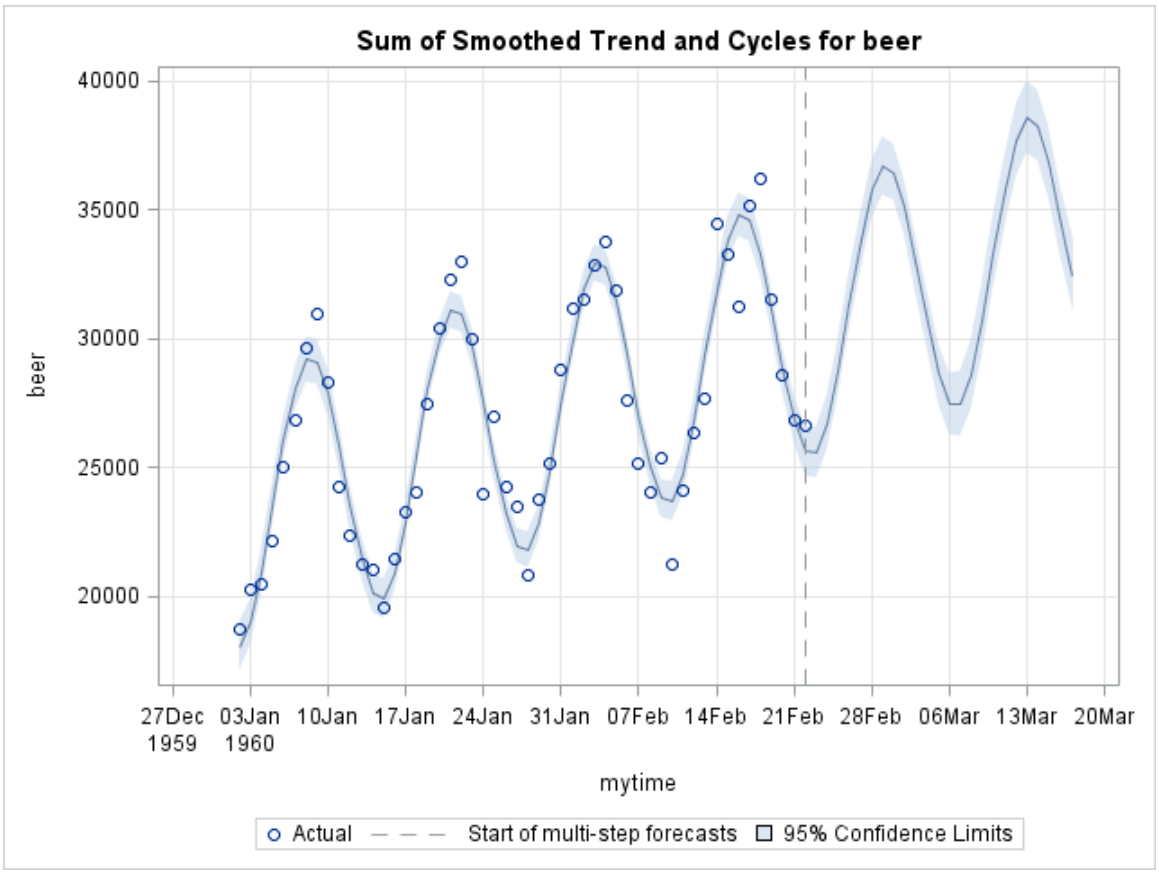
Forecasts for Variable beer

Obs	mytime	Forecast	Standard Error	95% Confidence Limits	
53	23FEB1960	25568.5	1528.02	22573.7	28563.4
54	24FEB1960	26679.8	1537.62	23666.1	29693.5
55	25FEB1960	28747.4	1545.50	25718.3	31776.5
56	26FEB1960	31328.0	1550.13	28289.8	34366.2
57	27FEB1960	33860.3	1551.01	30820.4	36900.2
58	28FEB1960	35793.8	1548.82	32758.2	38829.4
59	29FEB1960	36716.2	1545.10	33687.9	39744.6
60	01MAR1960	36448.2	1541.67	33426.6	39469.8
61	02MAR1960	35084.6	1540.12	32066.0	38103.1
62	03MAR1960	32972.7	1541.54	29951.3	35994.1
63	04MAR1960	30632.4	1546.57	27601.1	33663.6
64	05MAR1960	28635.9	1555.33	25587.5	31684.3
65	06MAR1960	27476.6	1567.29	24404.8	30548.4
66	07MAR1960	27454.6	1581.01	24355.9	30553.3
67	08MAR1960	28608.2	1594.32	25483.3	31733.0
68	09MAR1960	30704.6	1604.85	27559.2	33850.1
69	10MAR1960	33294.1	1610.84	30136.9	36451.3
70	11MAR1960	35813.1	1611.83	32653.9	38972.2
71	12MAR1960	37714.2	1608.78	34561.1	40867.4
72	13MAR1960	38592.7	1603.76	35449.4	41736.1
73	14MAR1960	38279.3	1599.17	35145.0	41413.6
74	15MAR1960	36879.2	1597.17	33748.8	40009.6
75	16MAR1960	34748.3	1599.30	31613.8	37882.9
76	17MAR1960	32410.7	1606.33	29262.4	35559.1


Smoothed Level Component for beer
Smoothed Level Component
35000
30000
25000
27Dec 1959
03Jan 1960
10Jan
17Jan
24Jan
31Jan
07Feb
14Feb
21Feb
28Feb
06Mar
13Mar
20Mar
mytime
95% Confidence Limits
Start of multi-step forecasts


Forecasts for beer
beer
40000
35000
30000
25000
22Feb 1960
24Feb
26Feb
28Feb
01Mar
03Mar
05Mar
07Mar
09Mar
11Mar
13Mar
15Mar
17Mar
mytime
Actual
Predicted
95% Confidence Limits


Smoothed Trend for beer
beer
35000
30000
25000
20000
27Dec 1959
03Jan 1960
10Jan
17Jan
24Jan
31Jan
07Feb
14Feb
21Feb
28Feb
06Mar
13Mar
20Mar
mytime
Actual
Start of multi-step forecasts
95% Confidence Limits


Sum of Smoothed Trend and Cycles for beer
beer
40000
35000
30000
25000
20000
27Dec 1959
03Jan 1960
10Jan
17Jan
24Jan
31Jan
07Feb
14Feb
21Feb
28Feb
06Mar
13Mar
20Mar
mytime
Actual
Start of multi-step forecasts
95% Confidence Limits