The UCM Procedure

Input Data Set	
Name	SASUSER.ITA_LOAD_H8_2012_2015
Time ID Variable	DATE

Estimation Span Summary

Variable	Type	First Obs	Last Obs	NObs	NMiss	Min	Max	Mean	Standard Deviation
H08	**Dependent**	01JAN2012	03DEC2015	1433	0	19574	40802	31852	4961.61781
HOLIDAY	**Predictor**	01JAN2012	03DEC2015	1433	0	0	1.00000	0.02442	0.15442
UNDER18_MI	**Predictor**	01JAN2012	03DEC2015	1433	0	0	26.00000	5.34264	5.98046
OVER18_MI	**Predictor**	01JAN2012	03DEC2015	1433	0	0	13.00000	1.89812	3.16395
cos1	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99996	1.00000	-0.01821	0.70130
cos2	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99996	1.00000	-0.01638	0.70356
cos3	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99996	1.00000	-0.01359	0.70616
cos4	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99996	1.00000	-0.01016	0.70803
cos5	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99907	1.00000	-0.00650	0.70862
cos6	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99996	1.00000	-0.00301	0.70809
cos7	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99996	1.00000	-0.00004980	0.70712
cos8	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99996	1.00000	0.00212	0.70646
cos9	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99996	1.00000	0.00335	0.70647
cos10	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99907	1.00000	0.00366	0.70701
cos11	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99996	1.00000	0.00317	0.70760
cos12	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99996	1.00000	0.00210	0.70783
cos13	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99996	1.00000	0.00073107	0.70759
cos14	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99996	1.00000	-0.00064818	0.70712
cos15	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99907	1.00000	-0.00179	0.70679
cos16	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99996	1.00000	-0.00251	0.70682
sin1	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99999	0.99999	0.00414	0.71311
sin2	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99999	0.99999	0.00786	0.71089
sin3	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99999	0.99999	0.01079	0.70833
sin4	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99999	0.99999	0.01268	0.70649
sin5	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99977	0.99977	0.01339	0.70593
sin6	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99999	0.99999	0.01296	0.70649
sin7	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99999	0.99999	0.01157	0.70749
sin8	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99999	0.99999	0.00949	0.70818
sin9	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99999	0.99999	0.00707	0.70819
sin10	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99977	0.99977	0.00465	0.70768
sin11	**Predictor**	01JAN2012	03DEC2015	1433	0	-0.99999	0.99999	0.00256	0.70710

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Estimation Span Summary									
Variable	Type	First Obs	Last Obs	NObs	NMiss	Min	Max	Mean	Standard Deviation
sin12	Predictor	01JAN2012	03DEC2015	1433	0	-0.99999	0.99999	0.00103	0.70688
sin13	Predictor	01JAN2012	03DEC2015	1433	0	-0.99999	0.99999	0.00017302	0.70712
sin14	Predictor	01JAN2012	03DEC2015	1433	0	-0.99999	0.99999	-0.00000558	0.70758
sin15	Predictor	01JAN2012	03DEC2015	1433	0	-0.99977	0.99977	0.00039062	0.70791
sin16	Predictor	01JAN2012	03DEC2015	1433	0	-0.99999	0.99999	0.00118	0.70788

Forecast Span Summary									
Variable	Type	First Obs	Last Obs	NObs	NMiss	Min	Max	Mean	Standard Deviation
H08	Dependent	01JAN2012	03DEC2015	1433	0	19574	40802	31852	4961.61781
HOLIDAY	Predictor	01JAN2012	31DEC2015	1461	0	0	1.00000	0.02533	0.15716
UNDER18_MI	Predictor	01JAN2012	31DEC2015	1461	0	0	26.00000	5.48734	6.01921
OVER18_MI	Predictor	01JAN2012	31DEC2015	1461	0	0	13.00000	1.86174	3.14426
cos1	Predictor	01JAN2012	31DEC2015	1461	0	-0.99996	1.00000	0.00068436	0.70759
cos2	Predictor	01JAN2012	31DEC2015	1461	0	-0.99996	1.00000	0.00068406	0.70759
cos3	Predictor	01JAN2012	31DEC2015	1461	0	-0.99996	1.00000	0.00068355	0.70759
cos4	Predictor	01JAN2012	31DEC2015	1461	0	-0.99996	1.00000	0.00068284	0.70759
cos5	Predictor	01JAN2012	31DEC2015	1461	0	-0.99907	1.00000	0.00068193	0.70759
cos6	Predictor	01JAN2012	31DEC2015	1461	0	-0.99996	1.00000	0.00068082	0.70759
cos7	Predictor	01JAN2012	31DEC2015	1461	0	-0.99996	1.00000	0.00067950	0.70758
cos8	Predictor	01JAN2012	31DEC2015	1461	0	-0.99996	1.00000	0.00067798	0.70758
cos9	Predictor	01JAN2012	31DEC2015	1461	0	-0.99996	1.00000	0.00067626	0.70758
cos10	Predictor	01JAN2012	31DEC2015	1461	0	-0.99907	1.00000	0.00067435	0.70758
cos11	Predictor	01JAN2012	31DEC2015	1461	0	-0.99996	1.00000	0.00067223	0.70757
cos12	Predictor	01JAN2012	31DEC2015	1461	0	-0.99996	1.00000	0.00066991	0.70757
cos13	Predictor	01JAN2012	31DEC2015	1461	0	-0.99996	1.00000	0.00066740	0.70757
cos14	Predictor	01JAN2012	31DEC2015	1461	0	-0.99996	1.00000	0.00066468	0.70756
cos15	Predictor	01JAN2012	31DEC2015	1461	0	-0.99907	1.00000	0.00066177	0.70756
cos16	Predictor	01JAN2012	31DEC2015	1461	0	-0.99996	1.00000	0.00065866	0.70755
sin1	Predictor	01JAN2012	31DEC2015	1461	0	-0.99999	0.99999	0.00001178	0.70711
sin2	Predictor	01JAN2012	31DEC2015	1461	0	-0.99999	0.99999	0.00002356	0.70711
sin3	Predictor	01JAN2012	31DEC2015	1461	0	-0.99999	0.99999	0.00003533	0.70711
sin4	Predictor	01JAN2012	31DEC2015	1461	0	-0.99999	0.99999	0.00004709	0.70711
sin5	Predictor	01JAN2012	31DEC2015	1461	0	-0.99977	0.99977	0.00005884	0.70711
sin6	Predictor	01JAN2012	31DEC2015	1461	0	-0.99999	0.99999	0.00007057	0.70711

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Forecast Span Summary									
Variable	Type	First Obs	Last Obs	NObs	NMiss	Min	Max	Mean	Standard Deviation
sin7	**Predictor**	01JAN2012	31DEC2015	1461	0	-0.99999	0.99999	0.00008228	0.70711
sin8	**Predictor**	01JAN2012	31DEC2015	1461	0	-0.99999	0.99999	0.00009396	0.70712
sin9	**Predictor**	01JAN2012	31DEC2015	1461	0	-0.99999	0.99999	0.00010562	0.70712
sin10	**Predictor**	01JAN2012	31DEC2015	1461	0	-0.99977	0.99977	0.00011724	0.70712
sin11	**Predictor**	01JAN2012	31DEC2015	1461	0	-0.99999	0.99999	0.00012883	0.70712
sin12	**Predictor**	01JAN2012	31DEC2015	1461	0	-0.99999	0.99999	0.00014039	0.70713
sin13	**Predictor**	01JAN2012	31DEC2015	1461	0	-0.99999	0.99999	0.00015190	0.70713
sin14	**Predictor**	01JAN2012	31DEC2015	1461	0	-0.99999	0.99999	0.00016336	0.70713
sin15	**Predictor**	01JAN2012	31DEC2015	1461	0	-0.99977	0.99977	0.00017478	0.70714
sin16	**Predictor**	01JAN2012	31DEC2015	1461	0	-0.99999	0.99999	0.00018615	0.70714

Preliminary Estimates of the Free Parameters		
Component	**Parameter**	**Estimate**
Irregular	**Error Variance**	13737520
Level	**Error Variance**	5151570
Season	**Error Variance**	856145

Likelihood Based Fit Statistics	
Statistic	**Value**
Full Log Likelihood	-11758
Diffuse Part of Log Likelihood	-1019
Non-Missing Observations Used	1433
Estimated Parameters	3
Initialized Diffuse State Elements	42
Normalized Residual Sum of Squares	1391
AIC (smaller is better)	23523
BIC (smaller is better)	23538
AICC (smaller is better)	23523
HQIC (smaller is better)	23528
CAIC (smaller is better)	23541

Likelihood Optimization Algorithm Converged in 7 Iterations.

The UCM Procedure

Final Estimates of the Free Parameters					
Component	Parameter	Estimate	Approx Std Error	t Value	Approx Pr > |t|
Irregular	Error Variance	542803	66705.1	8.14	<.0001
Level	Error Variance	131627	36615.7	3.59	0.0003
Season	Error Variance	2241.89771	760.92463	2.95	0.0032
HOLIDAY	Coefficient	-9111.56665	160.68856	-56.70	<.0001
UNDER18_MI	Coefficient	20.66991	17.84631	1.16	0.2468
OVER18_MI	Coefficient	60.38154	22.91549	2.63	0.0084
cos1	Coefficient	1198.46166	795.49124	1.51	0.1319
cos2	Coefficient	478.68573	396.95965	1.21	0.2279
cos3	Coefficient	-1443.35248	264.71781	-5.45	<.0001
cos4	Coefficient	480.69832	199.95077	2.40	0.0162
cos5	Coefficient	-961.41939	160.94229	-5.97	<.0001
cos6	Coefficient	-779.29841	134.87869	-5.78	<.0001
cos7	Coefficient	-346.96518	116.21778	-2.99	0.0028
cos8	Coefficient	-1039.19680	102.50882	-10.14	<.0001
cos9	Coefficient	-263.82317	92.11868	-2.86	0.0042
cos10	Coefficient	-377.15481	83.91649	-4.49	<.0001
cos11	Coefficient	-530.13045	77.19635	-6.87	<.0001
cos12	Coefficient	-348.92544	71.71305	-4.87	<.0001
cos13	Coefficient	-387.33532	66.91683	-5.79	<.0001
cos14	Coefficient	-285.42610	62.99578	-4.53	<.0001
cos15	Coefficient	-259.28128	59.57318	-4.35	<.0001
cos16	Coefficient	-213.73878	56.71537	-3.77	0.0002
sin1	Coefficient	233.60574	801.45024	0.29	0.7707
sin2	Coefficient	118.48740	400.44187	0.30	0.7673
sin3	Coefficient	365.15654	266.09632	1.37	0.1700
sin4	Coefficient	23.20103	199.47780	0.12	0.9074
sin5	Coefficient	-812.36428	160.50328	-5.06	<.0001
sin6	Coefficient	554.43584	135.20929	4.10	<.0001
sin7	Coefficient	-630.01462	117.13795	-5.38	<.0001
sin8	Coefficient	-47.12181	103.09367	-0.46	0.6476
sin9	Coefficient	358.54788	92.44030	3.88	0.0001
sin10	Coefficient	-392.37147	83.99114	-4.67	<.0001
sin11	Coefficient	266.08220	77.24352	3.44	0.0006
sin12	Coefficient	-45.21276	71.71542	-0.63	0.5284
sin13	Coefficient	-205.15206	67.14083	-3.06	0.0022

The UCM Procedure

Final Estimates of the Free Parameters					
Component	Parameter	Estimate	Approx Std Error	t Value	Approx Pr > |t|
sin14	Coefficient	327.80128	63.19243	5.19	<.0001
sin15	Coefficient	-11.04205	59.76183	-0.18	0.8534
sin16	Coefficient	-65.16557	56.88128	-1.15	0.2519

Fit Statistics Based on Residuals	
Mean Squared Error	4010451
Root Mean Squared Error	2002.61100
Mean Absolute Percentage Error	3.75997
Maximum Percent Error	162.10941
R-Square	0.83109
Adjusted R-Square	0.83081
Random Walk R-Square	0.83287
Amemiya's Adjusted R-Square	0.83025
Number of non-missing residuals used for computing the fit statistics = 1206	

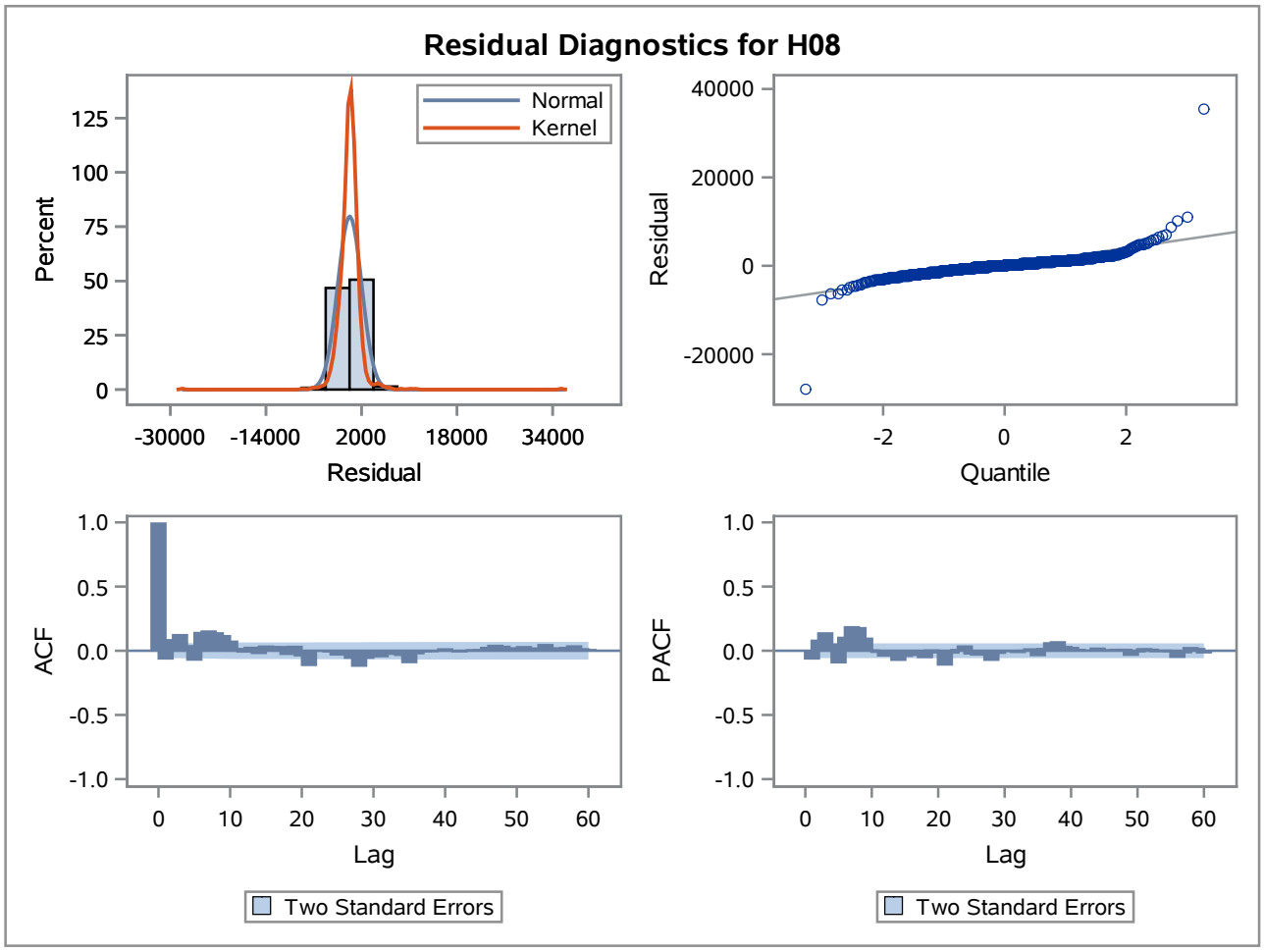
Significance Analysis of Components (Based on the Final State)			
Component	DF	Chi-Square	Pr > ChiSq
Irregular	1	0.01	0.9100
Level	1	834.32	<.0001
Season	6	716.72	<.0001

Trend Information (Based on the Final State)		
Name	Estimate	Standard Error
Level	32613.46349	1129.0928

Summary of Seasons			
Name	Type	Season Length	Error Variance
Season	TRIG	7	2241.89771

The UCM Procedure

Outlier Summary							
Obs	DATE	Break Type	Estimate	Standard Error	Chi-Square	DF	Pr > ChiSq
1324	16AUG2015	Additive Outlier	5115.46750	916.55698	31.15	1	<.0001
729	29DEC2013	Additive Outlier	4973.82174	914.27969	29.60	1	<.0001
1093	28DEC2014	Additive Outlier	4889.70015	916.11914	28.49	1	<.0001
365	30DEC2012	Additive Outlier	4814.66433	914.51333	27.72	1	<.0001
359	24DEC2012	Additive Outlier	-4787.06228	914.98739	27.37	1	<.0001



Forecasts for Variable H08					
Obs	DATE	Forecast	Standard Error	95% Confidence Limits	
1434	04DEC2015	38139.4	1080.01	36022.7	40256.2
1435	05DEC2015	31671.5	1149.06	29419.4	33923.6
1436	06DEC2015	26295.5	1213.13	23917.8	28673.2
1437	07DEC2015	37328.4	1273.82	34831.7	39825.0
1438	08DEC2015	30267.6	1338.82	27643.5	32891.6
1439	09DEC2015	39800.0	1378.44	37098.3	42501.7

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Forecasts for Variable H08					
Obs	DATE	Forecast	Standard Error	95% Confidence Limits	
1440	10DEC2015	39756.3	1421.63	36970.0	42542.6
1441	11DEC2015	39900.4	1550.59	36861.3	42939.6
1442	12DEC2015	33282.4	1607.82	30131.2	36433.7
1443	13DEC2015	27540.4	1662.28	24282.4	30798.4
1444	14DEC2015	38177.4	1710.60	34824.7	41530.1
1445	15DEC2015	39685.6	1754.69	36246.5	43124.7
1446	16DEC2015	39430.7	1796.07	35910.4	42950.9
1447	17DEC2015	38701.2	1827.05	35120.2	42282.1
1448	18DEC2015	38113.0	1925.30	34339.5	41886.6
1449	19DEC2015	30766.9	1969.14	26907.4	34626.3
1450	20DEC2015	24333.9	2009.69	20395.0	28272.8
1451	21DEC2015	34269.2	2046.97	30257.2	38281.2
1452	22DEC2015	35161.0	2081.39	31081.6	39240.5
1453	23DEC2015	34469.1	2111.48	30330.7	38607.5
1454	24DEC2015	33385.9	2136.18	29199.1	37572.7
1455	25DEC2015	23520.7	2221.38	19166.8	27874.5
1456	26DEC2015	25365.2	2252.59	20950.2	29780.2
1457	27DEC2015	19180.4	2286.58	14698.8	23662.0
1458	28DEC2015	29551.7	2318.71	25007.1	34096.3
1459	29DEC2015	31036.1	2348.24	26433.6	35638.6
1460	30DEC2015	30970.8	2375.60	26314.7	35626.9
1461	31DEC2015	30748.8	2398.72	26047.4	35450.2

Post Sample Predictions for H08						
Obs	DATE	Actual	Forecast	Prediction Error	Sum of Squared Errors	Sum of Absolute Errors
1434	04DEC2015	37857.104	38139.42362	-282.319624	79704.36994	282.3196237
1435	05DEC2015	31248.352	31671.4632	-423.111203	258727.4599	705.4308265
1436	06DEC2015	25289.66	26295.51009	-1005.85009	1270461.86	1711.280915
1437	07DEC2015	30150.798	37328.3555	-7177.5575	52787793.55	8888.838416
1438	08DEC2015	25640.009	30267.55983	-4627.55083	74202020.24	13516.38925
1439	09DEC2015	37055.34	39800.00283	-2744.66283	81735194.28	16261.05207
1440	10DEC2015	38119.758	39756.29555	-1636.53755	84413449.44	17897.58963
1441	11DEC2015	38321.858	39900.44617	-1578.58817	86905390.04	19476.17779

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Post Sample Predictions for H08						
Obs	DATE	Actual	Forecast	Prediction Error	Sum of Squared Errors	Sum of Absolute Errors
1442	12DEC2015	31903.921	33282.44993	-1378.52893	88805732.04	20854.70672
1443	13DEC2015	25008.423	27540.36152	-2531.93852	95216444.73	23386.64524
1444	14DEC2015	36406.314	38177.39164	-1771.07764	98353160.74	25157.72289
1445	15DEC2015	36761.049	39685.58038	-2924.53138	106906044.6	28082.25427
1446	16DEC2015	38638.665	39430.66655	-792.001546	107533311	28874.25582
1447	17DEC2015	38011.428	38701.18303	-689.755033	108009073	29564.01085
1448	18DEC2015	37284.789	38113.03701	-828.248007	108695067.8	30392.25886
1449	19DEC2015	30086.951	30766.88955	-679.93855	109157384.2	31072.19741
1450	20DEC2015	23735.825	24333.90688	-598.081881	109515086.1	31670.27929
1451	21DEC2015	33937.558	34269.19167	-331.633666	109625067	32001.91295
1452	22DEC2015	35466.47	35161.00943	305.4605737	109718373.2	32307.37353
1453	23DEC2015	34851.224	34469.09505	382.1289516	109864395.7	32689.50248
1454	24DEC2015	28859.607	33385.89832	-4526.29132	130351708.9	37215.7938
1455	25DEC2015	21296.738	23520.66781	-2223.92981	135297572.7	39439.72361
1456	26DEC2015	20777.948	25365.23287	-4587.28487	156340755.2	44027.00848
1457	27DEC2015	22314.221	19180.37241	3133.848586	166161762.1	47160.85707
1458	28DEC2015	29264.767	29551.67091	-286.903911	166244076	47447.76098
1459	29DEC2015	30202.843	31036.08274	-833.239739	166938364.5	48281.00072
1460	30DEC2015	29755.988	30970.81528	-1214.82728	168414169.8	49495.828
1461	31DEC2015	27716.614	30748.80029	-3032.18629	177608323.4	52528.01428

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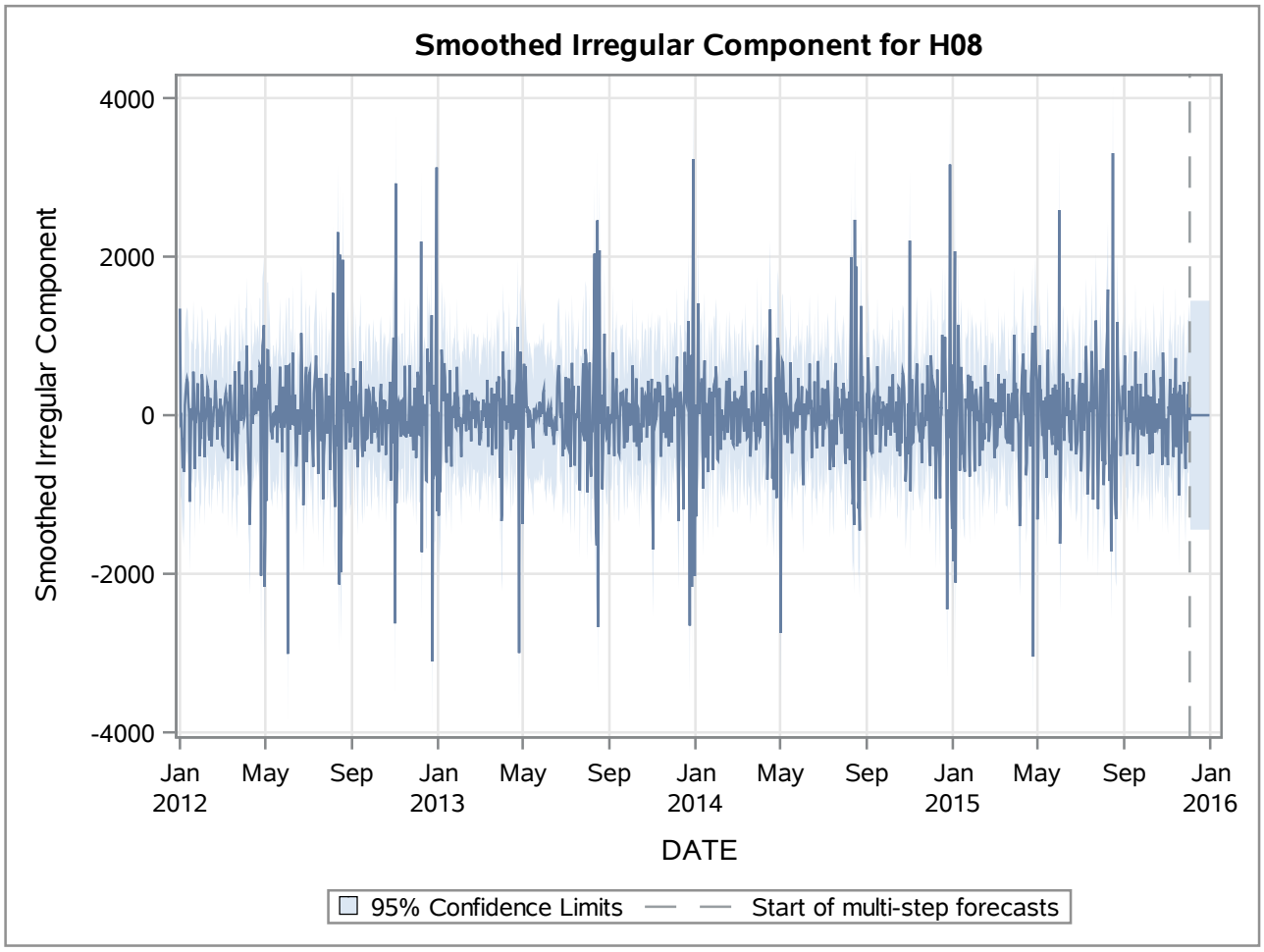

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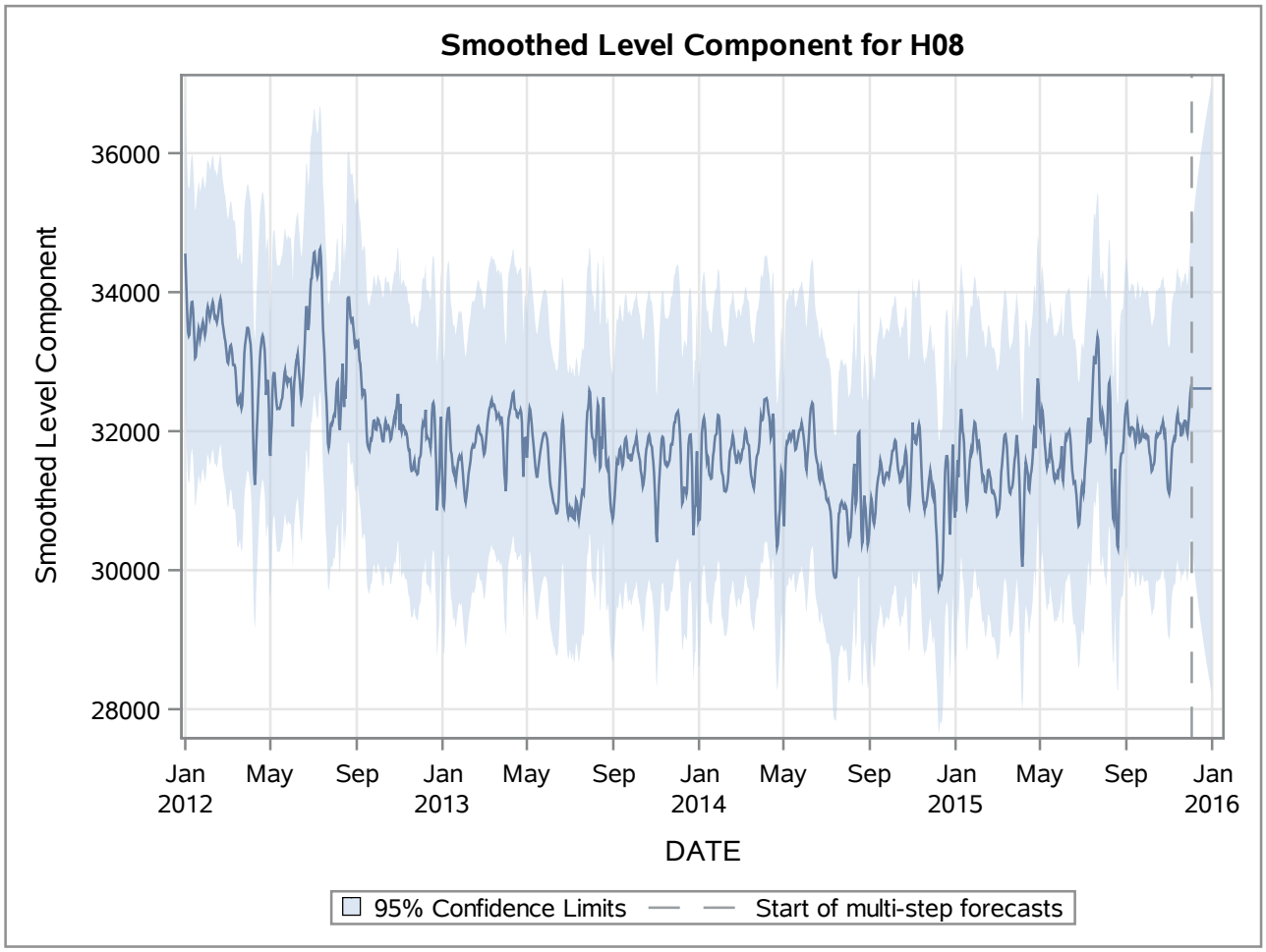

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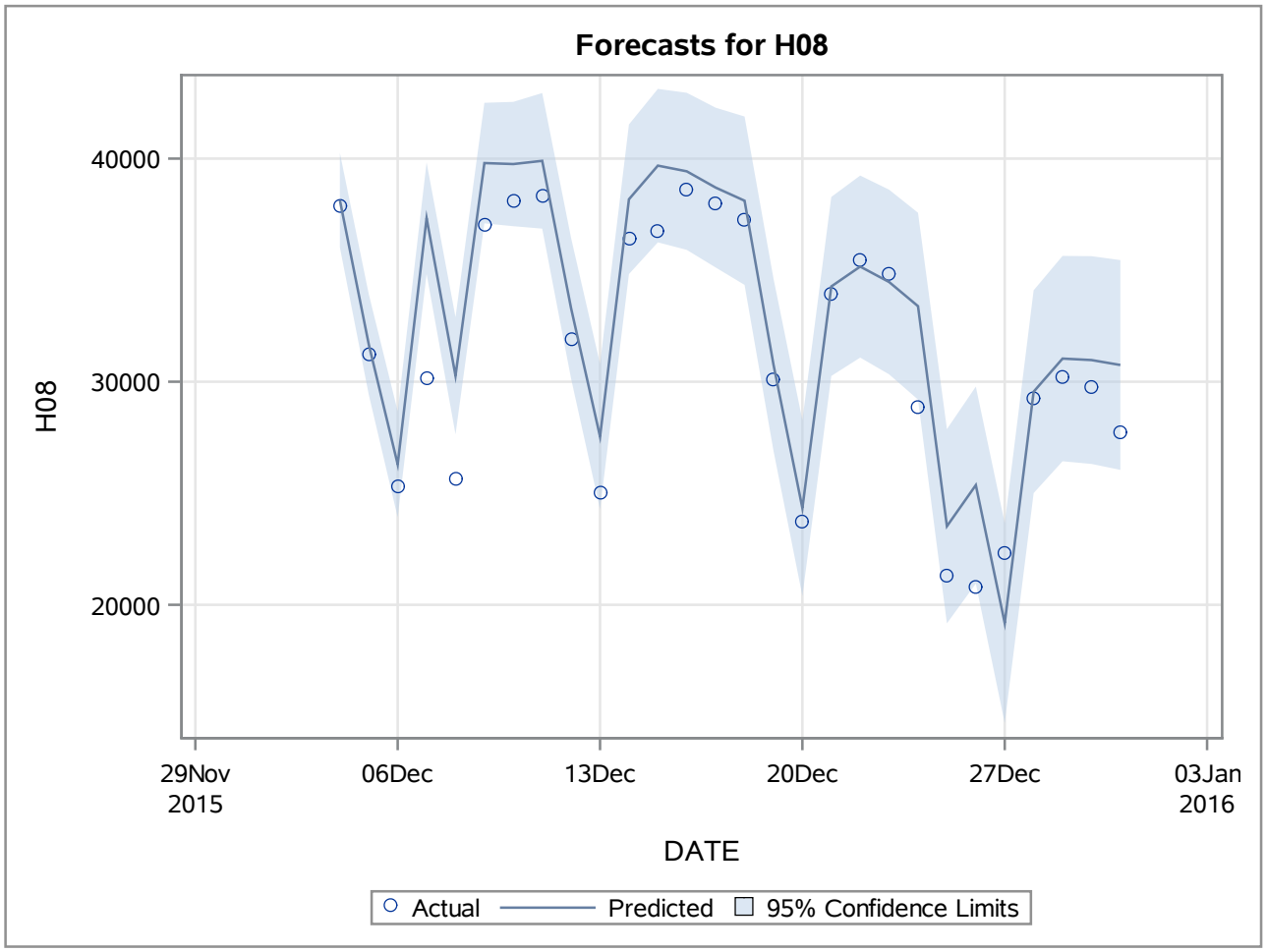

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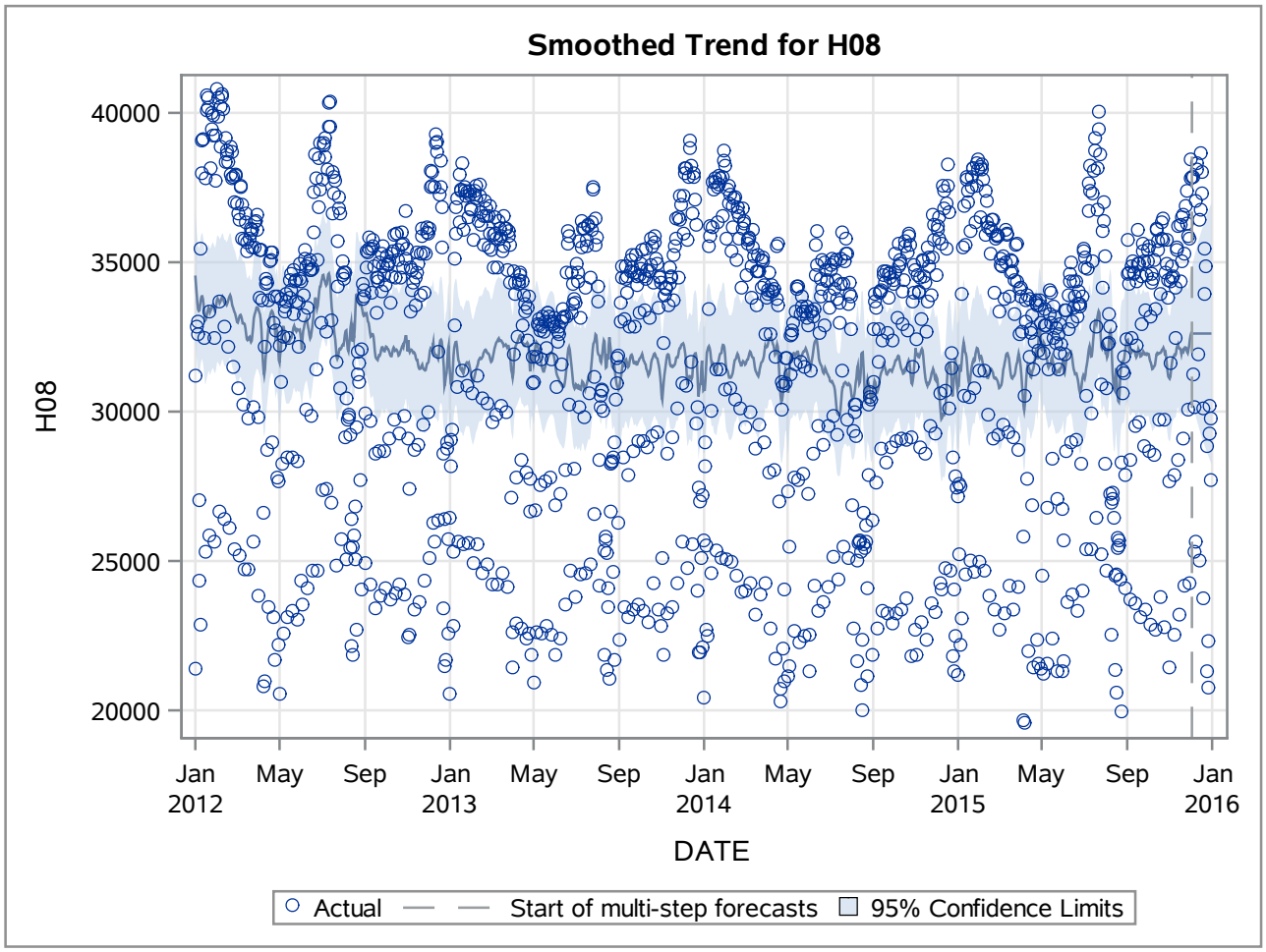

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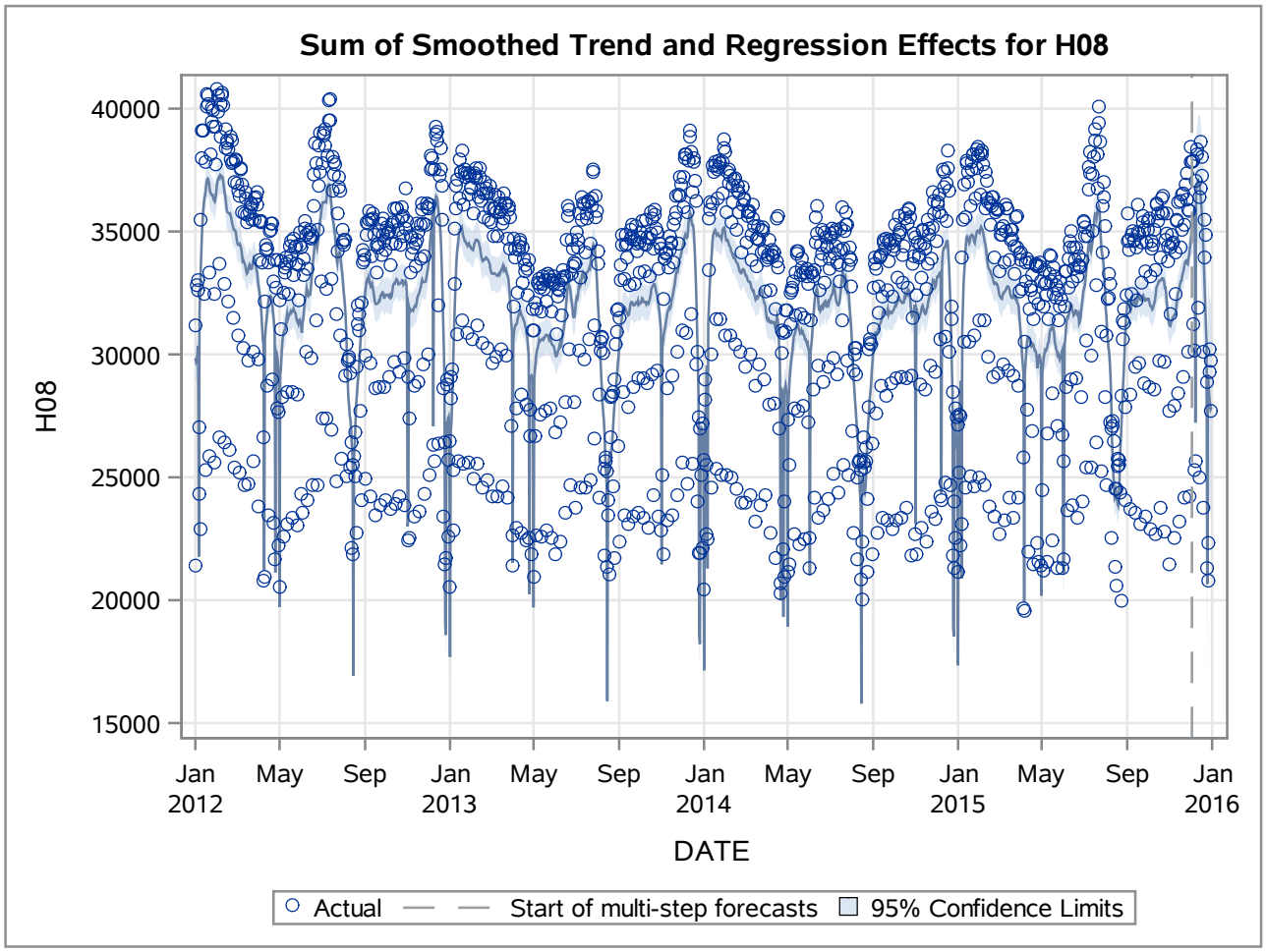
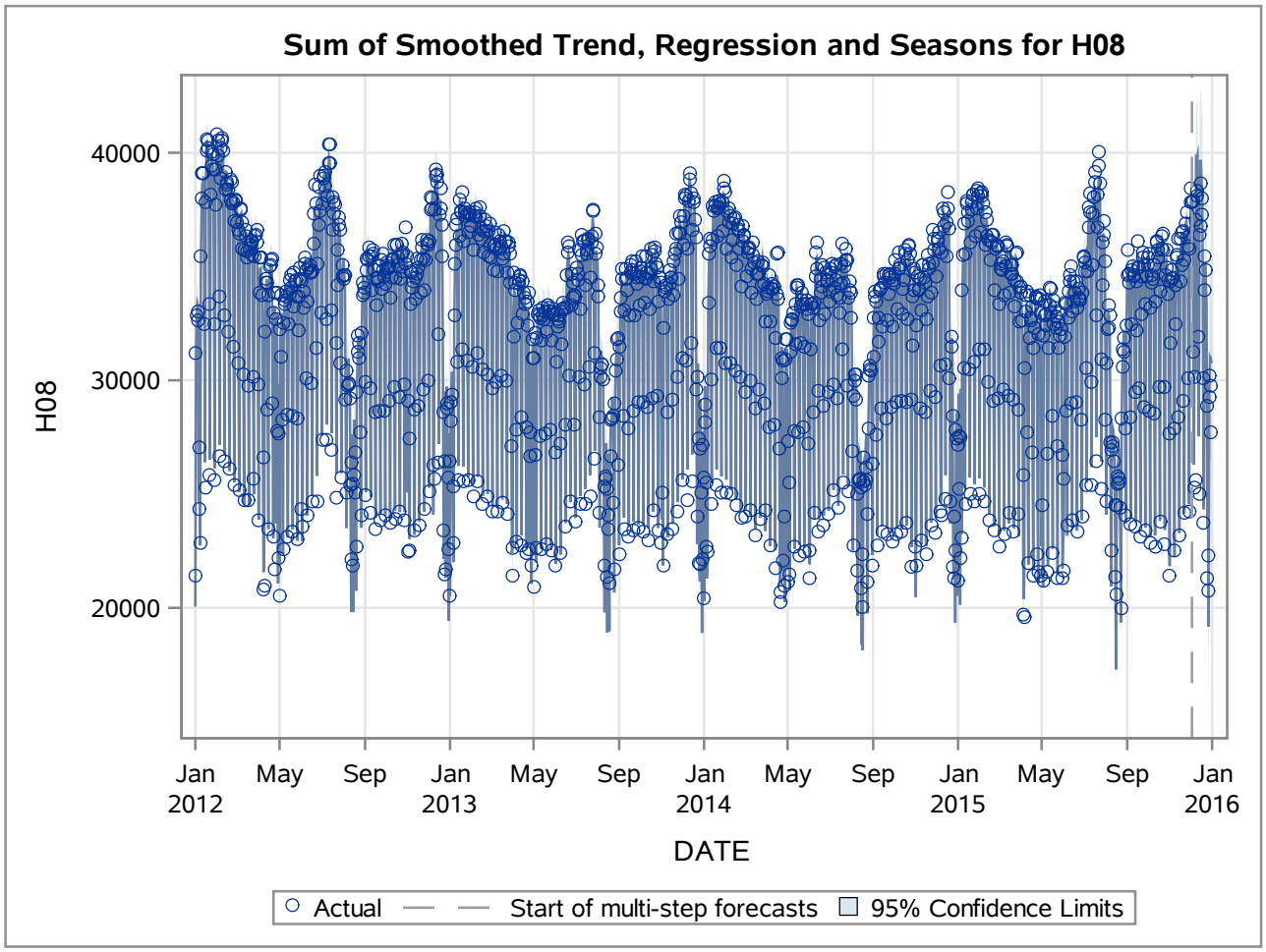
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