Illustration of ODS Graphics

The VARMAX Procedure

Number of Observations	132
Number of Pairwise Missing	0

Simple Summary Statistics						
Variable	Type	N	Mean	Standard Deviation	Min	Max
Gasoline_Gallons	Dependent	132	376804937.74	34812609.531	218414414.00	476873743.00
Diesel_Gallons	Dependent	132	80003756.470	9364707.9800	64939973.000	111638305.00
Kerosene_Gallons	Dependent	132	299988.92424	368176.38610	2214.00000	1725070.0000
Alternative_Fuels_Gallons	Dependent	132	482229.06818	509431.11286	53077.00000	2372859.0000

Dickey-Fuller Unit Root Tests					
Variable	Type	Rho	Pr < Rho	Tau	Pr < Tau
Gasoline_Gallons	Zero Mean	0.16	0.7187	0.29	0.7677
	Single Mean	-36.69	0.0011	-5.29	<.0001
	Trend	-53.35	0.0004	-7.01	<.0001
Diesel_Gallons	Zero Mean	-0.16	0.6458	-0.24	0.5986
	Single Mean	-21.73	0.0058	-3.30	0.0169
	Trend	-68.66	0.0004	-6.33	<.0001
Kerosene_Gallons	Zero Mean	-41.45	<.0001	-4.52	<.0001
	Single Mean	-85.06	0.0011	-6.45	<.0001
	Trend	-88.50	0.0004	-6.51	<.0001
Alternative_Fuels_Gallons	Zero Mean	-17.77	0.0027	-3.22	0.0015
	Single Mean	-40.29	0.0011	-4.60	0.0003
	Trend	-283.42	0.0001	-11.79	<.0001

Cointegration Rank Test Using Trace						
H0: Rank=r	H1: Rank>r	Eigenvalue	Trace	Pr > Trace	Drift in ECM	Drift in Process
0	0	0.5216	201.2586	<.0001	Constant	Linear
1	1	0.3788	105.4205	<.0001		
2	2	0.2423	43.5368	<.0001		
3	3	0.0559	7.4719	0.0061		

Cointegration Rank Test Using Trace Under Restriction						
H0: Rank=r	H1: Rank>r	Eigenvalue	Trace	Pr > Trace	Drift in ECM	Drift in Process
0	0	0.3969	124.5472	<.0001	Constant	Constant
1	1	0.2488	58.8132	0.0001		
2	2	0.1532	21.6190	0.0318		

3	3	0.0000	0.0032	1.0000		

Hypothesis of the Restriction		
Hypothesis	Drift in ECM	Drift in Process
H0(Case 2)	Constant	Constant
H1(Case 3)	Constant	Linear

Hypothesis Test of the Restriction					
Rank	Eigenvalue	Restricted Eigenvalue	DF	Chi-Square	Pr > ChiSq
0	0.5216	0.3969	4	-76.71	0.9999
1	0.3788	0.2488	3	-46.61	0.9999
2	0.2423	0.1532	2	-21.92	0.9999
3	0.0559	0.0000	1	-7.47	0.9999

Long-Run Parameter Beta Estimates				
Variable	1	2	3	4
Gasoline_Gallons	-0.00000	0.00000	-0.00000	0.00000
Diesel_Gallons	-0.00000	-0.00000	0.00000	0.00000
Kerosene_Gallons	-0.00000	0.00000	0.00000	0.00000
Alternative_Fuels_Gallons	0.00000	0.00000	-0.00000	0.00000

Adjustment Coefficient Alpha Estimates				
Variable	1	2	3	4
Gasoline_Gallons	11191248.024	-5159242.580	6217142.5539	-3316314.950
Diesel_Gallons	2494287.4983	1359449.9882	501935.06618	-1278653.487
Kerosene_Gallons	-4902.08930	-64422.86951	-117036.5659	560.28852
Alternative_Fuels_Gallons	-234491.3791	-61302.21231	293.00340	-73677.17577

Long-Run Coefficient Beta Based on the Restricted Trend				
Variable	1	2	3	4
Gasoline_Gallons	0.00000	-0.00000	-0.00000	0.00000
Diesel_Gallons	-0.00000	0.00000	0.00000	-0.00000
Kerosene_Gallons	0.00000	0.00000	-0.00000	0.00000
Alternative_Fuels_Gallons	0.00000	0.00000	0.00000	-0.00000
1	-0.00000	0.00000	-0.00000	0.00000

Adjustment Coefficient Alpha Based on the Restricted Trend				
Variable	1	2	3	4
Gasoline_Gallons	-3.509345E11	67326156290	20013496015	823722450780
Diesel_Gallons	206669417288	8.7694165E14	1.7665407E14	6.1248758E13
Kerosene_Gallons	-1.283054E11	65849839336	114459216296	551652547039
Alternative_Fuels_Gallons	240548060796	8.7395913E14	1.7320853E14	5.7268335E13

Illustration of ODS Graphics

The VARMAX Procedure

Type of Model	VAR(2)
Estimation Method	Least Squares Estimation

Model Parameter Estimates						
Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
Gasoline_Gallons	CONST1	192002703.74	32195307.951	5.96	0.0001	1
	AR1_1_1	0.37066	0.11466	3.23	0.0016	Gasoline_Gallons(t-1)
	AR1_1_2	-0.73230	0.46816	-1.56	0.1204	Diesel_Gallons(t-1)
	AR1_1_3	-16.96285	8.32695	-2.04	0.0438	Kerosene_Gallons(t-1)
	AR1_1_4	17.43293	5.12579	3.40	0.0009	Alternative_Fuels_Gallons(t-1)
	AR2_1_1	0.14297	0.11367	1.26	0.2109	Gasoline_Gallons(t-2)
	AR2_1_2	0.49454	0.46222	1.07	0.2868	Diesel_Gallons(t-2)
	AR2_1_3	16.16785	8.12617	1.99	0.0489	Kerosene_Gallons(t-2)
	AR2_1_4	7.76807	5.39988	1.44	0.1529	Alternative_Fuels_Gallons(t-2)
Diesel_Gallons	CONST2	36525646.868	9098230.3535	4.01	0.0001	1
	AR1_2_1	0.05780	0.03240	1.78	0.0769	Gasoline_Gallons(t-1)
	AR1_2_2	-0.07655	0.13230	-0.58	0.5639	Diesel_Gallons(t-1)
	AR1_2_3	-5.24901	2.35315	-2.23	0.0275	Kerosene_Gallons(t-1)
	AR1_2_4	6.35215	1.44852	4.39	0.0001	Alternative_Fuels_Gallons(t-1)
	AR2_2_1	0.00658	0.03212	0.20	0.8380	Gasoline_Gallons(t-2)
	AR2_2_2	0.26376	0.13062	2.02	0.0457	Diesel_Gallons(t-2)
	AR2_2_3	4.14046	2.29642	1.80	0.0739	Kerosene_Gallons(t-2)
	AR2_2_4	3.25159	1.52598	2.13	0.0351	Alternative_Fuels_Gallons(t-2)
Kerosene_Gallons	CONST3	435958.97454	332645.31976	1.31	0.1925	1
	AR1_3_1	-0.00313	0.00118	-2.65	0.0092	Gasoline_Gallons(t-1)
	AR1_3_2	0.00624	0.00484	1.29	0.1994	Diesel_Gallons(t-1)
	AR1_3_3	0.97238	0.08603	11.30	0.0001	Kerosene_Gallons(t-1)
	AR1_3_4	-0.09750	0.05296	-1.84	0.0681	Alternative_Fuels_Gallons(t-1)
	AR2_3_1	0.00103	0.00117	0.88	0.3830	Gasoline_Gallons(t-2)
	AR2_3_2	0.00026	0.00478	0.05	0.9567	Diesel_Gallons(t-2)
	AR2_3_3	-0.37273	0.08396	-4.44	0.0001	Kerosene_Gallons(t-2)
	AR2_3_4	0.01682	0.05579	0.30	0.7636	Alternative_Fuels_Gallons(t-2)
Alternative_Fuels_Gallons	CONST4	-2331414.596	574863.68589	-4.06	0.0001	1
	AR1_4_1	-0.00005	0.00205	-0.03	0.9788	Gasoline_Gallons(t-1)
	AR1_4_2	0.01870	0.00836	2.24	0.0271	Diesel_Gallons(t-1)
	AR1_4_3	0.20428	0.14868	1.37	0.1720	Kerosene_Gallons(t-1)

AR1_4_4	0.00109	0.09152	0.01	0.9905	Alternative_Fuels_Gallons(t-1)
AR2_4_1	-0.00264	0.00203	-1.30	0.1957	Gasoline_Gallons(t-2)
AR2_4_2	0.02802	0.00825	3.40	0.0009	Diesel_Gallons(t-2)
AR2_4_3	0.00556	0.14510	0.04	0.9695	Kerosene_Gallons(t-2)
AR2_4_4	0.02379	0.09642	0.25	0.8055	Alternative_Fuels_Gallons(t-2)

Covariances of Innovations				
Variable	Gasoline_Gallons	Diesel_Gallons	Kerosene_Gallons	Alternative_Fuels_Gallons
Gasoline_Gallons	4.9995863E14	1.0264586E14	-1.947195E12	2.414352E12
Diesel_Gallons	1.0264586E14	3.992664E13	-3.768001E11	988038607545
Kerosene_Gallons	-1.947195E12	-3.768001E11	53371786122	7227533784.6
Alternative_Fuels_Gallons	2.414352E12	988038607545	7227533784.6	159396452835

Log-likelihood	-7686.77

Information Criteria	
AICC	15517.64
HQC	15519.14
AIC	15465.54
SBC	15597.45
FPEC	7.287E49

Illustration of ODS Graphics

The VARMAX Procedure

Number of Observations	132
Number of Pairwise Missing	0

Simple Summary Statistics						
Variable	Type	N	Mean	Standard Deviation	Min	Max
Gasoline_Gallons	Dependent	132	376804937.74	34812609.531	218414414.00	476873743.00
Diesel_Gallons	Dependent	132	80003756.470	9364707.9800	64939973.000	111638305.00
Kerosene_Gallons	Dependent	132	299988.92424	368176.38610	2214.00000	1725070.0000
Alternative_Fuels_Gallons	Dependent	132	482229.06818	509431.11286	53077.00000	2372859.0000

Dickey-Fuller Unit Root Tests					
Variable	Type	Rho	Pr < Rho	Tau	Pr < Tau
Gasoline_Gallons	Zero Mean	0.16	0.7187	0.29	0.7677
	Single Mean	-36.69	0.0011	-5.29	<.0001
	Trend	-53.35	0.0004	-7.01	<.0001
Diesel_Gallons	Zero Mean	-0.16	0.6458	-0.24	0.5986
	Single Mean	-21.73	0.0058	-3.30	0.0169
	Trend	-68.66	0.0004	-6.33	<.0001
Kerosene_Gallons	Zero Mean	-41.45	<.0001	-4.52	<.0001
	Single Mean	-85.06	0.0011	-6.45	<.0001
	Trend	-88.50	0.0004	-6.51	<.0001
Alternative_Fuels_Gallons	Zero Mean	-17.77	0.0027	-3.22	0.0015
	Single Mean	-40.29	0.0011	-4.60	0.0003
	Trend	-283.42	0.0001	-11.79	<.0001

Cointegration Rank Test Using Trace						
H0: Rank=r	H1: Rank>r	Eigenvalue	Trace	Pr > Trace	Drift in ECM	Drift in Process
0	0	0.5216	201.2586	<.0001	Constant	Linear
1	1	0.3788	105.4205	<.0001		
2	2	0.2423	43.5368	<.0001		
3	3	0.0559	7.4719	0.0061		

Cointegration Rank Test Using Trace Under Restriction						
H0: Rank=r	H1: Rank>r	Eigenvalue	Trace	Pr > Trace	Drift in ECM	Drift in Process
0	0	0.3969	124.5472	<.0001	Constant	Constant
1	1	0.2488	58.8132	0.0001		

2	2	0.1532	21.6190	0.0318		
3	3	0.0000	0.0032	1.0000		

Hypothesis of the Restriction		
Hypothesis	Drift in ECM	Drift in Process
H0(Case 2)	Constant	Constant
H1(Case 3)	Constant	Linear

Hypothesis Test of the Restriction					
Rank	Eigenvalue	Restricted Eigenvalue	DF	Chi-Square	Pr > ChiSq
0	0.5216	0.3969	4	-76.71	0.9999
1	0.3788	0.2488	3	-46.61	0.9999
2	0.2423	0.1532	2	-21.92	0.9999
3	0.0559	0.0000	1	-7.47	0.9999

Long-Run Parameter Beta Estimates				
Variable	1	2	3	4
Gasoline_Gallons	-0.00000	0.00000	-0.00000	0.00000
Diesel_Gallons	-0.00000	-0.00000	0.00000	0.00000
Kerosene_Gallons	-0.00000	0.00000	0.00000	0.00000
Alternative_Fuels_Gallons	0.00000	0.00000	-0.00000	0.00000

Adjustment Coefficient Alpha Estimates				
Variable	1	2	3	4
Gasoline_Gallons	11191248.024	-5159242.580	6217142.5539	-3316314.950
Diesel_Gallons	2494287.4983	1359449.9882	501935.06618	-1278653.487
Kerosene_Gallons	-4902.08930	-64422.86951	-117036.5659	560.28852
Alternative_Fuels_Gallons	-234491.3791	-61302.21231	293.00340	-73677.17577

Long-Run Coefficient Beta Based on the Restricted Trend				
Variable	1	2	3	4
Gasoline_Gallons	0.00000	-0.00000	-0.00000	0.00000
Diesel_Gallons	-0.00000	0.00000	0.00000	-0.00000
Kerosene_Gallons	0.00000	0.00000	-0.00000	0.00000
Alternative_Fuels_Gallons	0.00000	0.00000	0.00000	-0.00000
1	-0.00000	0.00000	-0.00000	0.00000

Adjustment Coefficient Alpha Based on the Restricted Trend				
Variable	1	2	3	4
Gasoline_Gallons	0.00000	0.00000	0.00000	0.00000
Diesel_Gallons	0.00000	0.00000	0.00000	0.00000
Kerosene_Gallons	0.00000	0.00000	0.00000	0.00000

| Alternative_Fuels_Gallons | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

Illustration of ODS Graphics

The VARMAX Procedure

Type of Model	VAR(2)
Estimation Method	Least Squares Estimation

Model Parameter Estimates						
Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
Gasoline_Gallons	CONST1	192002703.74	32195307.951	5.96	0.0001	1
	AR1_1_1	0.37066	0.11466	3.23	0.0016	Gasoline_Gallons(t-1)
	AR1_1_2	-0.73230	0.46816	-1.56	0.1204	Diesel_Gallons(t-1)
	AR1_1_3	-16.96285	8.32695	-2.04	0.0438	Kerosene_Gallons(t-1)
	AR1_1_4	17.43293	5.12579	3.40	0.0009	Alternative_Fuels_Gallons(t-1)
	AR2_1_1	0.14297	0.11367	1.26	0.2109	Gasoline_Gallons(t-2)
	AR2_1_2	0.49454	0.46222	1.07	0.2868	Diesel_Gallons(t-2)
	AR2_1_3	16.16785	8.12617	1.99	0.0489	Kerosene_Gallons(t-2)
	AR2_1_4	7.76807	5.39988	1.44	0.1529	Alternative_Fuels_Gallons(t-2)
Diesel_Gallons	CONST2	36525646.868	9098230.3535	4.01	0.0001	1
	AR1_2_1	0.05780	0.03240	1.78	0.0769	Gasoline_Gallons(t-1)
	AR1_2_2	-0.07655	0.13230	-0.58	0.5639	Diesel_Gallons(t-1)
	AR1_2_3	-5.24901	2.35315	-2.23	0.0275	Kerosene_Gallons(t-1)
	AR1_2_4	6.35215	1.44852	4.39	0.0001	Alternative_Fuels_Gallons(t-1)
	AR2_2_1	0.00658	0.03212	0.20	0.8380	Gasoline_Gallons(t-2)
	AR2_2_2	0.26376	0.13062	2.02	0.0457	Diesel_Gallons(t-2)
	AR2_2_3	4.14046	2.29642	1.80	0.0739	Kerosene_Gallons(t-2)
	AR2_2_4	3.25159	1.52598	2.13	0.0351	Alternative_Fuels_Gallons(t-2)
Kerosene_Gallons	CONST3	435958.97454	332645.31976	1.31	0.1925	1
	AR1_3_1	-0.00313	0.00118	-2.65	0.0092	Gasoline_Gallons(t-1)
	AR1_3_2	0.00624	0.00484	1.29	0.1994	Diesel_Gallons(t-1)
	AR1_3_3	0.97238	0.08603	11.30	0.0001	Kerosene_Gallons(t-1)
	AR1_3_4	-0.09750	0.05296	-1.84	0.0681	Alternative_Fuels_Gallons(t-1)
	AR2_3_1	0.00103	0.00117	0.88	0.3830	Gasoline_Gallons(t-2)
	AR2_3_2	0.00026	0.00478	0.05	0.9567	Diesel_Gallons(t-2)
	AR2_3_3	-0.37273	0.08396	-4.44	0.0001	Kerosene_Gallons(t-2)
	AR2_3_4	0.01682	0.05579	0.30	0.7636	Alternative_Fuels_Gallons(t-2)
Alternative_Fuels_Gallons	CONST4	-2331414.596	574863.68589	-4.06	0.0001	1
	AR1_4_1	-0.00005	0.00205	-0.03	0.9788	Gasoline_Gallons(t-1)
	AR1_4_2	0.01870	0.00836	2.24	0.0271	Diesel_Gallons(t-1)
	AR1_4_3	0.20428	0.14868	1.37	0.1720	Kerosene_Gallons(t-1)

AR1_4_4	0.00109	0.09152	0.01	0.9905	Alternative_Fuels_Gallons(t-1)
AR2_4_1	-0.00264	0.00203	-1.30	0.1957	Gasoline_Gallons(t-2)
AR2_4_2	0.02802	0.00825	3.40	0.0009	Diesel_Gallons(t-2)
AR2_4_3	0.00556	0.14510	0.04	0.9695	Kerosene_Gallons(t-2)
AR2_4_4	0.02379	0.09642	0.25	0.8055	Alternative_Fuels_Gallons(t-2)

Covariances of Innovations				
Variable	**Gasoline_Gallons**	**Diesel_Gallons**	**Kerosene_Gallons**	**Alternative_Fuels_Gallons**
Gasoline_Gallons	4.9995863E14	1.0264586E14	-1.947195E12	2.414352E12
Diesel_Gallons	1.0264586E14	3.992664E13	-3.768001E11	988038607545
Kerosene_Gallons	-1.947195E12	-3.768001E11	53371786122	7227533784.6
Alternative_Fuels_Gallons	2.414352E12	988038607545	7227533784.6	159396452835

Log-likelihood	-7686.77

Information Criteria	
AICC	15517.64
HQC	15519.14
AIC	15465.54
SBC	15597.45
FPEC	7.287E49

Illustration of ODS Graphics

The VARMAX Procedure

Number of Observations	132
Number of Pairwise Missing	0

Simple Summary Statistics						
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Alternative_Fuels_Gallons	Dependent	132	482229.06818	509431.11286	53077.00000	2372859.0000

Dickey-Fuller Unit Root Tests					
Variable	Type	Rho	Pr < Rho	Tau	Pr < Tau
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	Single Mean	-36.69	0.0011	-5.29	<.0001
	Trend	-53.35	0.0004	-7.01	<.0001
Diesel_Gallons	Zero Mean	-0.16	0.6458	-0.24	0.5986
	Single Mean	-21.73	0.0058	-3.30	0.0169
	Trend	-68.66	0.0004	-6.33	<.0001
Kerosene_Gallons	Zero Mean	-41.45	<.0001	-4.52	<.0001
	Single Mean	-85.06	0.0011	-6.45	<.0001
	Trend	-88.50	0.0004	-6.51	<.0001
Alternative_Fuels_Gallons	Zero Mean	-17.77	0.0027	-3.22	0.0015
	Single Mean	-40.29	0.0011	-4.60	0.0003
	Trend	-283.42	0.0001	-11.79	<.0001

Illustration of ODS Graphics

The VARMAX Procedure

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Estimation Method	Least Squares Estimation

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	AR1_1_1	0.37066	0.11466	3.23	0.0016	Gasoline_Gallons(t-1)
	AR1_1_2	-0.73230	0.46816	-1.56	0.1204	Diesel_Gallons(t-1)
	AR1_1_3	-16.96285	8.32695	-2.04	0.0438	Kerosene_Gallons(t-1)
	AR1_1_4	17.43293	5.12579	3.40	0.0009	Alternative_Fuels_Gallons(t-1)
	AR2_1_1	0.14297	0.11367	1.26	0.2109	Gasoline_Gallons(t-2)
	AR2_1_2	0.49454	0.46222	1.07	0.2868	Diesel_Gallons(t-2)
	AR2_1_3	16.16785	8.12617	1.99	0.0489	Kerosene_Gallons(t-2)
	AR2_1_4	7.76807	5.39988	1.44	0.1529	Alternative_Fuels_Gallons(t-2)
Diesel_Gallons	CONST2	36525646.868	9098230.3535	4.01	0.0001	1
	AR1_2_1	0.05780	0.03240	1.78	0.0769	Gasoline_Gallons(t-1)
	AR1_2_2	-0.07655	0.13230	-0.58	0.5639	Diesel_Gallons(t-1)
	AR1_2_3	-5.24901	2.35315	-2.23	0.0275	Kerosene_Gallons(t-1)
	AR1_2_4	6.35215	1.44852	4.39	0.0001	Alternative_Fuels_Gallons(t-1)
	AR2_2_1	0.00658	0.03212	0.20	0.8380	Gasoline_Gallons(t-2)
	AR2_2_2	0.26376	0.13062	2.02	0.0457	Diesel_Gallons(t-2)
	AR2_2_3	4.14046	2.29642	1.80	0.0739	Kerosene_Gallons(t-2)
	AR2_2_4	3.25159	1.52598	2.13	0.0351	Alternative_Fuels_Gallons(t-2)
Kerosene_Gallons	CONST3	435958.97454	332645.31976	1.31	0.1925	1
	AR1_3_1	-0.00313	0.00118	-2.65	0.0092	Gasoline_Gallons(t-1)
	AR1_3_2	0.00624	0.00484	1.29	0.1994	Diesel_Gallons(t-1)
	AR1_3_3	0.97238	0.08603	11.30	0.0001	Kerosene_Gallons(t-1)
	AR1_3_4	-0.09750	0.05296	-1.84	0.0681	Alternative_Fuels_Gallons(t-1)
	AR2_3_1	0.00103	0.00117	0.88	0.3830	Gasoline_Gallons(t-2)
	AR2_3_2	0.00026	0.00478	0.05	0.9567	Diesel_Gallons(t-2)
	AR2_3_3	-0.37273	0.08396	-4.44	0.0001	Kerosene_Gallons(t-2)
	AR2_3_4	0.01682	0.05579	0.30	0.7636	Alternative_Fuels_Gallons(t-2)
Alternative_Fuels_Gallons	CONST4	-2331414.596	574863.68589	-4.06	0.0001	1
	AR1_4_1	-0.00005	0.00205	-0.03	0.9788	Gasoline_Gallons(t-1)
	AR1_4_2	0.01870	0.00836	2.24	0.0271	Diesel_Gallons(t-1)
	AR1_4_3	0.20428	0.14868	1.37	0.1720	Kerosene_Gallons(t-1)

	AR1_4_4	0.00109	0.09152	0.01	0.9905	Alternative_Fuels_Gallons(t-1)
	AR2_4_1	-0.00264	0.00203	-1.30	0.1957	Gasoline_Gallons(t-2)
	AR2_4_2	0.02802	0.00825	3.40	0.0009	Diesel_Gallons(t-2)
	AR2_4_3	0.00556	0.14510	0.04	0.9695	Kerosene_Gallons(t-2)
	AR2_4_4	0.02379	0.09642	0.25	0.8055	Alternative_Fuels_Gallons(t-2)

Testing of the Parameters

Test	DF	Chi-Square	Pr > ChiSq
1	4	98.97	<.0001
2	16	208.35	<.0001
3	16	70.53	<.0001

Covariances of Innovations

Variable	Gasoline_Gallons	Diesel_Gallons	Kerosene_Gallons	Alternative_Fuels_Gallons
Gasoline_Gallons	4.9995863E14	1.0264586E14	-1.947195E12	2.414352E12
Diesel_Gallons	1.0264586E14	3.992664E13	-3.768001E11	988038607545
Kerosene_Gallons	-1.947195E12	-3.768001E11	53371786122	7227533784.6
Alternative_Fuels_Gallons	2.414352E12	988038607545	7227533784.6	159396452835

Log-likelihood	-7686.77

Information Criteria

AICC	15517.64
HQC	15519.14
AIC	15465.54
SBC	15597.45
FPEC	7.287E49

Illustration of ODS Graphics

The VARMAX Procedure

Number of Observations	132
Number of Pairwise Missing	0

Simple Summary Statistics						
Variable	Type	N	Mean	Standard Deviation	Min	Max
Gasoline_Gallons	Dependent	132	376804937.74	34812609.531	218414414.00	476873743.00
Diesel_Gallons	Dependent	132	80003756.470	9364707.9800	64939973.000	111638305.00
Kerosene_Gallons	Dependent	132	299988.92424	368176.38610	2214.00000	1725070.0000
Alternative_Fuels_Gallons	Dependent	132	482229.06818	509431.11286	53077.00000	2372859.0000

Illustration of ODS Graphics

The VARMAX Procedure

Type of Model	VAR(1)
Estimation Method	Least Squares Estimation

Model Parameter Estimates						
Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
Gasoline_Gallons	AR1_1_1	0.99173	0.11497	8.63	0.0001	Gasoline_Gallons(t-1) É)
	AR1_1_2	-0.07875	0.55512	-0.14	0.8874	Diesel_Gallons(t-1) É)
	AR1_1_3	15.51232	6.89407	2.25	0.0262	Kerosene_Gallons(t-1) É)
	AR1_1_4	8.90522	6.12408	1.45	0.1484	Alternative_Fuels_Gallons(t-1) É)
Diesel_Gallons	AR1_2_1	0.15783	0.02931	5.39	0.0001	Gasoline_Gallons(t-1) É)
	AR1_2_2	0.21701	0.14150	1.53	0.1276	Diesel_Gallons(t-1) É)
	AR1_2_3	1.51085	1.75733	0.86	0.3916	Kerosene_Gallons(t-1) É)
	AR1_2_4	5.19924	1.56106	3.33	0.0011	Alternative_Fuels_Gallons(t-1) É)
Kerosene_Gallons	AR1_3_1	-0.00161	0.00099	-1.63	0.1056	Gasoline_Gallons(t-1) É)
	AR1_3_2	0.00912	0.00478	1.91	0.0587	Diesel_Gallons(t-1) É)
	AR1_3_3	0.75283	0.05937	12.68	0.0001	Kerosene_Gallons(t-1) É)
	AR1_3_4	-0.10489	0.05274	-1.99	0.0489	Alternative_Fuels_Gallons(t-1) É)
Alternative_Fuels_Gallons	AR1_4_1	-0.00454	0.00176	-2.58	0.0110	Gasoline_Gallons(t-1) É)
	AR1_4_2	0.02646	0.00850	3.11	0.0023	Diesel_Gallons(t-1) É)
	AR1_4_3	-0.04989	0.10559	-0.47	0.6374	Kerosene_Gallons(t-1) É)
	AR1_4_4	0.20325	0.09380	2.17	0.0321	Alternative_Fuels_Gallons(t-1) É)

Covariances of Innovations				
Variable	Gasoline_Gallons	Diesel_Gallons	Kerosene_Gallons	Alternative_Fuels_Gallons
Gasoline_Gallons	8.7358682E14	1.7277449E14	-9.246189E11	460186760657
Diesel_Gallons	1.7277449E14	5.6762351E13	-1.972046E11	951456902723
Kerosene_Gallons	-9.246189E11	-1.972046E11	64791730949	4561539095.8
Alternative_Fuels_Gallons	460186760657	951456902723	4561539095.8	204919654655

Log-likelihood	-7845.24

Information Criteria	
AICC	15755.98
HQC	15772.85
AIC	15742.48
SBC	15817.23
FPEC	2.434E50

Cross Covariances of Residuals					
Lag	Variable	Gasoline_Gallons	Diesel_Gallons	Kerosene_Gallons	Alternative_Fuels_Gallons
0	Gasoline_Gallons	8.4691241E14	1.6749893E14	-8.963863E11	446135256515
	Diesel_Gallons	1.6749893E14	5.502915E13	-1.911831E11	922404783556
	Kerosene_Gallons	-8.963863E11	-1.911831E11	62813357485	4422255459.3
	Alternative_Fuels_Gallons	446135256515	922404783556	4422255459.3	198662565964
1	Gasoline_Gallons	-3.844266E14	-8.580358E13	-1.468598E12	-4.617432E11
	Diesel_Gallons	-7.810414E13	-2.146532E13	-3.393566E11	-4.918981E11
	Kerosene_Gallons	-6.063832E11	-1.381215E11	17366917739	3822775183.9
	Alternative_Fuels_Gallons	-7.569465E11	-3.889965E11	-4093575592	-27033630578
2	Gasoline_Gallons	1.4952401E14	3.7943429E13	73802670187	-7.730788E11
	Diesel_Gallons	3.80593E13	1.2342205E13	-51246881797	-2.145131E11
	Kerosene_Gallons	-1.091602E12	-3.155754E11	3892161236.6	2181273525.3
	Alternative_Fuels_Gallons	-9.33129E11	102167078398	-16867512282	-5129065180
3	Gasoline_Gallons	-3.725314E12	1.3664961E12	-6.090248E11	897958223381
	Diesel_Gallons	1.3914252E13	3.0679067E12	-20661874781	788548503405
	Kerosene_Gallons	911703591143	556426310983	-13479484525	14968021516
	Alternative_Fuels_Gallons	1.6691512E12	626458555057	9851170806.9	122460848773
4	Gasoline_Gallons	-1.300512E14	-3.928221E13	416673097442	196876694826
	Diesel_Gallons	-2.537704E13	-6.8589E12	28510976361	285732728809
	Kerosene_Gallons	-7.842569E11	-37278978837	-12497387886	-6368529268
	Alternative_Fuels_Gallons	-9.851419E11	-17728202212	-1985033218	-2687285322
5	Gasoline_Gallons	1.7176273E14	1.9683189E13	1.4299431E12	-1.125647E12
	Diesel_Gallons	3.0578681E13	2.0577087E12	17068887552	-3.18394E11
	Kerosene_Gallons	1.3446536E12	215219507166	-14510466349	-10365259192
	Alternative_Fuels_Gallons	-2.701126E12	-9.383934E11	-454473728.0	-14724053903
6	Gasoline_Gallons	-2.754999E14	-4.391813E13	791081970486	1.9279638E12
	Diesel_Gallons	-3.405292E13	557660596399	-3660644203	1.1541099E12
	Kerosene_Gallons	840154118298	-1.119181E11	-16007886628	1861686121.5
	Alternative_Fuels_Gallons	3.8613319E12	1.4763962E12	-3720497718	140413366454
7	Gasoline_Gallons	1.6685336E14	3.2941688E13	1.3701304E12	-1.430549E12
	Diesel_Gallons	1.2861059E13	2.275329E12	309332189393	-4.741601E11
	Kerosene_Gallons	1.0621212E12	40300548967	-12129205069	-1443833518
	Alternative_Fuels_Gallons	-2.701877E12	-5.84456E11	-7115224327	-15779896514
8	Gasoline_Gallons	-1.267646E14	-2.796144E13	-1.091444E12	-7.878981E11
	Diesel_Gallons	-3.754741E13	-8.007993E12	-61459350916	-2.369207E11
	Kerosene_Gallons	962189632050	73252573768	-15085785894	2318031789.1
	Alternative_Fuels_Gallons	-1.126056E12	-25598846114	2289276537.7	-6317191628
9	Gasoline_Gallons	1.7042233E13	1.9501567E13	878470711183	1.7384008E12
	Diesel_Gallons	2.9768664E12	3.0241692E12	453604358809	698446282586

	Variable				
	Kerosene_Gallons	-4.368368E11	-46785484027	-10738825354	6763710138.5
	Alternative_Fuels_Gallons	1.4101489E12	670700612926	5249657795.9	115535749259
10	Gasoline_Gallons	1.308368E14	1.8628684E13	-3.353529E11	-1.241564E12
	Diesel_Gallons	2.52764E13	2.459813E12	-1.531088E11	19249088837
	Kerosene_Gallons	-11868323988	110013564913	12710539410	-10774921768
	Alternative_Fuels_Gallons	-2.518239E12	-5.589392E11	390667937.71	-8367361161
11	Gasoline_Gallons	-2.640605E14	-5.421709E13	-4.684525E11	-2.360752E11
	Diesel_Gallons	-6.639926E13	-1.300335E13	91068439117	-1.97317E11
	Kerosene_Gallons	-1.640314E12	-3.52751E11	22434806012	-7816965282
	Alternative_Fuels_Gallons	-3.431833E11	-50498376073	14111177159	-18158482042
12	Gasoline_Gallons	3.780398E14	7.1031558E13	-3.926163E11	178865045452
	Diesel_Gallons	9.2168006E13	2.3056267E13	-3.162224E11	683420434812
	Kerosene_Gallons	-1.0217E12	-2.002012E11	32456973949	7307780283.2
	Alternative_Fuels_Gallons	1.1251242E12	875980019240	-5016472922	132082592887

Cross Correlations of Residuals					
Lag	Variable	Gasoline_Gallons	Diesel_Gallons	Kerosene_Gallons	Alternative_Fuels_Gallons
0	Gasoline_Gallons	1.00000	0.77588	-0.12290	0.03439
	Diesel_Gallons	0.77588	1.00000	-0.10283	0.27898
	Kerosene_Gallons	-0.12290	-0.10283	1.00000	0.03959
	Alternative_Fuels_Gallons	0.03439	0.27898	0.03959	1.00000
1	Gasoline_Gallons	-0.45392	-0.39746	-0.20135	-0.03560
	Diesel_Gallons	-0.36179	-0.39007	-0.18253	-0.14877
	Kerosene_Gallons	-0.08314	-0.07429	0.27648	0.03422
	Alternative_Fuels_Gallons	-0.05836	-0.11765	-0.03665	-0.13608
2	Gasoline_Gallons	0.17655	0.17576	0.01012	-0.05960
	Diesel_Gallons	0.17630	0.22428	-0.02756	-0.06488
	Kerosene_Gallons	-0.14966	-0.16974	0.06196	0.01953
	Alternative_Fuels_Gallons	-0.07194	0.03090	-0.15100	-0.02582
3	Gasoline_Gallons	-0.00440	0.00633	-0.08350	0.06923
	Diesel_Gallons	0.06445	0.05575	-0.01111	0.23849
	Kerosene_Gallons	0.12500	0.29929	-0.21460	0.13399
	Alternative_Fuels_Gallons	0.12868	0.18947	0.08819	0.61643
4	Gasoline_Gallons	-0.15356	-0.18196	0.05713	0.01518
	Diesel_Gallons	-0.11755	-0.12464	0.01534	0.08642
	Kerosene_Gallons	-0.10753	-0.02005	-0.19896	-0.05701
	Alternative_Fuels_Gallons	-0.07595	-0.00536	-0.01777	-0.01353
5	Gasoline_Gallons	0.20281	0.09118	0.19605	-0.08678
	Diesel_Gallons	0.14165	0.03739	0.00918	-0.09630
	Kerosene_Gallons	0.18436	0.11576	-0.23101	-0.09279

	Alternative_Fuels_Gallons	-0.20824	-0.28381	-0.00407	-0.07412
6	Gasoline_Gallons	-0.32530	-0.20344	0.10846	0.14864
	Diesel_Gallons	-0.15774	0.01013	-0.00197	0.34905
	Kerosene_Gallons	0.11519	-0.06020	-0.25485	0.01667
	Alternative_Fuels_Gallons	0.29769	0.44653	-0.03331	0.70679
7	Gasoline_Gallons	0.19701	0.15259	0.18785	-0.11029
	Diesel_Gallons	0.05957	0.04135	0.16638	-0.14341
	Kerosene_Gallons	0.14562	0.02168	-0.19310	-0.01293
	Alternative_Fuels_Gallons	-0.20830	-0.17677	-0.06369	-0.07943
8	Gasoline_Gallons	-0.14968	-0.12952	-0.14964	-0.06074
	Diesel_Gallons	-0.17393	-0.14552	-0.03306	-0.07166
	Kerosene_Gallons	0.13192	0.03940	-0.24017	0.02075
	Alternative_Fuels_Gallons	-0.08681	-0.00774	0.02049	-0.03180
9	Gasoline_Gallons	0.02012	0.09033	0.12044	0.13402
	Diesel_Gallons	0.01379	0.05496	0.24398	0.21124
	Kerosene_Gallons	-0.05989	-0.02516	-0.17096	0.06055
	Alternative_Fuels_Gallons	0.10871	0.20285	0.04699	0.58157
10	Gasoline_Gallons	0.15449	0.08629	-0.04598	-0.09572
	Diesel_Gallons	0.11708	0.04470	-0.08235	0.00582
	Kerosene_Gallons	-0.00163	0.05917	0.20235	-0.09646
	Alternative_Fuels_Gallons	-0.19414	-0.16905	0.00350	-0.04212
11	Gasoline_Gallons	-0.31179	-0.25114	-0.06423	-0.01820
	Diesel_Gallons	-0.30757	-0.23630	0.04898	-0.05968
	Kerosene_Gallons	-0.22490	-0.18973	0.35717	-0.06998
	Alternative_Fuels_Gallons	-0.02646	-0.01527	0.12632	-0.09140
12	Gasoline_Gallons	0.44637	0.32903	-0.05383	0.01379
	Diesel_Gallons	0.42694	0.41898	-0.17009	0.20670
	Kerosene_Gallons	-0.14008	-0.10768	0.51672	0.06542
	Alternative_Fuels_Gallons	0.08674	0.26494	-0.04491	0.66486

Schematic Representation of Cross Correlations of Residuals												
Variable/Lag	0	1	2	3	4	5	6	7	8	9	10	11	12
Gasoline_Gallons	++..	---.	++..	....	.-..	+.+.	--..	+.+.	....	....	....	--..	++..
Diesel_Gallons	++.+	---.	++..	...+	....	....	...+	....	....	..++	....	--..	++.+
Kerosene_Gallons	..+.	..+.	....	.+-.	..-.	+.-.	..-.	..-.	..-.	....	..+.	--+.	..+.
Alternative_Fuels_Gallons	.+.+	....	....	.+.+	....	--..	++.+	--..	....	.+.+	-...	....	.+.+
+ is > 2*std error, - is < -2*std error, . is between												

Portmanteau Test for Cross Correlations of Residuals			
Up To Lag	DF	Chi-Square	Pr > ChiSq

2	16	75.52	<.0001
3	32	155.84	<.0001
4	48	176.33	<.0001
5	64	223.68	<.0001
6	80	345.28	<.0001
7	96	380.30	<.0001
8	112	406.50	<.0001
9	128	475.28	<.0001
10	144	504.02	<.0001
11	160	552.96	<.0001
12	176	694.26	<.0001

Univariate Model ANOVA Diagnostics				
Variable	R-Square	Standard Deviation	F Value	Pr > F
Gasoline_Gallons	0.2620	29556502.077	15.03	<.0001
Diesel_Gallons	0.3692	7534079.3339	24.78	<.0001
Kerosene_Gallons	0.5350	254542.19876	48.71	<.0001
Alternative_Fuels_Gallons	0.2341	452680.52162	12.94	<.0001

Univariate Model White Noise Diagnostics					
	Durbin Watson	Normality		ARCH	
Variable		Chi-Square	Pr > ChiSq	F Value	Pr > F
Gasoline_Gallons	2.86953	114.17	<.0001	25.63	<.0001
Diesel_Gallons	2.77591	401.79	<.0001	14.53	0.0002
Kerosene_Gallons	1.44464	102.24	<.0001	10.42	0.0016
Alternative_Fuels_Gallons	2.22299	81.87	<.0001	0.89	0.3475

Univariate Model AR Diagnostics								
	AR1		AR2		AR3		AR4	
Variable	F Value	Pr > F	F Value	Pr > F	F Value	Pr > F	F Value	Pr > F
Gasoline_Gallons	35.55	<.0001	14.75	<.0001	14.96	<.0001	14.00	<.0001
Diesel_Gallons	23.28	<.0001	13.44	<.0001	13.66	<.0001	11.69	<.0001
Kerosene_Gallons	10.60	0.0014	5.25	0.0065	6.43	0.0004	4.91	0.0010
Alternative_Fuels_Gallons	2.57	0.1116	1.06	0.3489	29.67	<.0001	24.61	<.0001

Illustration of ODS Graphics

The VARMAX Procedure

Number of Observations	132
Number of Pairwise Missing	0

Simple Summary Statistics						
Variable	Type	N	Mean	Standard Deviation	Min	Max
Gasoline_Gallons	Dependent	132	376804937.74	34812609.531	218414414.00	476873743.00
Diesel_Gallons	Dependent	132	80003756.470	9364707.9800	64939973.000	111638305.00
Kerosene_Gallons	Dependent	132	299988.92424	368176.38610	2214.00000	1725070.0000
Alternative_Fuels_Gallons	Dependent	132	482229.06818	509431.11286	53077.00000	2372859.0000

Illustration of ODS Graphics

The VARMAX Procedure

Type of Model	VAR(1)-GARCH(1,1)
Estimation Method	Maximum Likelihood Estimation
Representation Type	CCC

Schematic Representation of Parameter Estimates	
Variable/Lag	AR1
Gasoline_Gallons	*.+.
Diesel_Gallons	**.+
Kerosene_Gallons	****
Alternative_Fuels_Gallons	****

+ is > 2*std error, - is < -2*std error, . is between, * is N/A

Schematic Representation of GARCH Parameter Estimates			
Variable/Lag	GCHC	ACH1	GCH1
h1	*	****	****
h2	*	****	****
h3	*	****	****
h4	*	****	****

+ is > 2*std error, - is < -2*std error, . is between, * is N/A

Model Parameter Estimates						
Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
Gasoline_Gallons	AR1_1_1	0.99379	0.00000			Gasoline_Gallons(t-1)
	AR1_1_2	-0.07384	0.46213	-0.16	0.8733	Diesel_Gallons(t-1)
	AR1_1_3	15.51248	5.61146	2.76	0.0065	Kerosene_Gallons(t-1)
	AR1_1_4	8.90700	6.72745	1.32	0.1878	Alternative_Fuels_Gallons(t-1)
Diesel_Gallons	AR1_2_1	0.12973	0.00000			Gasoline_Gallons(t-1)
	AR1_2_2	0.35465	0.00000			Diesel_Gallons(t-1)
	AR1_2_3	1.52129	1.51976	1.00	0.3187	Kerosene_Gallons(t-1)
	AR1_2_4	5.21484	1.64411	3.17	0.0019	Alternative_Fuels_Gallons(t-1)
Kerosene_Gallons	AR1_3_1	-0.00067	0.00000			Gasoline_Gallons(t-1)
	AR1_3_2	0.00368	0.00000			Diesel_Gallons(t-1)
	AR1_3_3	0.71656	0.00000			Kerosene_Gallons(t-1)
	AR1_3_4	-0.01728	0.00000			Alternative_Fuels_Gallons(t-1)

Alternative_Fuels_Gallons	AR1_4_1	-0.00529	0.00000			Gasoline_Gallons(t-1)
	AR1_4_2	0.02980	0.00000			Diesel_Gallons(t-1)
	AR1_4_3	-0.05051	0.00000			Kerosene_Gallons(t-1)
	AR1_4_4	0.24880	0.00000			Alternative_Fuels_Gallons(t-1)

GARCH Model Parameter Estimates				
Parameter	Estimate	Standard Error	t Value	Pr > |t|
CCC1_2	0.75782	0.00000		
CCC1_3	-0.22623	0.00000		
CCC2_3	-0.18039	0.00000		
CCC1_4	0.03899	0.00000		
CCC2_4	0.27376	0.00000		
CCC3_4	0.07420	0.00000		
GCHC1_1	8.7358682E14	0.00000		
GCHC2_2	5.6762351E13	0.00000		
GCHC3_3	64791730949	0.00000		
GCHC4_4	204919654655	0.00000		
ACH1_1_1	0.37790	0.00000		
ACH1_2_2	0.31527	0.00000		
ACH1_3_3	0.51792	0.00000		
ACH1_4_4	0.08012	0.00000		
GCH1_1_1	-0.31762	0.00000		
GCH1_2_2	-0.23780	0.00000		
GCH1_3_3	-0.26379	0.00000		
GCH1_4_4	-0.08719	0.00000		

Covariances of Innovations				
Variable	Gasoline_Gallons	Diesel_Gallons	Kerosene_Gallons	Alternative_Fuels_Gallons
Gasoline_Gallons	8.4829512E14	1.6804057E14	-9.539236E11	456916256723
Diesel_Gallons	1.6804057E14	5.5805809E13	-2.167098E11	949311685658
Kerosene_Gallons	-9.539236E11	-2.167098E11	66747615315	4552354310.1
Alternative_Fuels_Gallons	456916256723	949311685658	4552354310.1	200017189487

Log-likelihood	-7800.12

Information Criteria	
AICC	15693.04
HQC	15707.97
AIC	15668.24
SBC	15766

| FPEC | 2.665E50 |

Illustration of ODS Graphics

The VARMAX Procedure

Number of Observations	132
Number of Pairwise Missing	0

Simple Summary Statistics						
Variable	Type	N	Mean	Standard Deviation	Min	Max
Gasoline_Gallons	Dependent	132	376804937.74	34812609.531	218414414.00	476873743.00
Diesel_Gallons	Dependent	132	80003756.470	9364707.9800	64939973.000	111638305.00
Kerosene_Gallons	Dependent	132	299988.92424	368176.38610	2214.00000	1725070.0000
Alternative_Fuels_Gallons	Dependent	132	482229.06818	509431.11286	53077.00000	2372859.0000

Illustration of ODS Graphics

The VARMAX Procedure

Type of Model	VAR(1)-GARCH(1,1)
Estimation Method	Maximum Likelihood Estimation
Representation Type	BEKK

Schematic Representation of Parameter Estimates	
Variable/Lag	AR1
Gasoline_Gallons	+.+.
Diesel_Gallons	+..+
Kerosene_Gallons	*.+.
Alternative_Fuels_Gallons	-+..

+ is > 2*std error, - is < -2*std error, . is between, * is N/A

Schematic Representation of GARCH Parameter Estimates			
Variable/Lag	GCHC	ACH1	GCH1
h1	****	+.*.	..**
h2	****	...+	...*
h3	****	..+.	..**
h4	****	....	....

+ is > 2*std error, - is < -2*std error, . is between, * is N/A

Model Parameter Estimates						
Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
Gasoline_Gallons	AR1_1_1	1.14578	0.13051	8.78	0.0001	Gasoline_Gallons(t-1)
	AR1_1_2	-0.79958	0.63350	-1.26	0.2091	Diesel_Gallons(t-1)
	AR1_1_3	15.85183	6.67683	2.37	0.0190	Kerosene_Gallons(t-1)
	AR1_1_4	9.19882	6.40786	1.44	0.1535	Alternative_Fuels_Gallons(t-1)
Diesel_Gallons	AR1_2_1	0.16578	0.03578	4.63	0.0001	Gasoline_Gallons(t-1)
	AR1_2_2	0.18717	0.17399	1.08	0.2840	Diesel_Gallons(t-1)
	AR1_2_3	1.20571	1.79242	0.67	0.5023	Kerosene_Gallons(t-1)
	AR1_2_4	3.94997	1.74055	2.27	0.0249	Alternative_Fuels_Gallons(t-1)
Kerosene_Gallons	AR1_3_1	-0.00200	0.00000			Gasoline_Gallons(t-1)
	AR1_3_2	0.01061	0.00583	1.82	0.0710	Diesel_Gallons(t-1)
	AR1_3_3	0.73733	0.06906	10.68	0.0001	Kerosene_Gallons(t-1)
	AR1_3_4	-0.09435	0.05787	-1.63	0.1054	Alternative_Fuels_Gallons(t-1)

Alternative_Fuels_Gallons	AR1_4_1	-0.00788	0.00219	-3.61	0.0004	Gasoline_Gallons(t-1)
	AR1_4_2	0.04264	0.01062	4.02	0.0001	Diesel_Gallons(t-1)
	AR1_4_3	-0.03226	0.10493	-0.31	0.7590	Kerosene_Gallons(t-1)
	AR1_4_4	0.17107	0.11194	1.53	0.1289	Alternative_Fuels_Gallons(t-1)

GARCH Model Parameter Estimates				
Parameter	Estimate	Standard Error	t Value	Pr > |t|
GCHC1_1	8.7358682E14	0.00000		
GCHC1_2	1.7277449E14	0.00000		
GCHC2_2	5.6762351E13	0.00000		
GCHC1_3	-9.246189E11	0.00000		
GCHC2_3	-1.972046E11	0.00000		
GCHC3_3	64791730949	0.00000		
GCHC1_4	460186760657	0.00000		
GCHC2_4	951456902723	0.00000		
GCHC3_4	4561539095.8	0.00000		
GCHC4_4	204919654655	0.00000		
ACH1_1_1	0.64866	0.18982	3.42	0.0008
ACH1_2_1	-0.89845	0.80837	-1.11	0.2684
ACH1_3_1	0.65287	15.52715	0.04	0.9665
ACH1_4_1	2.09977	9.22754	0.23	0.8203
ACH1_1_2	0.08440	0.04786	1.76	0.0801
ACH1_2_2	0.18873	0.19901	0.95	0.3447
ACH1_3_2	-2.89409	3.73770	-0.77	0.4402
ACH1_4_2	-3.64809	2.36150	-1.54	0.1248
ACH1_1_3	-0.00211	0.00000		
ACH1_2_3	0.01045	0.00667	1.57	0.1196
ACH1_3_3	0.48572	0.13502	3.60	0.0005
ACH1_4_3	-0.13567	0.07087	-1.91	0.0577
ACH1_1_4	-0.00488	0.00266	-1.84	0.0683
ACH1_2_4	0.02895	0.01145	2.53	0.0126
ACH1_3_4	-0.18381	0.19881	-0.92	0.3569
ACH1_4_4	0.05378	0.16239	0.33	0.7410
GCH1_1_1	-0.00161	0.24867	-0.01	0.9948
GCH1_2_1	-0.00206	0.98755	-0.00	0.9983
GCH1_3_1	-0.00632	16.47420	-0.00	0.9997
GCH1_4_1	-0.00244	10.40386	-0.00	0.9998
GCH1_1_2	-0.00012	0.06160	-0.00	0.9985
GCH1_2_2	-0.00302	0.23185	-0.01	0.9896

GCH1_3_2	0.02668	4.64085	0.01	0.9954
GCH1_4_2	0.03114	2.70834	0.01	0.9908
GCH1_1_3	0.00011	0.00000		
GCH1_2_3	-0.00048	0.00215	-0.22	0.8245
GCH1_3_3	-0.01062	0.00000		
GCH1_4_3	0.00218	0.09464	0.02	0.9816
GCH1_1_4	0.00048	0.00000		
GCH1_2_4	-0.00212	0.00000		
GCH1_3_4	-0.01903	0.00000		
GCH1_4_4	0.00779	0.16597	0.05	0.9626

Covariances of Innovations				
Variable	Gasoline_Gallons	Diesel_Gallons	Kerosene_Gallons	Alternative_Fuels_Gallons
Gasoline_Gallons	8.6260589E14	1.6920285E14	-9.586304E11	148457538933
Diesel_Gallons	1.6920285E14	5.555678E13	-1.955723E11	888290892959
Kerosene_Gallons	-9.586304E11	-1.955723E11	63737546466	4538413294.5
Alternative_Fuels_Gallons	148457538933	888290892959	4538413294.5	205995027261

Log-likelihood	-7821.65

Information Criteria	
AICC	15854.36
HQC	15827.07
AIC	15759.3
SBC	15926.07
FPEC	2.664E50

Illustration of ODS Graphics

The VARMAX Procedure

Number of Observations	132
Number of Pairwise Missing	0

Simple Summary Statistics						
Variable	Type	N	Mean	Standard Deviation	Min	Max
Gasoline_Gallons	Dependent	132	376804937.74	34812609.531	218414414.00	476873743.00
Diesel_Gallons	Dependent	132	80003756.470	9364707.9800	64939973.000	111638305.00
Kerosene_Gallons	Dependent	132	299988.92424	368176.38610	2214.00000	1725070.0000
Alternative_Fuels_Gallons	Dependent	132	482229.06818	509431.11286	53077.00000	2372859.0000

Illustration of ODS Graphics

The VARMAX Procedure

Type of Model	VAR(1)-GARCH(1,1)
Estimation Method	Maximum Likelihood Estimation
Representation Type	BEKK

Schematic Representation of Parameter Estimates	
Variable/Lag	AR1
Gasoline_Gallons	+.+.
Diesel_Gallons	++.+
Kerosene_Gallons	..+.
Alternative_Fuels_Gallons	-+.+

+ is > 2*std error, - is < -2*std error, . is between, * is N/A

Schematic Representation of GARCH Parameter Estimates			
Variable/Lag	GCHC	ACH1	GCH1
h1	****	+***	.***
h2	****	*+**	*.**
h3	****	**+*	**.*
h4	****	***+	***.

+ is > 2*std error, - is < -2*std error, . is between, * is N/A

Model Parameter Estimates						
Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
Gasoline_Gallons	AR1_1_1	0.98952	0.11285	8.77	0.0001	Gasoline_Gallons(t-1)
	AR1_1_2	-0.05698	0.54571	-0.10	0.9170	Diesel_Gallons(t-1)
	AR1_1_3	16.33230	6.54459	2.50	0.0138	Kerosene_Gallons(t-1)
	AR1_1_4	8.63501	6.15075	1.40	0.1627	Alternative_Fuels_Gallons(t-1)
Diesel_Gallons	AR1_2_1	0.13302	0.03056	4.35	0.0001	Gasoline_Gallons(t-1)
	AR1_2_2	0.33640	0.14781	2.28	0.0245	Diesel_Gallons(t-1)
	AR1_2_3	1.82265	1.69535	1.08	0.2843	Kerosene_Gallons(t-1)
	AR1_2_4	5.35801	1.55853	3.44	0.0008	Alternative_Fuels_Gallons(t-1)
Kerosene_Gallons	AR1_3_1	-0.00105	0.00100	-1.05	0.2962	Gasoline_Gallons(t-1)
	AR1_3_2	0.00594	0.00484	1.23	0.2218	Diesel_Gallons(t-1)
	AR1_3_3	0.73178	0.06446	11.35	0.0001	Kerosene_Gallons(t-1)
	AR1_3_4	-0.06604	0.05325	-1.24	0.2171	Alternative_Fuels_Gallons(t-1)

Alternative_Fuels_Gallons	AR1_4_1	-0.00493	0.00186	-2.66	0.0089	Gasoline_Gallons(t-1)
	AR1_4_2	0.02749	0.00903	3.04	0.0028	Diesel_Gallons(t-1)
	AR1_4_3	-0.01476	0.09926	-0.15	0.8820	Kerosene_Gallons(t-1)
	AR1_4_4	0.34802	0.11658	2.99	0.0034	Alternative_Fuels_Gallons(t-1)

GARCH Model Parameter Estimates				
Parameter	Estimate	Standard Error	t Value	Pr > |t|
GCHC1_1	8.7358682E14	0.00000		
GCHC1_2	1.7277449E14	0.00000		
GCHC2_2	5.6762351E13	0.00000		
GCHC1_3	-9.246189E11	0.00000		
GCHC2_3	-1.972046E11	0.00000		
GCHC3_3	64791730949	0.00000		
GCHC1_4	460186760657	0.00000		
GCHC2_4	951456902723	0.00000		
GCHC3_4	4561539095.8	0.00000		
GCHC4_4	204919654655	0.00000		
ACH1_1_1	0.40776	0.06875	5.93	0.0001
ACH1_2_1	0.00000	0.00000		
ACH1_3_1	0.00000	0.00000		
ACH1_4_1	0.00000	0.00000		
ACH1_1_2	0.00000	0.00000		
ACH1_2_2	0.40776	0.06875	5.93	0.0001
ACH1_3_2	0.00000	0.00000		
ACH1_4_2	0.00000	0.00000		
ACH1_1_3	0.00000	0.00000		
ACH1_2_3	0.00000	0.00000		
ACH1_3_3	0.40776	0.06875	5.93	0.0001
ACH1_4_3	0.00000	0.00000		
ACH1_1_4	0.00000	0.00000		
ACH1_2_4	0.00000	0.00000		
ACH1_3_4	0.00000	0.00000		
ACH1_4_4	0.40776	0.06875	5.93	0.0001
GCH1_1_1	0.00006	0.09786	0.00	0.9995
GCH1_2_1	0.00000	0.00000		
GCH1_3_1	0.00000	0.00000		
GCH1_4_1	0.00000	0.00000		
GCH1_1_2	0.00000	0.00000		
GCH1_2_2	0.00006	0.09786	0.00	0.9995

GCH1_3_2	0.00000	0.00000		
GCH1_4_2	0.00000	0.00000		
GCH1_1_3	0.00000	0.00000		
GCH1_2_3	0.00000	0.00000		
GCH1_3_3	0.00006	0.09786	0.00	0.9995
GCH1_4_3	0.00000	0.00000		
GCH1_1_4	0.00000	0.00000		
GCH1_2_4	0.00000	0.00000		
GCH1_3_4	0.00000	0.00000		
GCH1_4_4	0.00006	0.09786	0.00	0.9995

Testing of the Restricted Parameters					
Parameter	**Estimate**	**Standard Error**	**t Value**	**Pr > |t|**	**Equation**
Restrict0	106.95199	62.60301	1.71	0.0906	+ ACH1_1_2 = 0
Restrict1	344.44766	1127.56654	0.31	0.7606	+ ACH1_1_3 = 0
Restrict2	-291.08814	687.75565	-0.42	0.6730	+ ACH1_1_4 = 0
Restrict3	-1.98552	3.84515	-0.52	0.6067	+ ACH1_2_1 = 0
Restrict4	9.76890	14.64033	0.67	0.5061	-ACH1_1_1 + ACH1_2_2 = 0
Restrict5	21.67868	307.59480	0.07	0.9439	+ ACH1_2_3 = 0
Restrict6	165.65967	172.00728	0.96	0.3378	+ ACH1_2_4 = 0
Restrict7	0.08385	0.09476	0.88	0.3783	+ ACH1_3_1 = 0
Restrict8	-0.24512	0.45151	-0.54	0.5884	+ ACH1_3_2 = 0
Restrict9	6.29303	6.12350	1.03	0.3065	-ACH1_1_1 + ACH1_3_3 = 0
Restrict10	-0.27292	5.46184	-0.05	0.9602	+ ACH1_3_4 = 0
Restrict11	0.11461	0.14667	0.78	0.4363	+ ACH1_4_1 = 0
Restrict12	-0.13747	0.45614	-0.30	0.7637	+ ACH1_4_2 = 0
Restrict13	-25.43842	15.31468	-1.66	0.0997	+ ACH1_4_3 = 0
Restrict14	-0.35495	5.31056	-0.07	0.9468	-ACH1_1_1 + ACH1_4_4 = 0
Restrict15	-0.00436	26.72210	-0.00	0.9999	+ GCH1_1_2 = 0
Restrict16	0.00163	743.50179	0.00	1.0000	+ GCH1_1_3 = 0
Restrict17	-0.00243	292.91870	-0.00	1.0000	+ GCH1_1_4 = 0
Restrict18	-0.00033	2.02184	-0.00	0.9999	+ GCH1_2_1 = 0
Restrict19	0.00040	6.71370	0.00	1.0000	-GCH1_1_1 + GCH1_2_2 = 0
Restrict20	-0.00040	180.84194	-0.00	1.0000	+ GCH1_2_3 = 0
Restrict21	-0.01435	70.02671	-0.00	0.9998	+ GCH1_2_4 = 0
Restrict22	-0.00000	0.06542	-0.00	1.0000	+ GCH1_3_1 = 0
Restrict23	0.00003	0.21879	0.00	0.9999	+ GCH1_3_2 = 0
Restrict24	-0.00063	4.74448	-0.00	0.9999	-GCH1_1_1 + GCH1_3_3 = 0
Restrict25	0.00025	2.98941	0.00	0.9999	+ GCH1_3_4 = 0
Restrict26	0.00001	0.09620	0.00	0.9999	+ GCH1_4_1 = 0

Restrict27	-0.00005	0.39212	-0.00	0.9999	+ GCH1_4_2 = 0
Restrict28	0.00119	9.27607	0.00	0.9999	+ GCH1_4_3 = 0
Restrict29	0.00061	3.10682	0.00	0.9998	-GCH1_1_1 + GCH1_4_4 = 0

Covariances of Innovations				
Variable	**Gasoline_Gallons**	**Diesel_Gallons**	**Kerosene_Gallons**	**Alternative_Fuels_Gallons**
Gasoline_Gallons	8.4804274E14	1.6791657E14	-9.283237E11	462705558303
Diesel_Gallons	1.6791657E14	5.5657839E13	-2.057305E11	963499551512
Kerosene_Gallons	-9.283237E11	-2.057305E11	63929876555	4541875787.8
Alternative_Fuels_Gallons	462705558303	963499551512	4541875787.8	204664266546

Log-likelihood	-7831.94

Information Criteria	
AICC	15735.81
HQC	15752.6
AIC	15719.89
SBC	15800.39
FPEC	2.593E50

Illustration of ODS Graphics

The VARMAX Procedure

Number of Observations	132
Number of Pairwise Missing	0

Simple Summary Statistics						
Variable	Type	N	Mean	Standard Deviation	Min	Max
Gasoline_Gallons	Dependent	132	376804937.74	34812609.531	218414414.00	476873743.00
Diesel_Gallons	Dependent	132	80003756.470	9364707.9800	64939973.000	111638305.00
Kerosene_Gallons	Dependent	132	299988.92424	368176.38610	2214.00000	1725070.0000
Alternative_Fuels_Gallons	Dependent	132	482229.06818	509431.11286	53077.00000	2372859.0000

Illustration of ODS Graphics

The VARMAX Procedure

Type of Model	VAR(1)-GARCH(1,1)
Estimation Method	Maximum Likelihood Estimation
Representation Type	BEKK

Schematic Representation of Parameter Estimates	
Variable/Lag	AR1
Gasoline_Gallons	+.+.
Diesel_Gallons	++.+
Kerosene_Gallons	..+.
Alternative_Fuels_Gallons	-+.+
+ is > 2*std error, - is < -2*std error, . is between, * is N/A	

Schematic Representation of GARCH Parameter Estimates			
Variable/Lag	GCHC	ACH1	GCH1
h1	****	+***	.***
h2	****	*+**	*.**
h3	****	**+*	**.*
h4	****	***+	***.
+ is > 2*std error, - is < -2*std error, . is between, * is N/A			

Model Parameter Estimates						
Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
Gasoline_Gallons	AR1_1_1	0.99238	0.11381	8.72	0.0001	Gasoline_Gallons(t-1)
	AR1_1_2	-0.06887	0.54991	-0.13	0.9005	Diesel_Gallons(t-1)
	AR1_1_3	16.65898	6.64965	2.51	0.0135	Kerosene_Gallons(t-1)
	AR1_1_4	8.49942	6.14312	1.38	0.1688	Alternative_Fuels_Gallons(t-1)
Diesel_Gallons	AR1_2_1	0.13415	0.03293	4.07	0.0001	Gasoline_Gallons(t-1)
	AR1_2_2	0.33127	0.15903	2.08	0.0392	Diesel_Gallons(t-1)
	AR1_2_3	1.90876	1.71639	1.11	0.2681	Kerosene_Gallons(t-1)
	AR1_2_4	5.31637	1.57769	3.37	0.0010	Alternative_Fuels_Gallons(t-1)
Kerosene_Gallons	AR1_3_1	-0.00072	0.00102	-0.71	0.4810	Gasoline_Gallons(t-1)
	AR1_3_2	0.00422	0.00500	0.84	0.4001	Diesel_Gallons(t-1)
	AR1_3_3	0.71606	0.06846	10.46	0.0001	Kerosene_Gallons(t-1)
	AR1_3_4	-0.04860	0.05425	-0.90	0.3720	Alternative_Fuels_Gallons(t-1)

Alternative_Fuels_Gallons	AR1_4_1	-0.00485	0.00190	-2.56	0.0117	Gasoline_Gallons(t-1)
	AR1_4_2	0.02701	0.00922	2.93	0.0040	Diesel_Gallons(t-1)
	AR1_4_3	-0.01554	0.09907	-0.16	0.8756	Kerosene_Gallons(t-1)
	AR1_4_4	0.35728	0.13067	2.73	0.0071	Alternative_Fuels_Gallons(t-1)

GARCH Model Parameter Estimates				
Parameter	Estimate	Standard Error	t Value	Pr > |t|
GCHC1_1	8.7358682E14	0.00000		
GCHC1_2	1.7277449E14	0.00000		
GCHC2_2	5.6762351E13	0.00000		
GCHC1_3	-9.246189E11	0.00000		
GCHC2_3	-1.972046E11	0.00000		
GCHC3_3	64791730949	0.00000		
GCHC1_4	460186760657	0.00000		
GCHC2_4	951456902723	0.00000		
GCHC3_4	4561539095.8	0.00000		
GCHC4_4	204919654655	0.00000		
ACH1_1_1	0.33956	0.08690	3.91	0.0001
ACH1_2_1	0.00000	0.00000		
ACH1_3_1	0.00000	0.00000		
ACH1_4_1	0.00000	0.00000		
ACH1_1_2	0.00000	0.00000		
ACH1_2_2	0.40116	0.10235	3.92	0.0001
ACH1_3_2	0.00000	0.00000		
ACH1_4_2	0.00000	0.00000		
ACH1_1_3	0.00000	0.00000		
ACH1_2_3	0.00000	0.00000		
ACH1_3_3	0.56526	0.16371	3.45	0.0007
ACH1_4_3	0.00000	0.00000		
ACH1_1_4	0.00000	0.00000		
ACH1_2_4	0.00000	0.00000		
ACH1_3_4	0.00000	0.00000		
ACH1_4_4	0.42689	0.15896	2.69	0.0082
GCH1_1_1	0.00000	0.16109	0.00	1.0000
GCH1_2_1	0.00000	0.00000		
GCH1_3_1	0.00000	0.00000		
GCH1_4_1	0.00000	0.00000		
GCH1_1_2	0.00000	0.00000		
GCH1_2_2	-0.00003	0.16491	-0.00	0.9999

GCH1_3_2	0.00000	0.00000		
GCH1_4_2	0.00000	0.00000		
GCH1_1_3	0.00000	0.00000		
GCH1_2_3	0.00000	0.00000		
GCH1_3_3	-0.00003	0.14224	-0.00	0.9998
GCH1_4_3	0.00000	0.00000		
GCH1_1_4	0.00000	0.00000		
GCH1_2_4	0.00000	0.00000		
GCH1_3_4	0.00000	0.00000		
GCH1_4_4	0.00001	0.26632	0.00	1.0000

Testing of the Restricted Parameters					
Parameter	**Estimate**	**Standard Error**	**t Value**	**Pr > |t|**	**Equation**
Restrict0	61.61311	20.00802	3.08	0.0027	ACH1_1_2 = 0
Restrict1	51.86738	1116.54586	0.05	0.9630	ACH1_1_3 = 0
Restrict2	-234.80973	676.84164	-0.35	0.7294	ACH1_1_4 = 0
Restrict3	1.45096	1.66567	0.87	0.3859	ACH1_2_1 = 0
Restrict4	-37.99057	292.69282	-0.13	0.8970	ACH1_2_3 = 0
Restrict5	156.93710	144.82831	1.08	0.2812	ACH1_2_4 = 0
Restrict6	0.08003	0.09956	0.80	0.4235	ACH1_3_1 = 0
Restrict7	-0.32130	0.44616	-0.72	0.4732	ACH1_3_2 = 0
Restrict8	2.05993	4.88216	0.42	0.6740	ACH1_3_4 = 0
Restrict9	0.13582	0.15171	0.90	0.3729	ACH1_4_1 = 0
Restrict10	-0.21289	0.45366	-0.47	0.6399	ACH1_4_2 = 0
Restrict11	-25.06119	14.71295	-1.70	0.0917	ACH1_4_3 = 0
Restrict12	0.00630	7.82426	0.00	0.9994	GCH1_1_2 = 0
Restrict13	-0.03345	766.24128	-0.00	1.0000	GCH1_1_3 = 0
Restrict14	0.00472	303.06190	0.00	1.0000	GCH1_1_4 = 0
Restrict15	-0.00030	1.05744	-0.00	0.9998	GCH1_2_1 = 0
Restrict16	-0.00576	192.32718	-0.00	1.0000	GCH1_2_3 = 0
Restrict17	0.00116	70.79371	0.00	1.0000	GCH1_2_4 = 0
Restrict18	0.00000	0.06902	0.00	1.0000	GCH1_3_1 = 0
Restrict19	-0.00002	0.24878	-0.00	0.9999	GCH1_3_2 = 0
Restrict20	-0.00012	3.54846	-0.00	1.0000	GCH1_3_4 = 0
Restrict21	0.00000	0.07649	0.00	1.0000	GCH1_4_1 = 0
Restrict22	0.00000	0.42494	0.00	1.0000	GCH1_4_2 = 0
Restrict23	0.00056	7.12157	0.00	0.9999	GCH1_4_3 = 0

Covariances of Innovations				
Variable	**Gasoline_Gallons**	**Diesel_Gallons**	**Kerosene_Gallons**	**Alternative_Fuels_Gallons**

Gasoline_Gallons	8.4849912E14	1.6794719E14	-9.50829E11	455549204020
Diesel_Gallons	1.6794719E14	5.5620052E13	-2.143004E11	960497021680
Kerosene_Gallons	-9.50829E11	-2.143004E11	65207502385	4706247613.0
Alternative_Fuels_Gallons	455549204020	960497021680	4706247613.0	205050248591

Log-likelihood	-7830.97

Information Criteria	
AICC	15754.73
HQC	15769.66
AIC	15729.94
SBC	15827.69
FPEC	2.648E50

Illustration of ODS Graphics

The VARMAX Procedure

Number of Observations	132
Number of Pairwise Missing	0

Simple Summary Statistics						
Variable	Type	N	Mean	Standard Deviation	Min	Max
Gasoline_Gallons	Dependent	132	376804937.74	34812609.531	218414414.00	476873743.00
Diesel_Gallons	Dependent	132	80003756.470	9364707.9800	64939973.000	111638305.00
Kerosene_Gallons	Dependent	132	299988.92424	368176.38610	2214.00000	1725070.0000
Alternative_Fuels_Gallons	Dependent	132	482229.06818	509431.11286	53077.00000	2372859.0000

Illustration of ODS Graphics

The VARMAX Procedure

Type of Model	VAR(1)-GARCH(1,1)
Estimation Method	Maximum Likelihood Estimation
Representation Type	DCC

Schematic Representation of Parameter Estimates	
Variable/Lag	AR1
Gasoline_Gallons	*.+.
Diesel_Gallons	**.+
Kerosene_Gallons	****
Alternative_Fuels_Gallons	****

+ is > 2*std error, - is < -2*std error, . is between, * is N/A

Schematic Representation of GARCH Parameter Estimates			
Variable/Lag	GCHC	ACH1	GCH1
h1	*	****	****
h2	*	****	****
h3	*	****	****
h4	*	****	****

+ is > 2*std error, - is < -2*std error, . is between, * is N/A

Model Parameter Estimates						
Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
Gasoline_Gallons	AR1_1_1	1.00035	0.00000			Gasoline_Gallons(t-1)
	AR1_1_2	-0.10320	0.56977	-0.18	0.8566	Diesel_Gallons(t-1)
	AR1_1_3	15.51307	4.94641	3.14	0.0021	Kerosene_Gallons(t-1)
	AR1_1_4	8.90460	5.30954	1.68	0.0959	Alternative_Fuels_Gallons(t-1)
Diesel_Gallons	AR1_2_1	0.12798	0.00000			Gasoline_Gallons(t-1)
	AR1_2_2	0.36283	0.00000			Diesel_Gallons(t-1)
	AR1_2_3	1.50945	1.44683	1.04	0.2987	Kerosene_Gallons(t-1)
	AR1_2_4	5.20515	1.20479	4.32	0.0001	Alternative_Fuels_Gallons(t-1)
Kerosene_Gallons	AR1_3_1	-0.00005	0.00000			Gasoline_Gallons(t-1)
	AR1_3_2	0.00057	0.00000			Diesel_Gallons(t-1)
	AR1_3_3	0.68084	0.00000			Kerosene_Gallons(t-1)
	AR1_3_4	0.01258	0.00000			Alternative_Fuels_Gallons(t-1)

Alternative_Fuels_Gallons	AR1_4_1	-0.00421	0.00000			Gasoline_Gallons(t-1)
	AR1_4_2	0.02446	0.00000			Diesel_Gallons(t-1)
	AR1_4_3	-0.01898	0.00000			Kerosene_Gallons(t-1)
	AR1_4_4	0.26245	0.00000			Alternative_Fuels_Gallons(t-1)

GARCH Model Parameter Estimates				
Parameter	Estimate	Standard Error	t Value	Pr > |t|
DCCA	0.04550	0.00000		
DCCB	0.11342	0.84992	0.13	0.8940
DCCS1_2	0.80189	0.00000		
DCCS1_3	-0.19308	0.00000		
DCCS2_3	-0.15094	0.00000		
DCCS1_4	0.08607	0.00000		
DCCS2_4	0.24313	0.00000		
DCCS3_4	0.09842	0.00000		
GCHC1_1	8.7358682E14	0.00000		
GCHC2_2	5.6762351E13	0.00000		
GCHC3_3	64791730949	0.00000		
GCHC4_4	204919654655	0.00000		
ACH1_1_1	0.51405	0.00000		
ACH1_2_2	0.41013	0.00000		
ACH1_3_3	0.56766	0.00000		
ACH1_4_4	0.11689	0.00000		
GCH1_1_1	-0.14260	0.00000		
GCH1_2_2	-0.16239	0.00000		
GCH1_3_3	-0.21634	0.00000		
GCH1_4_4	-0.04081	0.00000		

Covariances of Innovations				
Variable	Gasoline_Gallons	Diesel_Gallons	Kerosene_Gallons	Alternative_Fuels_Gallons
Gasoline_Gallons	8.4860626E14	1.6794611E14	-9.69125E11	453196346622
Diesel_Gallons	1.6794611E14	5.5861534E13	-2.260964E11	927074509872
Kerosene_Gallons	-9.69125E11	-2.260964E11	69388700050	4979970100.1
Alternative_Fuels_Gallons	453196346622	927074509872	4979970100.1	199478169918

Log-likelihood	-7804.81

Information Criteria	
AICC	15709.95
HQC	15723.67

AIC	15681.61
SBC	15785.12
FPEC	2.803E50

Illustration of ODS Graphics

The VARMAX Procedure

Number of Observations	132
Number of Pairwise Missing	0

Simple Summary Statistics						
Variable	Type	N	Mean	Standard Deviation	Min	Max
Gasoline_Gallons	Dependent	132	376804937.74	34812609.531	218414414.00	476873743.00
Diesel_Gallons	Dependent	132	80003756.470	9364707.9800	64939973.000	111638305.00
Kerosene_Gallons	Dependent	132	299988.92424	368176.38610	2214.00000	1725070.0000
Alternative_Fuels_Gallons	Dependent	132	482229.06818	509431.11286	53077.00000	2372859.0000

Illustration of ODS Graphics

The VARMAX Procedure

Type of Model	VAR(1)-GARCH(1,1)
Estimation Method	Maximum Likelihood Estimation
Representation Type	DCC

Schematic Representation of Parameter Estimates	
Variable/Lag	AR1
Gasoline_Gallons	**+*
Diesel_Gallons	**.*
Kerosene_Gallons	****
Alternative_Fuels_Gallons	***+

+ is > 2*std error, - is < -2*std error, . is between, * is N/A

Schematic Representation of GARCH Parameter Estimates			
Variable/Lag	GCHC	ACH1	GCH1
h1	*	****	****
h2	*	****	****
h3	*	****	****
h4	*	****	***.

+ is > 2*std error, - is < -2*std error, . is between, * is N/A

Model Parameter Estimates						
Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
Gasoline_Gallons	AR1_1_1	0.99517	0.00000			Gasoline_Gallons(t-1)
	AR1_1_2	-0.10685	0.00000			Diesel_Gallons(t-1)
	AR1_1_3	15.51307	2.66345	5.82	0.0001	Kerosene_Gallons(t-1)
	AR1_1_4	8.90424	0.00000			Alternative_Fuels_Gallons(t-1)
Diesel_Gallons	AR1_2_1	0.12600	0.00000			Gasoline_Gallons(t-1)
	AR1_2_2	0.36748	0.00000			Diesel_Gallons(t-1)
	AR1_2_3	1.50899	1.33464	1.13	0.2603	Kerosene_Gallons(t-1)
	AR1_2_4	5.20551	0.00000			Alternative_Fuels_Gallons(t-1)
Kerosene_Gallons	AR1_3_1	-0.00046	0.00000			Gasoline_Gallons(t-1)
	AR1_3_2	0.00230	0.00000			Diesel_Gallons(t-1)
	AR1_3_3	0.67127	0.00000			Kerosene_Gallons(t-1)
	AR1_3_4	0.03901	0.00000			Alternative_Fuels_Gallons(t-1)

Alternative_Fuels_Gallons	AR1_4_1	-0.00506	0.00000			Gasoline_Gallons(t-1)
	AR1_4_2	0.02839	0.00000			Diesel_Gallons(t-1)
	AR1_4_3	-0.01394	0.00000			Kerosene_Gallons(t-1)
	AR1_4_4	0.26451	0.11656	2.27	0.0249	Alternative_Fuels_Gallons(t-1)

GARCH Model Parameter Estimates				
Parameter	Estimate	Standard Error	t Value	Pr > |t|
DCCA	0.04889	0.00000		
DCCB	0.11059	0.00000		
GCHC1_1	8.7358682E14	0.00000		
GCHC2_2	5.6762351E13	0.00000		
GCHC3_3	64791730949	0.00000		
GCHC4_4	204919654655	0.00000		
ACH1_1_1	0.50570	0.00000		
ACH1_2_2	0.26863	0.00000		
ACH1_3_3	0.58879	0.00000		
ACH1_4_4	0.13027	0.00000		
GCH1_1_1	-0.21176	0.00000		
GCH1_2_2	-0.24822	0.00000		
GCH1_3_3	-0.22375	0.00000		
GCH1_4_4	-0.04749	0.15085	-0.31	0.7534

Unconditional Correlation Matrix in DCC GARCH Model				
Variable	Gasoline_Gallons	Diesel_Gallons	Kerosene_Gallons	Alternative_Fuels_Gallons
Gasoline_Gallons	1.00000	0.70850	-0.16944	-0.01096
Diesel_Gallons	0.70850	1.00000	-0.11198	0.24455
Kerosene_Gallons	-0.16944	-0.11198	1.00000	0.07959
Alternative_Fuels_Gallons	-0.01096	0.24455	0.07959	1.00000

Covariances of Innovations				
Variable	Gasoline_Gallons	Diesel_Gallons	Kerosene_Gallons	Alternative_Fuels_Gallons
Gasoline_Gallons	8.4785739E14	1.6731893E14	-8.378692E11	442502688562
Diesel_Gallons	1.6731893E14	5.5722148E13	-1.909257E11	942871664574
Kerosene_Gallons	-8.378692E11	-1.909257E11	71138421968	5691606757.5
Alternative_Fuels_Gallons	442502688562	942871664574	5691606757.5	200137258689

Log-likelihood	-7806.07

Information Criteria	
AICC	15690.73
HQC	15707.18

AIC	15672.13
SBC	15758.39
FPEC	2.884E50

Illustration of ODS Graphics

The VARMAX Procedure

	Optimization Start		
	Parameter Estimates		
N	Parameter	Estimate	Gradient Objective Function
1	AR1_1_1	0	-1.67333E21
2	AR1_2_1	0	-3.967318E21
3	AR1_3_1	0	-1.646054E22
4	AR1_4_1	0	3.5930165E22
5	AR1_1_2	0	-4.364379E20
6	AR1_2_2	0	-4.533789E20
7	AR1_3_2	0	-2.606156E21
8	AR1_4_2	0	5.686054E21
9	AR1_1_3	0	-1.110166E18
10	AR1_2_3	0	-4.025916E18
11	AR1_3_3	0	-1.490701E19
12	AR1_4_3	0	3.2568435E19
13	AR1_1_4	0	-1.06108E19
14	AR1_2_4	0	3.5088468E19
15	AR1_3_4	0	7.046394E19
16	AR1_4_4	0	-1.540846E20
17	DCCA	0	-5.989859E39
18	DCCB	0	0
19	GCHC1_1	1.000000	-7.969837E20
20	GCHC2_2	1.000000	1.7244351E20
21	GCHC3_3	1.000000	8.3596957E15
22	GCHC4_4	1.000000	-4.574411E16
23	ACH1_1_1	0	-1.435618E29
24	ACH1_2_2	0	2.2889063E27
25	ACH1_3_3	0	-9.390455E24
26	ACH1_4_4	0	-9.790429E24
27	EACH1_1_1	0	0
28	EACH1_2_2	0	0
29	EACH1_3_3	0	0
30	EACH1_4_4	0	0
31	GCH1_1_1	0	-6.739475E21
32	GCH1_2_2	0	8.3685865E21

| 33 | GCH1_3_3 | 0 | 6.7051369E18 |
| 34 | GCH1_4_4 | 0 | -8.011669E20 |

Value of Objective Function = 6.2457757E20

Illustration of ODS Graphics

The VARMAX Procedure

Dual Quasi-Newton Optimization

Minimum Iterations	0
Maximum Iterations	5000
Maximum Function Calls	50000
ABSGCONV Gradient Criterion	0.00001
GCONV Gradient Criterion	1E-8
ABSFCONV Function Criterion	0
FCONV Function Criterion	2.220446E-16
FCONV2 Function Criterion	0
FSIZE Parameter	0
ABSXCONV Parameter Change Criterion	0
XCONV Parameter Change Criterion	0
XSIZE Parameter	0
ABSCONV Function Criterion	-1.34078E154
Line Search Method	2
Starting Alpha for Line Search	1
Line Search Precision LSPRECISION	0.4
DAMPSTEP Parameter for Line Search	.
Singularity Tolerance (SINGULAR)	1E-8

Dual Quasi-Newton Optimization

Dual Broyden - Fletcher - Goldfarb - Shanno Update (DBFGS)

Parameter Estimates	34

Optimization Start			
Active Constraints	0	**Objective Function**	6.2457757E20
Max Abs Gradient Element	5.9898588E39		

Iteration		Restarts	Function Calls	Active Constraints	Objective Function	Objective Function Change	Max Abs Gradient Element	Step Size	Slope of Search Direction
1		0	49	0	1.09171E20	5.154E20	1.621E38	883E-59	-359E75
2		0	50	0	4.734E19	6.183E19	3.104E37	1E-33	-109E50
3	*	0	51	0	7.44088E18	3.99E19	5.577E35	1E-34	-7E53
4		0	52	0	5.72938E18	1.712E18	8.242E33	1E-34	-162E51

5	*	0	53	0	4.99193E17	5.23E18	1.793E33	1E-33	-189E50
6		0	55	0	3.40995E17	1.582E17	9.245E32	251E-34	-87E47
7	*	0	56	0	2.50008E17	9.099E16	4.069E32	1E-31	-147E46
8		0	58	0	2.18625E17	3.138E16	2.679E32	1E-31	-944E45
9		0	59	0	2.16073E17	2.553E15	2.54E32	1E-26	-187E39
10	*	0	60	0	2.15372E17	7.01E14	2.505E32	1E-27	-653E39
11	*	0	61	0	2.14422E17	9.492E14	2.46E32	1E-27	-869E39
12	*	0	62	0	2.13032E17	1.39E15	2.397E32	1E-27	-124E40
13	*	0	63	0	2.12832E17	1.999E14	2.389E32	1E-28	-197E40
14	*	0	64	0	2.12619E17	2.131E14	2.379E32	1E-28	-21E41
15	*	0	65	0	2.12392E17	2.277E14	2.369E32	1E-28	-224E40
16	*	0	66	0	2.12147E17	2.442E14	2.359E32	1E-28	-24E41
17	*	0	67	0	2.11884E17	2.629E14	2.347E32	1E-28	-258E40
18	*	0	68	0	2.116E17	2.842E14	2.335E32	1E-28	-279E40
19	*	0	69	0	2.11292E17	3.087E14	2.322E32	1E-28	-302E40
20	*	0	70	0	2.10954E17	3.37E14	2.308E32	1E-28	-329E40
21	*	0	71	0	2.10951E17	3.613E12	2.308E32	1E-30	-361E40
22	*	0	72	0	2.10947E17	3.616E12	2.308E32	1E-30	-362E40
23	*	0	73	0	2.10944E17	3.62E12	2.307E32	1E-30	-362E40
24	*	0	74	0	2.1094E17	3.623E12	2.307E32	1E-30	-362E40
25	*	0	75	0	2.1094E17	3.626E11	2.307E32	1E-31	-363E40
26	*	0	76	0	2.10939E17	3.626E11	2.307E32	1E-31	-363E40
27	*	0	77	0	2.10939E17	3.627E11	2.307E32	1E-31	-363E40
28	*	0	78	0	2.10939E17	3.627E11	2.307E32	1E-31	-363E40
29	*	0	79	0	2.10938E17	3.627E10	2.307E32	1E-32	-363E40
30	*	0	80	0	2.10938E17	3.627E10	2.307E32	1E-32	-363E40
31	*	0	81	0	2.10938E17	3.627E10	2.307E32	1E-32	-363E40
32	*	0	82	0	2.10938E17	3.6274E8	2.307E32	1E-34	-363E40
33	*	0	83	0	2.10938E17	3.6274E8	2.307E32	1E-34	-363E40
34	*	0	84	0	2.10938E17	3.6274E8	2.307E32	1E-34	-363E40
35	*	0	85	0	2.10938E17	3.6274E8	2.307E32	1E-34	-363E40
36	*	0	86	0	2.10938E17	3.6274E8	2.307E32	1E-34	-363E40
37	*	0	87	0	2.10938E17	36274464	2.307E32	1E-35	-363E40
38	*	0	88	0	2.10938E17	36274752	2.307E32	1E-35	-363E40
39	*	0	89	0	2.10938E17	3626944	2.307E32	1E-36	-363E40
40	*	0	90	0	2.10938E17	3626944	2.307E32	1E-36	-363E40
41	*	0	91	0	2.10938E17	3628000	2.307E32	1E-36	-363E40
42	*	0	92	0	2.10938E17	3627552	2.307E32	1E-36	-363E40
43	*	0	93	0	2.10938E17	3627424	2.307E32	1E-36	-363E40
44	*	0	94	0	2.10938E17	362560	2.307E32	1E-37	-363E40
45									

	*	0	95	0	2.10938E17	362880	2.307E32	1E-37	-363E40
46	*	0	96	0	2.10938E17	362336	2.307E32	1E-37	-363E40
47	*	0	97	0	2.10938E17	363488	2.307E32	1E-37	-363E40
48	*	0	98	0	2.10938E17	35904.0	2.307E32	1E-38	-363E40
49	*	0	99	0	2.10938E17	3456.0	2.307E32	1E-39	-363E40
50	*	0	101	0	2.10938E17	12480.0	2.307E32	324E-41	-363E40
51	*	0	102	0	2.10938E17	2976.0	2.307E32	1E-39	-363E40
52	*	0	103	0	2.10938E17	3648.0	2.307E32	1E-39	-363E40
53	*	0	104	0	2.10938E17	4064.0	2.307E32	1E-39	-363E40
54	*	0	105	0	2.10938E17	3840.0	2.307E32	1E-39	-363E40
55	*	0	106	0	2.10938E17	0	2.307E32	1E-40	-363E40

Optimization Results			
Iterations	55	Function Calls	107
Gradient Calls	104	Active Constraints	0
Objective Function	2.1093842E17	Max Abs Gradient Element	2.3072369E32
Slope of Search Direction	-3.627448E42		

Convergence criterion (FCONV=2.220446E-16) satisfied.

Note: At least one element of the gradient is greater than 1e-3.

Illustration of ODS Graphics

The VARMAX Procedure

	Optimization Results		
	Parameter Estimates		
N	Parameter	Estimate	Gradient Objective Function
1	AR1_1_1	0.937609	-4.404686E17
2	AR1_2_1	7.335179E-11	-1.178422E18
3	AR1_3_1	8.4341719E-9	-8.942904E19
4	AR1_4_1	8.4216589E-9	-9.439142E19
5	AR1_1_2	-1.11637E-13	-9.037795E16
6	AR1_2_2	1.610705E-11	-2.572847E17
7	AR1_3_2	1.7324244E-9	-1.846185E19
8	AR1_4_2	1.7283044E-9	-1.9444E19
9	AR1_1_3	-7.66526E-15	-1.158294E14
10	AR1_2_3	1.28622E-13	-1.807803E15
11	AR1_3_3	2.418667E-12	-1.79738E16
12	AR1_4_3	2.346715E-12	-1.748789E16
13	AR1_1_4	-9.62112E-15	-3.175257E14
14	AR1_2_4	1.634748E-13	-2.472263E15
15	AR1_3_4	7.227556E-12	-6.921148E16
16	AR1_4_4	7.072066E-12	-6.982014E16
17	DCCA	4.674505E-19	-2.307237E32
18	DCCB	2.132649E-28	-1.532157E14
19	GCHC1_1	1.000000	-2.047564E16
20	GCHC2_2	1.000000	-1.335762E17
21	GCHC3_3	1.000000	3.0646918E15
22	GCHC4_4	1.000000	6.6894602E15
23	ACH1_1_1	3.0969361E-9	-8.487057E22
24	ACH1_2_2	2.7453203E-8	-4.238085E24
25	ACH1_3_3	-0.000000541	9.8863126E21
26	ACH1_4_4	-0.000000630	1.7626194E22
27	EACH1_1_1	-1.128734	-3.965444E14
28	EACH1_2_2	0.011788	-1.149935E17
29	EACH1_3_3	-3.202097E-9	-5.346794E15
30	EACH1_4_4	-1.225547E-8	-1.110703E16
31	GCH1_1_1	-1.69637E-12	-2.868507E16
32	GCH1_2_2	4.616243E-11	-3.382331E17

| 33 | GCH1_3_3 | 4.530091E-15 | 2.4834579E15 |
| 34 | GCH1_4_4 | 7.506201E-12 | -4.09635E16 |

Value of Objective Function = 2.1093842E17

Illustration of ODS Graphics

The VARMAX Procedure

Number of Observations	132
Number of Pairwise Missing	0

Simple Summary Statistics						
Variable	Type	N	Mean	Standard Deviation	Min	Max
Gasoline_Gallons	Dependent	132	376804937.74	34812609.531	218414414.00	476873743.00
Diesel_Gallons	Dependent	132	80003756.470	9364707.9800	64939973.000	111638305.00
Kerosene_Gallons	Dependent	132	299988.92424	368176.38610	2214.00000	1725070.0000
Alternative_Fuels_Gallons	Dependent	132	482229.06818	509431.11286	53077.00000	2372859.0000

Illustration of ODS Graphics

The VARMAX Procedure

Type of Model	VAR(1)-GARCH(1,1)
Estimation Method	Maximum Likelihood Estimation
Representation Type	DCC

Schematic Representation of Parameter Estimates	
Variable/Lag	AR1
Gasoline_Gallons	+...
Diesel_Gallons	....
Kerosene_Gallons	++.*
Alternative_Fuels_Gallons	*+.*

+ is > 2*std error, - is < -2*std error, . is between, * is N/A

Schematic Representation of GARCH Parameter Estimates			
Variable/Lag	GCHC	ACH1	GCH1
h1	+	****	****
h2	*	****	*+**
h3	+	****	**.*
h4	+	****	***.

+ is > 2*std error, - is < -2*std error, . is between, * is N/A

Model Parameter Estimates						
Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
Gasoline_Gallons	AR1_1_1	0.93761	0.00000	999.00	0.0001	Gasoline_Gallons(t-1)
	AR1_1_2	-0.00000	0.00000	-0.00	1.0000	Diesel_Gallons(t-1)
	AR1_1_3	-0.00000	0.00000	-0.00	1.0000	Kerosene_Gallons(t-1)
	AR1_1_4	-0.00000	0.00000	-0.00	1.0000	Alternative_Fuels_Gallons(t-1)
Diesel_Gallons	AR1_2_1	0.00000	0.00000	0.02	0.9878	Gasoline_Gallons(t-1)
	AR1_2_2	0.00000	0.00000	0.00	0.9994	Diesel_Gallons(t-1)
	AR1_2_3	0.00000	0.00000	0.00	1.0000	Kerosene_Gallons(t-1)
	AR1_2_4	0.00000	0.00000	0.00	1.0000	Alternative_Fuels_Gallons(t-1)
Kerosene_Gallons	AR1_3_1	0.00000	0.00000	194.31	0.0001	Gasoline_Gallons(t-1)
	AR1_3_2	0.00000	0.00000	8.91	0.0001	Diesel_Gallons(t-1)
	AR1_3_3	0.00000	0.00000	0.00	0.9998	Kerosene_Gallons(t-1)
	AR1_3_4	0.00000	0.00000			Alternative_Fuels_Gallons(t-1)

Alternative_Fuels_Gallons	AR1_4_1	0.00000	0.00000			Gasoline_Gallons(t-1)
	AR1_4_2	0.00000	0.00000	11.45	0.0001	Diesel_Gallons(t-1)
	AR1_4_3	0.00000	0.00000	0.00	0.9997	Kerosene_Gallons(t-1)
	AR1_4_4	0.00000	0.00000			Alternative_Fuels_Gallons(t-1)

GARCH Model Parameter Estimates				
Parameter	Estimate	Standard Error	t Value	Pr > |t|
DCCA	0.00000	0.00000		
DCCB	0.00000	0.00000		
GCHC1_1	1.00000	0.00000	999.00	0.0001
GCHC2_2	1.00000	0.00000		
GCHC3_3	1.00000	0.00000	999.00	0.0001
GCHC4_4	1.00000	0.00000	999.00	0.0001
ACH1_1_1	0.00000	0.00000		
ACH1_2_2	0.00000	0.00000		
ACH1_3_3	-0.00000	0.00000		
ACH1_4_4	-0.00000	0.00000		
EACH1_1_1	-1.12873	0.00000		
EACH1_2_2	0.01179	0.00000	999.00	0.0001
EACH1_3_3	-0.00000	0.00000	-0.22	0.8301
EACH1_4_4	-0.00000	0.00000	-1.15	0.2540
GCH1_1_1	-0.00000	0.00000	-0.00	0.9993
GCH1_2_2	0.00000	0.00000	0.09	0.9249
GCH1_3_3	0.00000	0.00000	0.00	0.9999
GCH1_4_4	0.00000	0.00000	0.04	0.9649

Unconditional Correlation Matrix in DCC GARCH Model				
Variable	Gasoline_Gallons	Diesel_Gallons	Kerosene_Gallons	Alternative_Fuels_Gallons
Gasoline_Gallons	1.00000	0.67533	0.39967	0.46284
Diesel_Gallons	0.67533	1.00000	0.58133	0.71126
Kerosene_Gallons	0.39967	0.58133	1.00000	0.36302
Alternative_Fuels_Gallons	0.46284	0.71126	0.36302	1.00000

Covariances of Innovations				
Variable	Gasoline_Gallons	Diesel_Gallons	Kerosene_Gallons	Alternative_Fuels_Gallons
Gasoline_Gallons	1.4289506E15	2.031196E15	7.200387E12	1.2280502E13
Diesel_Gallons	2.031196E15	6.4972367E15	2.2857753E13	4.1230155E13
Kerosene_Gallons	7.200387E12	2.2857753E13	226211490744	134549078927
Alternative_Fuels_Gallons	1.2280502E13	4.1230155E13	134549078927	490972865119

Log-likelihood	-2.11E17

Information Criteria	
AICC	4.219E17
HQC	4.219E17
AIC	4.219E17
SBC	4.219E17
FPEC	2.19E53

Illustration of ODS Graphics

The VARMAX Procedure

| | | | Optimization Start |
| | | | Parameter Estimates |

N	Parameter	Estimate	Gradient Objective Function
1	AR1_1_1	0.991732	3.866213
2	AR1_2_1	0.157831	135.691011
3	AR1_3_1	-0.001614	5340.037110
4	AR1_4_1	-0.004545	-5197.955555
5	AR1_1_2	-0.078747	2.063644
6	AR1_2_2	0.217005	28.904985
7	AR1_3_2	0.009119	1273.400759
8	AR1_4_2	0.026459	-1144.588736
9	AR1_1_3	15.512319	-0.122103
10	AR1_2_3	1.510845	0.625270
11	AR1_3_3	0.752832	1.115158
12	AR1_4_3	-0.049891	-10.475474
13	AR1_1_4	8.905219	0.050313
14	AR1_2_4	5.199243	0.352271
15	AR1_3_4	-0.104891	13.331734
16	AR1_4_4	0.203255	-15.841234
17	DCCA	0.100000	57.308040
18	DCCB	0.100000	-1.731882
19	GCHC1_1	8.7358682E14	9.352861E-15
20	GCHC2_2	5.6762351E13	-1.34891E-13
21	GCHC3_3	64791730949	-3.49652E-11
22	GCHC4_4	204919654655	6.06618E-12
23	ACH1_1_1	0.000001054	-32.061907
24	ACH1_2_2	0.000001054	-189.006328
25	ACH1_3_3	0.000001054	-108.257524
26	ACH1_4_4	0.000001054	-19.127468
27	PACH1_1_1	0.000001054	0.000022531
28	PACH1_2_2	0.000001054	-0.000000235
29	PACH1_3_3	0.000001054	0.000274
30	PACH1_4_4	0.000001054	0.000050899
31	GCH1_1_1	0.000001054	8.383219
32	GCH1_2_2	0.000001054	-7.599686

33	GCH1_3_3	0.000001054	-2.273045
34	GCH1_4_4	0.000001054	1.264640
35	LAMBDA1	1.000000	-281.096165
36	LAMBDA2	1.000000	242.487178
37	LAMBDA3	1.000000	56.397166
38	LAMBDA4	1.000000	-32.377145

Value of Objective Function = 7846.6185098

Illustration of ODS Graphics

The VARMAX Procedure

Dual Quasi-Newton Optimization

Minimum Iterations	0
Maximum Iterations	5000
Maximum Function Calls	50000
ABSGCONV Gradient Criterion	0.00001
GCONV Gradient Criterion	1E-8
ABSFCONV Function Criterion	0
FCONV Function Criterion	2.220446E-16
FCONV2 Function Criterion	0
FSIZE Parameter	0
ABSXCONV Parameter Change Criterion	0
XCONV Parameter Change Criterion	0
XSIZE Parameter	0
ABSCONV Function Criterion	-1.34078E154
Line Search Method	2
Starting Alpha for Line Search	1
Line Search Precision LSPRECISION	0.4
DAMPSTEP Parameter for Line Search	.
Singularity Tolerance (SINGULAR)	1E-8

Dual Quasi-Newton Optimization

Dual Broyden - Fletcher - Goldfarb - Shanno Update (DBFGS)

Parameter Estimates	38

Optimization Start			
Active Constraints	0	**Objective Function**	7846.6185098
Max Abs Gradient Element	5340.0371099		

Iteration	Restarts	Function Calls	Active Constraints	Objective Function	Objective Function Change	Max Abs Gradient Element	Step Size	Slope of Search Direction
1	0	7	0	7847	0.1109	2379.5	3.77E-7	-586805
2	0	10	0	7846	0.0232	1551.5	0.00100	-119.0
3	0	12	0	7846	0.5099	823.0	0.454	-2.237
4	0	14	0	7846	0.2032	424.2	0.527	-0.773

5	0	16	0	7845	0.9554	3300.2	0.748	-2.522
6	0	18	0	7840	4.8646	12846.5	10.191	-0.911
7	0	19	0	7832	7.6434	4902.0	2.734	-4.448
8	0	21	0	7825	7.2945	13473.9	2.507	-5.382
9	0	22	0	7824	1.5071	7975.6	0.491	-3.717
10	0	23	0	7823	0.3498	6649.9	0.150	-2.505
11	0	24	0	7823	0.0857	6338.3	0.0421	-2.075
12	0	25	0	7823	0.2043	5608.1	0.100	-2.146
13	0	26	0	7823	0.0504	5430.4	0.0264	-1.937
14	0	27	0	7823	0.0200	5363.7	0.0100	-2.010
15	0	28	0	7823	0.0211	5296.4	0.0100	-2.122
16	0	29	0	7823	0.0221	5228.8	0.0100	-2.220
17	0	30	0	7823	0.0230	5160.8	0.0100	-2.312
18	0	31	0	7823	0.00240	5153.9	0.00100	-2.401
19	0	32	0	7823	0.00253	5146.9	0.00100	-2.529
20	0	33	0	7823	0.00265	5139.8	0.00100	-2.656
21	0	34	0	7823	0.00278	5132.6	0.00100	-2.782
22	0	35	0	7823	0.00291	5125.2	0.00100	-2.909
23	0	36	0	7823	0.00304	5117.8	0.00100	-3.037
24	0	37	0	7823	0.00316	5110.2	0.00100	-3.165
25	0	38	0	7823	0.00329	5102.4	0.00100	-3.293
26	0	39	0	7823	0.00342	5094.6	0.00100	-3.422
27	0	40	0	7823	0.000355	5093.8	0.00010	-3.552
28	0	41	0	7823	0.000369	5093.0	0.00010	-3.687
29	0	42	0	7823	0.000382	5092.1	0.00010	-3.822
30	0	43	0	7823	0.000396	5091.3	0.00010	-3.957
31	0	44	0	7823	0.000409	5090.5	0.00010	-4.092
32	0	45	0	7823	4.227E-6	5090.5	1E-6	-4.227
33	0	46	0	7823	4.363E-6	5090.5	1E-6	-4.363
34	0	47	0	7823	4.498E-6	5090.4	1E-6	-4.498
35	0	48	0	7823	4.633E-6	5090.4	1E-6	-4.633
36	0	49	0	7823	4.767E-6	5090.4	1E-6	-4.767
37	0	50	0	7823	4.901E-6	5090.4	1E-6	-4.901
38	0	51	0	7823	5.034E-6	5090.4	1E-6	-5.034
39	0	52	0	7823	5.167E-6	5090.4	1E-6	-5.167
40	0	53	0	7823	5.299E-7	5090.4	1E-7	-5.299
41	0	54	0	7823	5.431E-7	5090.4	1E-7	-5.431
42	0	55	0	7823	5.561E-7	5090.4	1E-7	-5.561
43	0	56	0	7823	5.691E-7	5090.4	1E-7	-5.691
44	0	57	0	7823	5.82E-7	5090.4	1E-7	-5.820
45								

		0	58	0		7823	5.948E-7	5090.4	1E-7	-5.948
46		0	59	0		7823	6.075E-7	5090.4	1E-7	-6.075
47		0	60	0		7823	6.201E-8	5090.4	1E-8	-6.201
48		0	61	0		7823	6.326E-8	5090.4	1E-8	-6.326
49		0	62	0		7823	6.448E-9	5090.4	1E-9	-6.450
50		0	63	0		7823	6.57E-10	5090.4	1E-10	-6.573
51		0	64	0		7823	6.72E-10	5090.4	1E-10	-6.695
52		0	65	0		7823	6.8E-10	5090.4	1E-10	-6.815
53		0	66	0		7823	6.97E-10	5090.4	1E-10	-6.935
54		0	67	0		7823	0	5090.4	1E-11	-7.054

Optimization Results			
Iterations	54	**Function Calls**	68
Gradient Calls	104	**Active Constraints**	0
Objective Function	7822.7016887	**Max Abs Gradient Element**	5090.390517
Slope of Search Direction	-7.053947584		

Convergence criterion (FCONV=2.220446E-16) satisfied.

Note: At least one element of the gradient is greater than 1e-3.

Illustration of ODS Graphics

The VARMAX Procedure

			Optimization Results
			Parameter Estimates

N	Parameter	Estimate	Gradient Objective Function
1	AR1_1_1	0.994384	-47.865500
2	AR1_2_1	0.156636	167.427231
3	AR1_3_1	-0.002413	-5090.390517
4	AR1_4_1	-0.005009	-3737.135634
5	AR1_1_2	-0.082006	-7.444477
6	AR1_2_2	0.225928	14.742027
7	AR1_3_2	0.012409	-959.221763
8	AR1_4_2	0.028387	-753.497405
9	AR1_1_3	15.512611	0.004951
10	AR1_2_3	1.509654	-0.246195
11	AR1_3_3	0.755418	13.054097
12	AR1_4_3	-0.035650	-1.811357
13	AR1_1_4	8.905054	-0.020061
14	AR1_2_4	5.199471	-0.851059
15	AR1_3_4	-0.102923	-22.912664
16	AR1_4_4	0.218317	-3.772929
17	DCCA	4.966229E-13	-33.016049
18	DCCB	0.102969	-1.15313E-11
19	GCHC1_1	8.7358682E14	-1.59365E-15
20	GCHC2_2	5.6762351E13	-6.70043E-14
21	GCHC3_3	64791730949	-2.0963E-11
22	GCHC4_4	204919654655	-4.47033E-14
23	ACH1_1_1	0.187058	-10.537301
24	ACH1_2_2	0.196980	-7.285993
25	ACH1_3_3	0.202862	-27.667358
26	ACH1_4_4	0.051070	-2.597650
27	PACH1_1_1	0.000068731	-6.251033
28	PACH1_2_2	0.001768	-5.352696
29	PACH1_3_3	-0.002112	18.668404
30	PACH1_4_4	-0.000157	0.330874
31	GCH1_1_1	-0.000129	0.868865
32	GCH1_2_2	-0.000298	-8.024666

33	GCH1_3_3	-0.000745	-0.619239
34	GCH1_4_4	-0.000120	-0.521572
35	LAMBDA1	1.013579	46.822805
36	LAMBDA2	1.015934	119.192472
37	LAMBDA3	1.019961	32.428625
38	LAMBDA4	1.003706	0.178143

Value of Objective Function = 7822.7016887

Illustration of ODS Graphics

The VARMAX Procedure

Number of Observations	132
Number of Pairwise Missing	0

Simple Summary Statistics						
Variable	Type	N	Mean	Standard Deviation	Min	Max
Gasoline_Gallons	Dependent	132	376804937.74	34812609.531	218414414.00	476873743.00
Diesel_Gallons	Dependent	132	80003756.470	9364707.9800	64939973.000	111638305.00
Kerosene_Gallons	Dependent	132	299988.92424	368176.38610	2214.00000	1725070.0000
Alternative_Fuels_Gallons	Dependent	132	482229.06818	509431.11286	53077.00000	2372859.0000

Illustration of ODS Graphics

The VARMAX Procedure

Type of Model	VAR(1)-GARCH(1,1)
Estimation Method	Maximum Likelihood Estimation
Representation Type	DCC

Schematic Representation of Parameter Estimates	
Variable/Lag	AR1
Gasoline_Gallons	**++
Diesel_Gallons	**.+
Kerosene_Gallons	-++-
Alternative_Fuels_Gallons	-+.+

+ is > 2*std error, - is < -2*std error, . is between, * is N/A

Schematic Representation of GARCH Parameter Estimates			
Variable/Lag	GCHC	ACH1	GCH1
h1	*	****	****
h2	*	****	* .**
h3	*	** .*	** .*
h4	*	***.	***.

+ is > 2*std error, - is < -2*std error, . is between, * is N/A

Model Parameter Estimates						
Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
Gasoline_Gallons	AR1_1_1	0.99438	0.00000			Gasoline_Gallons(t-1)
	AR1_1_2	-0.08201	0.00000			Diesel_Gallons(t-1)
	AR1_1_3	15.51261	5.16128	3.01	0.0032	Kerosene_Gallons(t-1)
	AR1_1_4	8.90505	4.44682	2.00	0.0473	Alternative_Fuels_Gallons(t-1)
Diesel_Gallons	AR1_2_1	0.15664	0.00000			Gasoline_Gallons(t-1)
	AR1_2_2	0.22593	0.00000			Diesel_Gallons(t-1)
	AR1_2_3	1.50965	1.42598	1.06	0.2917	Kerosene_Gallons(t-1)
	AR1_2_4	5.19947	1.14055	4.56	0.0001	Alternative_Fuels_Gallons(t-1)
Kerosene_Gallons	AR1_3_1	-0.00241	0.00110	-2.20	0.0297	Gasoline_Gallons(t-1)
	AR1_3_2	0.01241	0.00506	2.45	0.0156	Diesel_Gallons(t-1)
	AR1_3_3	0.75542	0.07857	9.61	0.0001	Kerosene_Gallons(t-1)
	AR1_3_4	-0.10292	0.04988	-2.06	0.0411	Alternative_Fuels_Gallons(t-1)

Alternative_Fuels_Gallons	AR1_4_1	-0.00501	0.00199	-2.51	0.0132	Gasoline_Gallons(t-1)
	AR1_4_2	0.02839	0.00960	2.96	0.0037	Diesel_Gallons(t-1)
	AR1_4_3	-0.03565	0.10481	-0.34	0.7343	Kerosene_Gallons(t-1)
	AR1_4_4	0.21832	0.10407	2.10	0.0378	Alternative_Fuels_Gallons(t-1)

GARCH Model Parameter Estimates				
Parameter	Estimate	Standard Error	t Value	Pr > |t|
DCCA	0.00000	0.00000		
DCCB	0.10297	0.00000		
GCHC1_1	8.7358682E14	0.00000		
GCHC2_2	5.6762351E13	0.00000		
GCHC3_3	64791730949	0.00000		
GCHC4_4	204919654655	0.00000		
ACH1_1_1	0.18706	0.00000		
ACH1_2_2	0.19698	0.00000		
ACH1_3_3	0.20286	0.17924	1.13	0.2598
ACH1_4_4	0.05107	0.10395	0.49	0.6241
PACH1_1_1	0.00007	0.00000		
PACH1_2_2	0.00177	0.12952	0.01	0.9891
PACH1_3_3	-0.00211	0.43068	-0.00	0.9961
PACH1_4_4	-0.00016	1.00837	-0.00	0.9999
GCH1_1_1	-0.00013	0.00000		
GCH1_2_2	-0.00030	0.00000		
GCH1_3_3	-0.00075	0.00000		
GCH1_4_4	-0.00012	0.00000		
LAMBDA1	1.01358	0.00000		
LAMBDA2	1.01593	0.00000		
LAMBDA3	1.01996	0.00923	110.56	0.0001
LAMBDA4	1.00371	0.00000		

Unconditional Correlation Matrix in DCC GARCH Model				
Variable	Gasoline_Gallons	Diesel_Gallons	Kerosene_Gallons	Alternative_Fuels_Gallons
Gasoline_Gallons	1.00000	0.72320	-0.17375	-0.00436
Diesel_Gallons	0.72320	1.00000	-0.14248	0.24815
Kerosene_Gallons	-0.17375	-0.14248	1.00000	0.05959
Alternative_Fuels_Gallons	-0.00436	0.24815	0.05959	1.00000

Covariances of Innovations				
Variable	Gasoline_Gallons	Diesel_Gallons	Kerosene_Gallons	Alternative_Fuels_Gallons
Gasoline_Gallons	8.4746266E14	1.6769423E14	-9.235644E11	439267007619

Diesel_Gallons	1.6769423E14	5.5101565E13	-1.998485E11	920719730376
Kerosene_Gallons	-9.235644E11	-1.998485E11	64467692375	5010903479.9
Alternative_Fuels_Gallons	439267007619	920719730376	5010903479.9	199002772901

Log-likelihood	-7822.7

Information Criteria	
AICC	15753.62
HQC	15765.8
AIC	15721.4
SBC	15830.66
FPEC	2.505E50

Illustration of ODS Graphics

The VARMAX Procedure

	Optimization Start		
	Parameter Estimates		
N	Parameter	Estimate	Gradient Objective Function
1	AR1_1_1	0.991732	3.866213
2	AR1_2_1	0.157831	135.691011
3	AR1_3_1	-0.001614	5340.037110
4	AR1_4_1	-0.004545	-5197.955555
5	AR1_1_2	-0.078747	2.063644
6	AR1_2_2	0.217005	28.904985
7	AR1_3_2	0.009119	1273.400759
8	AR1_4_2	0.026459	-1144.588736
9	AR1_1_3	15.512319	-0.122103
10	AR1_2_3	1.510845	0.625270
11	AR1_3_3	0.752832	1.115158
12	AR1_4_3	-0.049891	-10.475474
13	AR1_1_4	8.905219	0.050313
14	AR1_2_4	5.199243	0.352271
15	AR1_3_4	-0.104891	13.331734
16	AR1_4_4	0.203255	-15.841234
17	DCCA	0.100000	57.308040
18	DCCB	0.100000	-1.731882
19	GCHC1_1	8.7358682E14	9.352861E-15
20	GCHC2_2	5.6762351E13	-1.34891E-13
21	GCHC3_3	64791730949	-3.49652E-11
22	GCHC4_4	204919654655	6.06618E-12
23	ACH1_1_1	0.000001054	-32.061929
24	ACH1_2_2	0.000001054	-189.006328
25	ACH1_3_3	0.000001054	-108.257797
26	ACH1_4_4	0.000001054	-19.127519
27	QACH1_1_1	0.000001054	-5.87175E-13
28	QACH1_2_2	0.000001054	-6.13095E-12
29	QACH1_3_3	0.000001054	5.035743E-10
30	QACH1_4_4	0.000001054	4.816632E-11
31	GCH1_1_1	0.000001054	8.383219
32	GCH1_2_2	0.000001054	-7.599686

| 33 | GCH1_3_3 | 0.000001054 | -2.273045 |
| 34 | GCH1_4_4 | 0.000001054 | 1.264640 |

Value of Objective Function = 7846.6185098

Illustration of ODS Graphics

The VARMAX Procedure

Dual Quasi-Newton Optimization

Minimum Iterations	0
Maximum Iterations	5000
Maximum Function Calls	50000
ABSGCONV Gradient Criterion	0.00001
GCONV Gradient Criterion	1E-8
ABSFCONV Function Criterion	0
FCONV Function Criterion	2.220446E-16
FCONV2 Function Criterion	0
FSIZE Parameter	0
ABSXCONV Parameter Change Criterion	0
XCONV Parameter Change Criterion	0
XSIZE Parameter	0
ABSCONV Function Criterion	-1.34078E154
Line Search Method	2
Starting Alpha for Line Search	1
Line Search Precision LSPRECISION	0.4
DAMPSTEP Parameter for Line Search	.
Singularity Tolerance (SINGULAR)	1E-8

Dual Quasi-Newton Optimization

Dual Broyden - Fletcher - Goldfarb - Shanno Update (DBFGS)

Parameter Estimates	34

Optimization Start			
Active Constraints	0	**Objective Function**	7846.6185098
Max Abs Gradient Element	5340.0371102		

Iteration	Restarts	Function Calls	Active Constraints	Objective Function	Objective Function Change	Max Abs Gradient Element	Step Size	Slope of Search Direction
1	0	8	0	7847	0.1104	2386.2	3.76E-7	-585384
2	0	11	0	7846	0.0217	1535.4	0.00100	-117.0
3	0	13	0	7846	0.5322	386.1	1.000	-0.762
4	0	14	0	7845	0.5883	2584.1	0.244	-5.461

5		0	16	0		7844	1.3690	1004.2	3.023	-0.894
6		0	18	0		7838	5.5525	512.0	7.738	-1.391
7		0	19	0		7837	1.7186	6256.1	7.525	-1.845
8		0	20	0		7835	2.0436	1586.3	1.409	-3.050
9		0	22	0		7834	0.2530	1715.3	2.804	-0.180
10		0	24	0		7834	0.1551	176.5	2.312	-0.134
11		0	26	0		7834	0.0988	2014.0	4.392	-0.0469
12		0	28	0		7834	0.6178	4246.5	11.296	-0.108
13		0	30	0		7828	5.8756	10507.6	15.939	-0.638
14		0	31	0		7826	1.2929	6096.8	0.534	-2.750
15		0	32	0		7823	2.9636	8211.7	0.667	-4.847
16	*	0	33	0		7823	0.0781	10048.2	0.00438	-16.934
17	*	0	34	0		7823	0.2507	18086.5	0.0100	-21.027
18	*	0	35	0		7822	0.7538	80399.7	0.0100	-43.932
19	*	0	36	0		7821	1.1806	613897	0.00100	-509.8
20	*	0	37	0		7821	0.3425	1020839	0.00001	-26649
21	*	0	38	0		7821	0.0779	1126877	1E-6	-74064
22	*	0	39	0		7821	0.0954	1244073	1E-6	-90501
23	*	0	40	0		7821	0.1145	1283423	1E-6	-110885
24	*	0	43	0		7820	0.1040	275806	1.1E-6	-119653
25		0	44	0		7820	0.1204	2606365	0.0100	-14.804
26		0	46	0		7820	0.2418	3215459	0.224	-2.687
27		0	47	0		7819	1.0258	19241977	0.131	-4.619
28	*	0	48	0		7819	0.0909	22708978	0.00100	-83.687
29	*	0	49	0		7819	0.1323	28802586	0.00100	-117.3
30	*	0	50	0		7819	0.2359	43465178	0.00100	-191.5
31	*	0	51	0		7818	0.7889	52557882	0.00100	-452.8
32	*	0	54	0		7818	0.0127	84973460	0.00003	-1336.2
33		0	57	0		7818	0.1238	1.635E10	0.00789	-71.604
34		0	62	0		7817	1.0557	2.1298E9	0.00095	-274.8
35		0	66	0		7817	0.0239	2.3333E9	0.00287	-15.403
36		0	68	0		7816	0.2847	1.6576E9	0.0509	-12.836
37		0	72	0		7815	1.0001	1.983E10	0.209	-4.296
38		0	76	0		7815	0.0984	2.881E10	0.00139	-112.0
39		0	77	0		7815	0.0434	3.189E10	0.0100	-4.083
40	*	0	78	0		7815	0.0706	3.742E10	0.0100	-5.814
41	*	0	79	0		7815	0.2022	5.786E10	0.0100	-13.200
42	*	0	80	0		7815	0.0839	6.903E10	0.00100	-73.185
43	*	0	81	0		7815	0.1581	9.595E10	0.00100	-126.5
44	*	0	82	0		7814	0.6034	3.294E11	0.00100	-312.9
45										

	*	0	83	0		7814	0.0590	3.711E11	0.00001	-5537.3
46	*	0	84	0		7814	0.0780	4.344E11	0.00001	-7172.5
47	*	0	85	0		7814	0.1133	5.457E11	0.00001	-10060
48	*	0	86	0		7814	0.2006	8.157E11	0.00001	-16351
49	*	0	87	0		7813	0.7418	3.53E12	0.00001	-38082
50	*	0	88	0		7813	0.0843	4.16E12	1E-7	-776269
51	*	0	89	0		7813	0.1220	5.271E12	1E-7	-1.08E6
52	*	0	90	0		7812	0.2146	7.97E12	1E-7	-1.75E6
53	*	0	91	0		7812	0.7782	3.431E13	1E-7	-4.05E6
54	*	0	92	0		7812	0.0827	3.989E13	1E-9	-7.67E7
55	*	0	93	0		7811	0.1151	4.911E13	1E-9	-1.04E8
56	*	0	94	0		7811	0.1855	6.835E13	1E-9	-1.58E8
57	*	0	95	0		7811	0.4383	1.454E14	1E-9	-3.06E8
58	*	0	96	0		7811	0.1582	1.887E14	1E-10	-1.39E9
59	*	0	97	0		7810	0.2937	2.979E14	1E-10	-2.35E9
60	*	0	98	0		7810	0.0612	3.251E14	1E-11	-5.86E9
61	*	0	99	0		7810	0.0734	3.586E14	1E-11	-6.98E9
62	*	0	100	0		7810	0.0896	3.978E14	1E-11	-8.5E9
63	*	0	101	0		7810	0.1092	4.269E14	1E-11	-105E8
64	*	0	105	0		7810	0.1352	6.121E13	139E-13	-121E8
65		0	118	0		7810	0.2145	1.677E15	6.39E-6	-138047
66		0	119	0		7810	0.1143	2.347E15	1E-7	-973344
67	*	0	120	0		7809	0.2766	5.28E15	1E-7	-1.91E6
68	*	0	124	0		7809	0.0924	5.477E15	1.33E-8	-8.28E6
69		0	138	0		7809	0.0264	9.534E14	3.28E-7	-150363
70		0	144	0		7809	0.000217	9.664E13	6.99E-6	-39.727
71		0	150	0		7809	0.00507	2.709E15	0.00070	-14.434
72		0	156	0		7809	0.00120	2.921E15	0.00003	-75.417
73		0	157	0		7809	0.0246	2.959E15	0.00100	-22.159
74	*	0	161	0		7809	0.0431	4.217E15	0.00130	-36.640
75		0	164	0		7809	0.0184	1.141E16	0.00634	-4.170
76		0	167	0		7809	0.5400	1.011E16	0.518	-3.169
77		0	168	0		7808	0.1401	1.237E16	0.0131	-10.285
78	*	0	169	0		7808	0.1357	1.51E16	0.0100	-12.670
79	*	0	170	0		7808	0.1772	1.966E16	0.0100	-15.901
80	*	0	171	0		7808	0.2405	2.801E16	0.0100	-22.067
81	*	0	172	0		7807	0.4641	5.463E16	0.0100	-35.414
82	*	0	173	0		7807	0.0846	6.081E16	0.00100	-96.255
83	*	0	175	0		7807	0.3116	6.666E16	0.00263	-112.7
84		0	179	0		7807	0.0528	2.559E15	0.00022	-291.5
85										

		0	182	0		7807	0.0296	6.019E16	0.166	-0.348
86		0	183	0		7807	0.0787	5.838E16	0.117	-0.632
87	*	0	187	0		7807	0.0316	8.363E16	0.0265	-1.662
88		0	191	0		7806	0.4330	2.203E17	1.374	-0.439
89	*	0	194	0		7806	0.0858	1.929E17	0.0249	-3.569
90		0	201	0		7806	0.0590	1.051E17	0.0527	-1.951
91		0	202	0		7806	0.1725	6.301E16	0.197	-0.747
92	*	0	203	0		7806	0.0428	2.555E16	0.0330	-1.305
93	*	0	204	0		7806	0.0127	6.397E16	0.0100	-1.351
94		0	205	0		7806	0.1298	4.985E17	0.100	-1.695
95	*	0	211	0		7806	0.0466	8.074E17	0.00406	-2.558
96	*	0	215	0		7806	0.0451	6.944E17	0.0460	-5.127
97	*	0	222	0		7806	0.0801	1.187E18	0.00280	-2.982
98	*	0	267	0		7806	0.0559	7.748E17	0.0111	-8.359
99	*	0	275	0		7806	0.0458	5.37E17	0.0118	-6.146
100	*	0	276	0		7805	0.1375	1.831E18	0.100	-4.424
101	*	0	277	0		7805	0.3582	2.23E18	0.00100	-56.949
102	*	0	281	0		7805	0.0113	1.972E18	0.00251	-80.154
103	*	0	282	0		7805	0.0697	3.496E17	0.0100	-52.449
104		0	315	0		7805	2.266E-6	3.495E17	1E-7	-20.961
105		0	329	0		7805	0	3.495E17	157E-14	-295.7

Optimization Results			
Iterations	105	Function Calls	330
Gradient Calls	252	Active Constraints	0
Objective Function	7805.0080692	Max Abs Gradient Element	3.4949897E17
Slope of Search Direction	-295.6646602		

Convergence criterion (FCONV=2.220446E-16) satisfied.

Note: At least one element of the gradient is greater than 1e-3.

Illustration of ODS Graphics

The VARMAX Procedure

		Optimization Results	
		Parameter Estimates	
N	Parameter	Estimate	Gradient Objective Function
1	AR1_1_1	1.001490	-34.817525
2	AR1_2_1	0.127320	-23.501944
3	AR1_3_1	-0.000445	-3.49499E17
4	AR1_4_1	-0.005124	36.511063
5	AR1_1_2	-0.105499	-9.035333
6	AR1_2_2	0.367531	-0.201883
7	AR1_3_2	0.002254	-7.880545E16
8	AR1_4_2	0.028791	-38.080252
9	AR1_1_3	15.513079	-0.052564
10	AR1_2_3	1.508977	-0.719656
11	AR1_3_3	0.671733	-9.610317E14
12	AR1_4_3	-0.013867	3.701727
13	AR1_1_4	8.904246	-0.149112
14	AR1_2_4	5.205492	-0.542574
15	AR1_3_4	0.038161	-9.300448E14
16	AR1_4_4	0.264450	-6.245984
17	DCCA	0.048298	-1.301567
18	DCCB	0.110595	-0.549797
19	GCHC1_1	8.7358682E14	1.94051E-14
20	GCHC2_2	5.6762351E13	1.489675E-13
21	GCHC3_3	64791730949	-1243.213828
22	GCHC4_4	204919654655	2.405349E-11
23	ACH1_1_1	0.506181	11.796092
24	ACH1_2_2	0.269256	-7.498260
25	ACH1_3_3	0.589203	1.3671015E14
26	ACH1_4_4	0.130422	5.491221
27	QACH1_1_1	0.000001055	2.0694919E-8
28	QACH1_2_2	0.000001057	-0.000000769
29	QACH1_3_3	-0.000000344	-985832764
30	QACH1_4_4	0.000001045	-0.000000184
31	GCH1_1_1	-0.211115	22.632838
32	GCH1_2_2	-0.247663	2.767820

| 33 | GCH1_3_3 | -0.223456 | -8.951176E14 |
| 34 | GCH1_4_4 | -0.047355 | 5.225474 |

Value of Objective Function = 7805.0080692

Illustration of ODS Graphics

The VARMAX Procedure

Number of Observations	132
Number of Pairwise Missing	0

Simple Summary Statistics						
Variable	Type	N	Mean	Standard Deviation	Min	Max
Gasoline_Gallons	Dependent	132	376804937.74	34812609.531	218414414.00	476873743.00
Diesel_Gallons	Dependent	132	80003756.470	9364707.9800	64939973.000	111638305.00
Kerosene_Gallons	Dependent	132	299988.92424	368176.38610	2214.00000	1725070.0000
Alternative_Fuels_Gallons	Dependent	132	482229.06818	509431.11286	53077.00000	2372859.0000

Illustration of ODS Graphics

The VARMAX Procedure

Type of Model	VAR(1)-GARCH(1,1)
Estimation Method	Maximum Likelihood Estimation
Representation Type	DCC

Schematic Representation of Parameter Estimates	
Variable/Lag	AR1
Gasoline_Gallons	****
Diesel_Gallons	**.*
Kerosene_Gallons	****
Alternative_Fuels_Gallons	****

+ is > 2*std error, - is < -2*std error, . is between, * is N/A

Schematic Representation of GARCH Parameter Estimates			
Variable/Lag	GCHC	ACH1	GCH1
h1	*	****	.***
h2	*	****	****
h3	*	****	****
h4	*	***.	****

+ is > 2*std error, - is < -2*std error, . is between, * is N/A

Model Parameter Estimates						
Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
Gasoline_Gallons	AR1_1_1	1.00149	0.00000			Gasoline_Gallons(t-1)
	AR1_1_2	-0.10550	0.00000			Diesel_Gallons(t-1)
	AR1_1_3	15.51308	0.00000			Kerosene_Gallons(t-1)
	AR1_1_4	8.90425	0.00000			Alternative_Fuels_Gallons(t-1)
Diesel_Gallons	AR1_2_1	0.12732	0.00000			Gasoline_Gallons(t-1)
	AR1_2_2	0.36753	0.00000			Diesel_Gallons(t-1)
	AR1_2_3	1.50898	0.81505	1.85	0.0664	Kerosene_Gallons(t-1)
	AR1_2_4	5.20549	0.00000			Alternative_Fuels_Gallons(t-1)
Kerosene_Gallons	AR1_3_1	-0.00044	0.00000			Gasoline_Gallons(t-1)
	AR1_3_2	0.00225	0.00000			Diesel_Gallons(t-1)
	AR1_3_3	0.67173	0.00000			Kerosene_Gallons(t-1)
	AR1_3_4	0.03816	0.00000			Alternative_Fuels_Gallons(t-1)

Alternative_Fuels_Gallons	AR1_4_1	-0.00512	0.00000			Gasoline_Gallons(t-1)
	AR1_4_2	0.02879	0.00000			Diesel_Gallons(t-1)
	AR1_4_3	-0.01387	0.00000			Kerosene_Gallons(t-1)
	AR1_4_4	0.26445	0.00000			Alternative_Fuels_Gallons(t-1)

GARCH Model Parameter Estimates				
Parameter	Estimate	Standard Error	t Value	Pr > |t|
DCCA	0.04830	0.00000		
DCCB	0.11060	0.00000		
GCHC1_1	8.7358682E14	0.00000		
GCHC2_2	5.6762351E13	0.00000		
GCHC3_3	64791730949	0.00000		
GCHC4_4	204919654655	0.00000		
ACH1_1_1	0.50618	0.00000		
ACH1_2_2	0.26926	0.00000		
ACH1_3_3	0.58920	0.00000		
ACH1_4_4	0.13042	0.21126	0.62	0.5381
QACH1_1_1	0.00000	0.82970	0.00	1.0000
QACH1_2_2	0.00000	0.00000		
QACH1_3_3	-0.00000	0.00000		
QACH1_4_4	0.00000	0.00000		
GCH1_1_1	-0.21111	0.00000		
GCH1_2_2	-0.24766	0.00000		
GCH1_3_3	-0.22346	0.00000		
GCH1_4_4	-0.04736	0.17856	-0.27	0.7913

Unconditional Correlation Matrix in DCC GARCH Model				
Variable	Gasoline_Gallons	Diesel_Gallons	Kerosene_Gallons	Alternative_Fuels_Gallons
Gasoline_Gallons	1.00000	0.71033	-0.22219	-0.00703
Diesel_Gallons	0.71033	1.00000	-0.16588	0.24554
Kerosene_Gallons	-0.22219	-0.16588	1.00000	0.06521
Alternative_Fuels_Gallons	-0.00703	0.24554	0.06521	1.00000

Covariances of Innovations				
Variable	Gasoline_Gallons	Diesel_Gallons	Kerosene_Gallons	Alternative_Fuels_Gallons
Gasoline_Gallons	8.4931077E14	1.6823595E14	-9.918474E11	456186241159
Diesel_Gallons	1.6823595E14	5.603082E13	-2.224065E11	949800950387
Kerosene_Gallons	-9.918474E11	-2.224065E11	71069368095	5105802105.0
Alternative_Fuels_Gallons	456186241159	949800950387	5105802105.0	200333219996

Log-likelihood	-7805.01

Information Criteria	
AICC	15702.81
HQC	15717.74
AIC	15678.02
SBC	15775.77
FPEC	2.872E50

Illustration of ODS Graphics

The VARMAX Procedure

			Gradient Objective Function
N	**Parameter**	**Estimate**	
1	AR1_1_1	0.991732	3.866663
2	AR1_2_1	0.157831	135.687684
3	AR1_3_1	-0.001614	5340.049788
4	AR1_4_1	-0.004545	-5197.948636
5	AR1_1_2	-0.078747	2.063751
6	AR1_2_2	0.217005	28.904188
7	AR1_3_2	0.009119	1273.403104
8	AR1_4_2	0.026459	-1144.586580
9	AR1_1_3	15.512319	-0.122102
10	AR1_2_3	1.510845	0.625263
11	AR1_3_3	0.752832	1.115185
12	AR1_4_3	-0.049891	-10.475461
13	AR1_1_4	8.905219	0.050315
14	AR1_2_4	5.199243	0.352256
15	AR1_3_4	-0.104891	13.331749
16	AR1_4_4	0.203255	-15.841199
17	DCCA	0.100000	57.307828
18	DCCB	0.100000	-1.731872
19	GCHC1_1	8.7358682E14	9.352939E-15
20	GCHC2_2	5.6762351E13	-1.34886E-13
21	GCHC3_3	64791730949	-3.49652E-11
22	GCHC4_4	204919654655	6.066218E-12
23	ACH1_1_1	0.000001054	-32.061822
24	ACH1_2_2	0.000001054	-189.004252
25	ACH1_3_3	0.000001054	-108.257789
26	ACH1_4_4	0.000001054	-19.127538
27	TACH1_1_1	0.000001054	-10.684953
28	TACH1_2_2	0.000001054	-94.557126
29	TACH1_3_3	0.000001054	10.848893
30	TACH1_4_4	0.000001054	2.512747
31	GCH1_1_1	0.000001054	8.383287
32	GCH1_2_2	0.000001054	-7.599407

| 33 | GCH1_3_3 | 0.000001054 | -2.273037 |
| 34 | GCH1_4_4 | 0.000001054 | 1.264643 |

Value of Objective Function = 7846.618413

Illustration of ODS Graphics

The VARMAX Procedure

Dual Quasi-Newton Optimization

Minimum Iterations	0
Maximum Iterations	5000
Maximum Function Calls	50000
ABSGCONV Gradient Criterion	0.00001
GCONV Gradient Criterion	1E-8
ABSFCONV Function Criterion	0
FCONV Function Criterion	2.220446E-16
FCONV2 Function Criterion	0
FSIZE Parameter	0
ABSXCONV Parameter Change Criterion	0
XCONV Parameter Change Criterion	0
XSIZE Parameter	0
ABSCONV Function Criterion	-1.34078E154
Line Search Method	2
Starting Alpha for Line Search	1
Line Search Precision LSPRECISION	0.4
DAMPSTEP Parameter for Line Search	.
Singularity Tolerance (SINGULAR)	1E-8

Dual Quasi-Newton Optimization

Dual Broyden - Fletcher - Goldfarb - Shanno Update (DBFGS)

Parameter Estimates	34

Optimization Start			
Active Constraints	0	**Objective Function**	7846.618413
Max Abs Gradient Element	5340.0497885		

Iteration	Restarts	Function Calls	Active Constraints	Objective Function	Objective Function Change	Max Abs Gradient Element	Step Size	Slope of Search Direction
1	0	8	0	7847	0.1104	2385.8	3.76E-7	-585477
2	0	11	0	7846	0.0218	1536.4	0.00100	-117.1
3	0	14	0	7846	0.7751	1548.9	2.000	-0.857
4	0	15	0	7845	0.6366	4552.4	0.294	-6.593

5		0	17	0		7843	1.7543	5316.9	3.305	-1.058
6		0	19	0		7838	5.7402	5748.5	7.198	-1.593
7		0	21	0		7835	2.4797	7235.8	3.577	-1.775
8		0	23	0		7834	0.7098	1678.9	1.819	-0.798
9		0	25	0		7834	0.2357	1077.4	3.274	-0.164
10		0	27	0		7834	0.1399	3000.2	4.862	-0.0572
11		0	29	0		7833	0.5768	920.3	7.002	-0.169
12		0	31	0		7832	1.1849	7117.0	11.270	-0.256
13		0	33	0		7830	2.2927	1525.1	3.498	-1.694
14		0	34	0		7828	2.0132	3059.5	1.218	-4.704
15		0	35	0		7825	2.5542	9309.2	3.601	-1.398
16		0	36	0		7825	0.5699	6390.3	0.366	-1.745
17		0	37	0		7825	0.1387	5753.4	0.0672	-2.121
18		0	38	0		7824	0.3383	3980.6	0.127	-2.729
19		0	39	0		7824	0.0151	3867.2	0.00010	-150.9
20	*	0	40	0		7824	0.0154	3746.2	0.00010	-153.3
21	*	0	41	0		7824	0.0157	3616.5	0.00010	-156.2
22	*	0	42	0		7824	0.00160	3603.0	0.00001	-159.5
23	*	0	43	0		7824	0.00160	3589.3	0.00001	-159.9
24	*	0	44	0		7824	0.00160	3575.6	0.00001	-160.2
25	*	0	45	0		7824	0.00161	3561.7	0.00001	-160.6
26	*	0	46	0		7824	0.00161	3547.8	0.00001	-161.0
27	*	0	47	0		7824	0.000161	3546.4	1E-6	-161.4
28	*	0	48	0		7824	0.000161	3545.0	1E-6	-161.4
29	*	0	49	0		7824	0.000161	3543.6	1E-6	-161.4
30	*	0	50	0		7824	0.000161	3542.2	1E-6	-161.5
31	*	0	51	0		7824	0.000162	3540.8	1E-6	-161.5
32	*	0	52	0		7824	0.000162	3539.4	1E-6	-161.6
33	*	0	53	0		7824	0.000162	3538.0	1E-6	-161.6
34	*	0	54	0		7824	0.000016	3537.8	1E-7	-161.6
35	*	0	55	0		7824	0.000016	3537.7	1E-7	-161.6
36	*	0	56	0		7824	0.000016	3537.5	1E-7	-161.6
37	*	0	57	0		7824	0.000016	3537.4	1E-7	-161.6
38	*	0	58	0		7824	0.000016	3537.3	1E-7	-161.7
39	*	0	59	0		7824	0.000016	3537.1	1E-7	-161.7
40	*	0	60	0		7824	0.000016	3537.0	1E-7	-161.7
41	*	0	61	0		7824	0.000016	3536.8	1E-7	-161.7
42	*	0	62	0		7824	0.000016	3536.7	1E-7	-161.7
43	*	0	63	0		7824	1.617E-8	3536.7	1E-10	-161.7
44	*	0	64	0		7824	1.617E-8	3536.7	1E-10	-161.7
45										

	*	0	65	0		7824	1.616E-8	3536.7	1E-10	-161.7
46	*	0	66	0		7824	1.617E-8	3536.7	1E-10	-161.7
47	*	0	67	0		7824	1.617E-8	3536.7	1E-10	-161.7
48	*	0	68	0		7824	1.616E-8	3536.7	1E-10	-161.7
49	*	0	69	0		7824	1.617E-8	3536.7	1E-10	-161.7
50	*	0	70	0		7824	1.616E-8	3536.7	1E-10	-161.7
51	*	0	71	0		7824	1.64E-10	3536.7	1E-12	-161.7
52	*	0	72	0		7824	1.62E-10	3536.7	1E-12	-161.7
53	*	0	73	0		7824	1.61E-10	3536.7	1E-12	-161.7
54	*	0	74	0		7824	1.68E-10	3536.7	1E-12	-161.7
55	*	0	75	0		7824	1.56E-10	3536.7	1E-12	-161.7
56	*	0	76	0		7824	1.62E-10	3536.7	1E-12	-161.7
57	*	0	77	0		7824	1.65E-10	3536.7	1E-12	-161.7
58	*	0	78	0		7824	1.6E-10	3536.7	1E-12	-161.7
59	*	0	79	0		7824	0	3536.7	1E-13	-161.7

Optimization Results			
Iterations	59	Function Calls	80
Gradient Calls	110	Active Constraints	0
Objective Function	7824.2907957	Max Abs Gradient Element	3536.6916023
Slope of Search Direction	-161.669725		

Convergence criterion (FCONV=2.220446E-16) satisfied.

Note: At least one element of the gradient is greater than 1e-3.

Illustration of ODS Graphics

The VARMAX Procedure

	Optimization Results		
	Parameter Estimates		
N	Parameter	Estimate	Gradient Objective Function
1	AR1_1_1	0.997496	-84.031206
2	AR1_2_1	0.125690	265.780003
3	AR1_3_1	-0.000990	-3536.691602
4	AR1_4_1	-0.005655	353.974817
5	AR1_1_2	-0.105280	-20.027719
6	AR1_2_2	0.370078	63.291065
7	AR1_3_2	0.005001	-628.087071
8	AR1_4_2	0.031359	51.567950
9	AR1_1_3	15.513055	-0.038410
10	AR1_2_3	1.509222	-0.611011
11	AR1_3_3	0.689443	10.350871
12	AR1_4_3	-0.012718	5.252333
13	AR1_1_4	8.904277	-0.202658
14	AR1_2_4	5.205187	-0.147242
15	AR1_3_4	0.012333	29.703749
16	AR1_4_4	0.258803	-0.698804
17	DCCA	4.812402E-13	-21.470488
18	DCCB	0.109778	-3.01899E-12
19	GCHC1_1	8.7358682E14	2.069596E-14
20	GCHC2_2	5.6762351E13	1.303224E-13
21	GCHC3_3	64791730949	3.248581E-10
22	GCHC4_4	204919654655	2.45357E-11
23	ACH1_1_1	0.458995	12.672008
24	ACH1_2_2	0.117433	-11.008729
25	ACH1_3_3	0.534781	-2.760875
26	ACH1_4_4	0.127172	5.198685
27	TACH1_1_1	0.231028	5.468303
28	TACH1_2_2	0.199866	-2.368468
29	TACH1_3_3	-0.146965	8.702891
30	TACH1_4_4	-0.032811	0.925443
31	GCH1_1_1	-0.188178	24.899495
32	GCH1_2_2	-0.228065	-1.632707

| 33 | GCH1_3_3 | -0.180446 | 40.721422 |
| 34 | GCH1_4_4 | -0.036590 | 5.327290 |

Value of Objective Function = 7824.2907957

Illustration of ODS Graphics

The VARMAX Procedure

Number of Observations	132
Number of Pairwise Missing	0

Simple Summary Statistics						
Variable	Type	N	Mean	Standard Deviation	Min	Max
Gasoline_Gallons	Dependent	132	376804937.74	34812609.531	218414414.00	476873743.00
Diesel_Gallons	Dependent	132	80003756.470	9364707.9800	64939973.000	111638305.00
Kerosene_Gallons	Dependent	132	299988.92424	368176.38610	2214.00000	1725070.0000
Alternative_Fuels_Gallons	Dependent	132	482229.06818	509431.11286	53077.00000	2372859.0000

Illustration of ODS Graphics

The VARMAX Procedure

Type of Model	VAR(1)-GARCH(1,1)
Estimation Method	Maximum Likelihood Estimation
Representation Type	DCC

Schematic Representation of Parameter Estimates	
Variable/Lag	AR1
Gasoline_Gallons	****
Diesel_Gallons	****
Kerosene_Gallons	*.+*
Alternative_Fuels_Gallons	*+**

+ is > 2*std error, - is < -2*std error, . is between, * is N/A

Schematic Representation of GARCH Parameter Estimates			
Variable/Lag	GCHC	ACH1	GCH1
h1	*	****	****
h2	*	*+**	****
h3	*	**+*	****
h4	*	****	****

+ is > 2*std error, - is < -2*std error, . is between, * is N/A

Model Parameter Estimates						
Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
Gasoline_Gallons	AR1_1_1	0.99750	0.00000			Gasoline_Gallons(t-1)
	AR1_1_2	-0.10528	0.00000			Diesel_Gallons(t-1)
	AR1_1_3	15.51305	0.00000			Kerosene_Gallons(t-1)
	AR1_1_4	8.90428	0.00000			Alternative_Fuels_Gallons(t-1)
Diesel_Gallons	AR1_2_1	0.12569	0.00000			Gasoline_Gallons(t-1)
	AR1_2_2	0.37008	0.00000			Diesel_Gallons(t-1)
	AR1_2_3	1.50922	0.00000			Kerosene_Gallons(t-1)
	AR1_2_4	5.20519	0.00000			Alternative_Fuels_Gallons(t-1)
Kerosene_Gallons	AR1_3_1	-0.00099	0.00000			Gasoline_Gallons(t-1)
	AR1_3_2	0.00500	0.00436	1.15	0.2538	Diesel_Gallons(t-1)
	AR1_3_3	0.68944	0.06011	11.47	0.0001	Kerosene_Gallons(t-1)
	AR1_3_4	0.01233	0.00000			Alternative_Fuels_Gallons(t-1)

Alternative_Fuels_Gallons	AR1_4_1	-0.00566	0.00000			Gasoline_Gallons(t-1)
	AR1_4_2	0.03136	0.00389	8.07	0.0001	Diesel_Gallons(t-1)
	AR1_4_3	-0.01272	0.00000			Kerosene_Gallons(t-1)
	AR1_4_4	0.25880	0.00000			Alternative_Fuels_Gallons(t-1)

GARCH Model Parameter Estimates				
Parameter	Estimate	Standard Error	t Value	Pr > |t|
DCCA	0.00000	0.00000		
DCCB	0.10978	0.00000		
GCHC1_1	8.7358682E14	0.00000		
GCHC2_2	5.6762351E13	0.00000		
GCHC3_3	64791730949	0.00000		
GCHC4_4	204919654655	0.00000		
ACH1_1_1	0.45899	0.00000		
ACH1_2_2	0.11743	0.05268	2.23	0.0275
ACH1_3_3	0.53478	0.09966	5.37	0.0001
ACH1_4_4	0.12717	0.00000		
TACH1_1_1	0.23103	0.00000		
TACH1_2_2	0.19987	0.00000		
TACH1_3_3	-0.14697	0.00000		
TACH1_4_4	-0.03281	0.00000		
GCH1_1_1	-0.18818	0.00000		
GCH1_2_2	-0.22806	0.00000		
GCH1_3_3	-0.18045	0.02693	-6.70	0.0001
GCH1_4_4	-0.03659	0.00000		

Unconditional Correlation Matrix in DCC GARCH Model				
Variable	Gasoline_Gallons	Diesel_Gallons	Kerosene_Gallons	Alternative_Fuels_Gallons
Gasoline_Gallons	1.00000	0.70279	-0.18676	-0.01229
Diesel_Gallons	0.70279	1.00000	-0.10801	0.24649
Kerosene_Gallons	-0.18676	-0.10801	1.00000	0.07150
Alternative_Fuels_Gallons	-0.01229	0.24649	0.07150	1.00000

Covariances of Innovations				
Variable	Gasoline_Gallons	Diesel_Gallons	Kerosene_Gallons	Alternative_Fuels_Gallons
Gasoline_Gallons	8.4693618E14	1.6738218E14	-9.006636E11	440937145659
Diesel_Gallons	1.6738218E14	5.5764325E13	-1.896824E11	957519052981
Kerosene_Gallons	-9.006636E11	-1.896824E11	68867491225	5029291135.4
Alternative_Fuels_Gallons	440937145659	957519052981	5029291135.4	201125127585

Log-likelihood	-7824.29

Information Criteria	
AICC	15741.37
HQC	15756.3
AIC	15716.58
SBC	15814.34
FPEC	2.781E50

Illustration of ODS Graphics

The VARMAX Procedure

			Gradient Objective
N	**Parameter**	**Estimate**	**Function**
1	AR1_1_1	0.991732	3.866213
2	AR1_2_1	0.157831	135.691011
3	AR1_3_1	-0.001614	5340.037110
4	AR1_4_1	-0.004545	-5197.955555
5	AR1_1_2	-0.078747	2.063644
6	AR1_2_2	0.217005	28.904985
7	AR1_3_2	0.009119	1273.400759
8	AR1_4_2	0.026459	-1144.588736
9	AR1_1_3	15.512319	-0.122103
10	AR1_2_3	1.510845	0.625270
11	AR1_3_3	0.752832	1.115158
12	AR1_4_3	-0.049891	-10.475474
13	AR1_1_4	8.905219	0.050313
14	AR1_2_4	5.199243	0.352271
15	AR1_3_4	-0.104891	13.331734
16	AR1_4_4	0.203255	-15.841234
17	DCCA	0.100000	57.308040
18	DCCB	0.100000	-1.731882
19	GCHC1_1	8.7358682E14	9.352861E-15
20	GCHC2_2	5.6762351E13	-1.34891E-13
21	GCHC3_3	64791730949	-3.49652E-11
22	GCHC4_4	204919654655	6.06618E-12
23	ACH1_1_1	0.000001054	-32.061907
24	ACH1_2_2	0.000001054	-189.006328
25	ACH1_3_3	0.000001054	-108.257524
26	ACH1_4_4	0.000001054	-19.127468
27	PACH1_1_1	0.000001054	0.000022531
28	PACH1_2_2	0.000001054	-0.000000235
29	PACH1_3_3	0.000001054	0.000274
30	PACH1_4_4	0.000001054	0.000050899
31	GCH1_1_1	0.000001054	8.383219
32	GCH1_2_2	0.000001054	-7.599686

33	GCH1_3_3	0.000001054	-2.273045
34	GCH1_4_4	0.000001054	1.264640
35	LAMBDA1	1.000000	-281.096165
36	LAMBDA2	1.000000	242.487178
37	LAMBDA3	1.000000	56.397166
38	LAMBDA4	1.000000	-32.377145

Value of Objective Function = 7846.6185098

Illustration of ODS Graphics

The VARMAX Procedure

Dual Quasi-Newton Optimization

Minimum Iterations	0
Maximum Iterations	5000
Maximum Function Calls	50000
ABSGCONV Gradient Criterion	0.00001
GCONV Gradient Criterion	1E-8
ABSFCONV Function Criterion	0
FCONV Function Criterion	2.220446E-16
FCONV2 Function Criterion	0
FSIZE Parameter	0
ABSXCONV Parameter Change Criterion	0
XCONV Parameter Change Criterion	0
XSIZE Parameter	0
ABSCONV Function Criterion	-1.34078E154
Line Search Method	2
Starting Alpha for Line Search	1
Line Search Precision LSPRECISION	0.4
DAMPSTEP Parameter for Line Search	.
Singularity Tolerance (SINGULAR)	1E-8

Dual Quasi-Newton Optimization

Dual Broyden - Fletcher - Goldfarb - Shanno Update (DBFGS)

Parameter Estimates	38

Optimization Start			
Active Constraints	0	**Objective Function**	7846.6185098
Max Abs Gradient Element	5340.0371099		

Iteration	Restarts	Function Calls	Active Constraints	Objective Function	Objective Function Change	Max Abs Gradient Element	Step Size	Slope of Search Direction
1	0	7	0	7847	0.1109	2379.5	3.77E-7	-586805
2	0	10	0	7846	0.0232	1551.5	0.00100	-119.0
3	0	12	0	7846	0.5099	823.0	0.454	-2.237
4	0	14	0	7846	0.2032	424.2	0.527	-0.773

5		0	16	0		7845	0.9554	3300.2	0.748	-2.522
6		0	18	0		7840	4.8646	12846.5	10.191	-0.911
7		0	19	0		7832	7.6434	4902.0	2.734	-4.448
8		0	21	0		7825	7.2945	13473.9	2.507	-5.382
9		0	22	0		7824	1.5071	7975.6	0.491	-3.717
10		0	23	0		7823	0.3498	6649.9	0.150	-2.505
11		0	24	0		7823	0.0857	6338.3	0.0421	-2.075
12		0	25	0		7823	0.2043	5608.1	0.100	-2.146
13		0	26	0		7823	0.0504	5430.4	0.0264	-1.937
14		0	27	0		7823	0.0200	5363.7	0.0100	-2.010
15		0	28	0		7823	0.0211	5296.4	0.0100	-2.122
16		0	29	0		7823	0.0221	5228.8	0.0100	-2.220
17		0	30	0		7823	0.0230	5160.8	0.0100	-2.312
18		0	31	0		7823	0.00240	5153.9	0.00100	-2.401
19		0	32	0		7823	0.00253	5146.9	0.00100	-2.529
20		0	33	0		7823	0.00265	5139.8	0.00100	-2.656
21		0	34	0		7823	0.00278	5132.6	0.00100	-2.782
22		0	35	0		7823	0.00291	5125.2	0.00100	-2.909
23		0	36	0		7823	0.00304	5117.8	0.00100	-3.037
24		0	37	0		7823	0.00316	5110.2	0.00100	-3.165
25		0	38	0		7823	0.00329	5102.4	0.00100	-3.293
26		0	39	0		7823	0.00342	5094.6	0.00100	-3.422
27		0	40	0		7823	0.000355	5093.8	0.00010	-3.552
28		0	41	0		7823	0.000369	5093.0	0.00010	-3.687
29		0	42	0		7823	0.000382	5092.1	0.00010	-3.822
30		0	43	0		7823	0.000396	5091.3	0.00010	-3.957
31		0	44	0		7823	0.000409	5090.5	0.00010	-4.092
32		0	45	0		7823	4.227E-6	5090.5	1E-6	-4.227
33		0	46	0		7823	4.363E-6	5090.5	1E-6	-4.363
34		0	47	0		7823	4.498E-6	5090.4	1E-6	-4.498
35		0	48	0		7823	4.633E-6	5090.4	1E-6	-4.633
36		0	49	0		7823	4.767E-6	5090.4	1E-6	-4.767
37		0	50	0		7823	4.901E-6	5090.4	1E-6	-4.901
38		0	51	0		7823	5.034E-6	5090.4	1E-6	-5.034
39		0	52	0		7823	5.167E-6	5090.4	1E-6	-5.167
40		0	53	0		7823	5.299E-7	5090.4	1E-7	-5.299
41		0	54	0		7823	5.431E-7	5090.4	1E-7	-5.431
42		0	55	0		7823	5.561E-7	5090.4	1E-7	-5.561
43		0	56	0		7823	5.691E-7	5090.4	1E-7	-5.691
44		0	57	0		7823	5.82E-7	5090.4	1E-7	-5.820
45										

		0	58	0		7823	5.948E-7	5090.4	1E-7	-5.948
46		0	59	0		7823	6.075E-7	5090.4	1E-7	-6.075
47		0	60	0		7823	6.201E-8	5090.4	1E-8	-6.201
48		0	61	0		7823	6.326E-8	5090.4	1E-8	-6.326
49		0	62	0		7823	6.448E-9	5090.4	1E-9	-6.450
50		0	63	0		7823	6.57E-10	5090.4	1E-10	-6.573
51		0	64	0		7823	6.72E-10	5090.4	1E-10	-6.695
52		0	65	0		7823	6.8E-10	5090.4	1E-10	-6.815
53		0	66	0		7823	6.97E-10	5090.4	1E-10	-6.935
54		0	67	0		7823	0	5090.4	1E-11	-7.054

Optimization Results			
Iterations	54	Function Calls	68
Gradient Calls	104	Active Constraints	0
Objective Function	7822.7016887	Max Abs Gradient Element	5090.390517
Slope of Search Direction	-7.053947584		

Convergence criterion (FCONV=2.220446E-16) satisfied.

Note: At least one element of the gradient is greater than 1e-3.

Illustration of ODS Graphics

The VARMAX Procedure

| | Optimization Results | | |
| | Parameter Estimates | | |
N	Parameter	Estimate	Gradient Objective Function
1	AR1_1_1	0.994384	-47.865500
2	AR1_2_1	0.156636	167.427231
3	AR1_3_1	-0.002413	-5090.390517
4	AR1_4_1	-0.005009	-3737.135634
5	AR1_1_2	-0.082006	-7.444477
6	AR1_2_2	0.225928	14.742027
7	AR1_3_2	0.012409	-959.221763
8	AR1_4_2	0.028387	-753.497405
9	AR1_1_3	15.512611	0.004951
10	AR1_2_3	1.509654	-0.246195
11	AR1_3_3	0.755418	13.054097
12	AR1_4_3	-0.035650	-1.811357
13	AR1_1_4	8.905054	-0.020061
14	AR1_2_4	5.199471	-0.851059
15	AR1_3_4	-0.102923	-22.912664
16	AR1_4_4	0.218317	-3.772929
17	DCCA	4.966229E-13	-33.016049
18	DCCB	0.102969	-1.15313E-11
19	GCHC1_1	8.7358682E14	-1.59365E-15
20	GCHC2_2	5.6762351E13	-6.70043E-14
21	GCHC3_3	64791730949	-2.0963E-11
22	GCHC4_4	204919654655	-4.47033E-14
23	ACH1_1_1	0.187058	-10.537301
24	ACH1_2_2	0.196980	-7.285993
25	ACH1_3_3	0.202862	-27.667358
26	ACH1_4_4	0.051070	-2.597650
27	PACH1_1_1	0.000068731	-6.251033
28	PACH1_2_2	0.001768	-5.352696
29	PACH1_3_3	-0.002112	18.668404
30	PACH1_4_4	-0.000157	0.330874
31	GCH1_1_1	-0.000129	0.868865
32	GCH1_2_2	-0.000298	-8.024666

33	GCH1_3_3	-0.000745	-0.619239
34	GCH1_4_4	-0.000120	-0.521572
35	LAMBDA1	1.013579	46.822805
36	LAMBDA2	1.015934	119.192472
37	LAMBDA3	1.019961	32.428625
38	LAMBDA4	1.003706	0.178143

Value of Objective Function = 7822.7016887

Illustration of ODS Graphics

The VARMAX Procedure

Number of Observations	132
Number of Pairwise Missing	0

Simple Summary Statistics						
Variable	Type	N	Mean	Standard Deviation	Min	Max
Gasoline_Gallons	Dependent	132	376804937.74	34812609.531	218414414.00	476873743.00
Diesel_Gallons	Dependent	132	80003756.470	9364707.9800	64939973.000	111638305.00
Kerosene_Gallons	Dependent	132	299988.92424	368176.38610	2214.00000	1725070.0000
Alternative_Fuels_Gallons	Dependent	132	482229.06818	509431.11286	53077.00000	2372859.0000

Illustration of ODS Graphics

The VARMAX Procedure

Type of Model	VAR(1)-GARCH(1,1)
Estimation Method	Maximum Likelihood Estimation
Representation Type	DCC

Schematic Representation of Parameter Estimates	
Variable/Lag	AR1
Gasoline_Gallons	**++
Diesel_Gallons	**.+
Kerosene_Gallons	-++-
Alternative_Fuels_Gallons	-+.+

+ is > 2*std error, - is < -2*std error, . is between, * is N/A

Schematic Representation of GARCH Parameter Estimates			
Variable/Lag	GCHC	ACH1	GCH1
h1	*	****	****
h2	*	****	*.**
h3	*	**.*	**.*
h4	*	***.	***.

+ is > 2*std error, - is < -2*std error, . is between, * is N/A

Model Parameter Estimates						
Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
Gasoline_Gallons	AR1_1_1	0.99438	0.00000			Gasoline_Gallons(t-1)
	AR1_1_2	-0.08201	0.00000			Diesel_Gallons(t-1)
	AR1_1_3	15.51261	5.16128	3.01	0.0032	Kerosene_Gallons(t-1)
	AR1_1_4	8.90505	4.44682	2.00	0.0473	Alternative_Fuels_Gallons(t-1)
Diesel_Gallons	AR1_2_1	0.15664	0.00000			Gasoline_Gallons(t-1)
	AR1_2_2	0.22593	0.00000			Diesel_Gallons(t-1)
	AR1_2_3	1.50965	1.42598	1.06	0.2917	Kerosene_Gallons(t-1)
	AR1_2_4	5.19947	1.14055	4.56	0.0001	Alternative_Fuels_Gallons(t-1)
Kerosene_Gallons	AR1_3_1	-0.00241	0.00110	-2.20	0.0297	Gasoline_Gallons(t-1)
	AR1_3_2	0.01241	0.00506	2.45	0.0156	Diesel_Gallons(t-1)
	AR1_3_3	0.75542	0.07857	9.61	0.0001	Kerosene_Gallons(t-1)
	AR1_3_4	-0.10292	0.04988	-2.06	0.0411	Alternative_Fuels_Gallons(t-1)

Alternative_Fuels_Gallons	AR1_4_1	-0.00501	0.00199	-2.51	0.0132	Gasoline_Gallons(t-1)
	AR1_4_2	0.02839	0.00960	2.96	0.0037	Diesel_Gallons(t-1)
	AR1_4_3	-0.03565	0.10481	-0.34	0.7343	Kerosene_Gallons(t-1)
	AR1_4_4	0.21832	0.10407	2.10	0.0378	Alternative_Fuels_Gallons(t-1)

GARCH Model Parameter Estimates				
Parameter	Estimate	Standard Error	t Value	Pr > |t|
DCCA	0.00000	0.00000		
DCCB	0.10297	0.00000		
GCHC1_1	8.7358682E14	0.00000		
GCHC2_2	5.6762351E13	0.00000		
GCHC3_3	64791730949	0.00000		
GCHC4_4	204919654655	0.00000		
ACH1_1_1	0.18706	0.00000		
ACH1_2_2	0.19698	0.00000		
ACH1_3_3	0.20286	0.17924	1.13	0.2598
ACH1_4_4	0.05107	0.10395	0.49	0.6241
PACH1_1_1	0.00007	0.00000		
PACH1_2_2	0.00177	0.12952	0.01	0.9891
PACH1_3_3	-0.00211	0.43068	-0.00	0.9961
PACH1_4_4	-0.00016	1.00837	-0.00	0.9999
GCH1_1_1	-0.00013	0.00000		
GCH1_2_2	-0.00030	0.00000		
GCH1_3_3	-0.00075	0.00000		
GCH1_4_4	-0.00012	0.00000		
LAMBDA1	1.01358	0.00000		
LAMBDA2	1.01593	0.00000		
LAMBDA3	1.01996	0.00923	110.56	0.0001
LAMBDA4	1.00371	0.00000		

Unconditional Correlation Matrix in DCC GARCH Model				
Variable	Gasoline_Gallons	Diesel_Gallons	Kerosene_Gallons	Alternative_Fuels_Gallons
Gasoline_Gallons	1.00000	0.72320	-0.17375	-0.00436
Diesel_Gallons	0.72320	1.00000	-0.14248	0.24815
Kerosene_Gallons	-0.17375	-0.14248	1.00000	0.05959
Alternative_Fuels_Gallons	-0.00436	0.24815	0.05959	1.00000

Testing of the Parameters			
Test	DF	Chi-Square	Pr > ChiSq
1	9	154.52	<.0001

Covariances of Innovations				
Variable	Gasoline_Gallons	Diesel_Gallons	Kerosene_Gallons	Alternative_Fuels_Gallons
Gasoline_Gallons	8.4746266E14	1.6769423E14	-9.235644E11	439267007619
Diesel_Gallons	1.6769423E14	5.5101565E13	-1.998485E11	920719730376
Kerosene_Gallons	-9.235644E11	-1.998485E11	64467692375	5010903479.9
Alternative_Fuels_Gallons	439267007619	920719730376	5010903479.9	199002772901

Log-likelihood	-7822.7

Information Criteria	
AICC	15753.62
HQC	15765.8
AIC	15721.4
SBC	15830.66
FPEC	2.505E50

Illustration of ODS Graphics

The VARMAX Procedure

			Optimization Start
			Parameter Estimates
N	Parameter	Estimate	Gradient Objective Function
1	AR1_1_1	0.991732	-416.448797
2	AR1_2_1	0.157831	-8382.077923
3	AR1_3_1	-0.001614	-510774
4	AR1_4_1	-0.004545	-703853
5	AR1_1_2	0	-111.419939
6	AR1_2_2	0.217005	-1647.978851
7	AR1_3_2	0.009119	-108579
8	AR1_4_2	0	-151695
9	AR1_1_3	0	-0.914473
10	AR1_2_3	0	-3.018632
11	AR1_3_3	0	-381.390957
12	AR1_4_3	0	-613.836586
13	AR1_1_4	0	-3.446071
14	AR1_2_4	5.199243	-3.659005
15	AR1_3_4	0	-705.747374
16	AR1_4_4	0	-1096.309989
17	DCCA	0.100000	5113.987342
18	DCCB	0.100000	-432.545735
19	GCHC1_1	8.7358682E14	-1.91927E-13
20	GCHC2_2	5.6762351E13	-3.38699E-12
21	GCHC3_3	64791730949	-1.62293E-9
22	GCHC4_4	204919654655	-1.037912E-8
23	ACH1_1_1	0.000001054	-555.623614
24	ACH1_2_2	0.000001054	-1279.186069
25	ACH1_3_3	0.000001054	-2234.651250
26	ACH1_4_4	0.000001054	-62455
27	PACH1_1_1	0.000001054	0.000016823
28	PACH1_2_2	0.000001054	0.000833
29	PACH1_3_3	0.000001054	0.004761
30	PACH1_4_4	0.000001054	0.129867
31	GCH1_1_1	0.000001054	-168.156252
32	GCH1_2_2	0.000001054	-192.259392

33	GCH1_3_3	0.000001054	-103.428824
34	GCH1_4_4	0.000001054	-2922.838261
35	LAMBDA1	1.000000	5768.275610
36	LAMBDA2	1.000000	6088.638297
37	LAMBDA3	1.000000	2617.706916
38	LAMBDA4	1.000000	55396

Value of Objective Function = 9982.9474247

Linear Constraints

1	0	:	ACT	0	==	+	1.0000	*	AR1_1_2
2	0	:	ACT	0	==	+	1.0000	*	AR1_1_3
3	0	:	ACT	0	==	+	1.0000	*	AR1_1_4
4	0	:	ACT	0	==	+	1.0000	*	AR1_2_3
5	0	:	ACT	0	==	+	1.0000	*	AR1_3_3
6	0	:	ACT	0	==	+	1.0000	*	AR1_3_4
7	0	:	ACT	0	==	+	1.0000	*	AR1_4_2
8	0	:	ACT	0	==	+	1.0000	*	AR1_4_3
9	0	:	ACT	0	==	+	1.0000	*	AR1_4_4

First Order Lagrange Multipliers

Active Constraint		Lagrange Multiplier
Linear EC	[1]	-111.419939
Linear EC	[2]	-0.914473
Linear EC	[3]	-3.446071
Linear EC	[4]	-3.018632
Linear EC	[5]	-381.390957
Linear EC	[6]	-705.747374
Linear EC	[7]	-151695
Linear EC	[8]	-613.836586
Linear EC	[9]	-1096.309989

Projected Gradient

Free Dimension	Projected Gradient
1	-416.448797
2	-8382.077923
3	-510774
4	-703853
5	1647.978851
6	108579
7	3.659005

8	-5113.987342
9	432.545735
10	1.919268E-13
11	3.386985E-12
12	1.6229304E-9
13	1.0379117E-8
14	555.623614
15	1279.186069
16	2234.651250
17	62455
18	-0.000016823
19	-0.000833
20	-0.004761
21	-0.129867
22	168.156252
23	192.259392
24	103.428824
25	2922.838261
26	-5768.275610
27	-6088.638297
28	-2617.706916
29	-55396

Illustration of ODS Graphics

The VARMAX Procedure

Dual Quasi-Newton Optimization

Minimum Iterations	0
Maximum Iterations	5000
Maximum Function Calls	50000
ABSGCONV Gradient Criterion	0.00001
GCONV Gradient Criterion	1E-8
ABSFCONV Function Criterion	0
FCONV Function Criterion	2.220446E-16
FCONV2 Function Criterion	0
FSIZE Parameter	0
ABSXCONV Parameter Change Criterion	0
XCONV Parameter Change Criterion	0
XSIZE Parameter	0
ABSCONV Function Criterion	-1.34078E154
Line Search Method	2
Starting Alpha for Line Search	1
Line Search Precision LSPRECISION	0.4
DAMPSTEP Parameter for Line Search	.
Singularity Tolerance (SINGULAR)	1E-8
Constraint Precision (LCEPS)	1E-8
Linearly Dependent Constraints (LCSING)	1E-8
Releasing Active Constraints (LCDEACT)	.

Dual Quasi-Newton Optimization

Dual Broyden - Fletcher - Goldfarb - Shanno Update (DBFGS)

Parameter Estimates	38
Linear Constraints	9

Optimization Start		
Active Constraints	9	**Objective Function**	9982.9474247
Max Abs Gradient Element	703852.55609		

Iteration	Restarts	Function Calls	Active Constraints	Objective Function	Objective Function Change	Max Abs Gradient Element	Step Size	Slope of Search Direction

1	0	7	9	9165	818.4	1199151	4.48E-7	-7.75E9
2	0	8	9	8072	1092.8	261882	0.360	-5681.7
3	0	10	9	7980	91.7111	30314.9	2.163	-85.234
4	0	11	9	7974	5.7743	5921.2	1.000	-9.865
5	0	12	9	7974	0.2618	2492.8	1.000	-0.442
6	0	14	9	7973	0.5367	14936.1	9.056	-0.145
7	0	16	9	7965	8.6755	12375.9	13.364	-1.004
8	0	18	9	7946	18.5049	28666.8	4.507	-9.625
9	0	20	9	7936	10.3106	9223.3	2.463	-8.748
10	0	22	9	7934	1.4191	4045.2	2.063	-1.773
11	0	24	9	7934	0.1979	2336.4	1.474	-0.259
12	0	26	9	7933	0.9608	15028.5	19.056	-0.100
13	0	27	9	7932	1.6343	3514.6	2.633	-0.912
14	0	28	9	7930	2.1360	12512.2	2.049	-1.994
15	0	30	9	7928	1.1820	2332.4	2.142	-1.168
16	0	32	9	7928	0.0532	397.0	1.279	-0.0785
17	0	34	9	7928	0.00599	389.5	1.920	-0.0062
18	0	37	9	7928	0.2094	4535.4	88.644	-0.0047
19	0	38	9	7928	0.1785	2093.7	1.821	-0.287
20	0	40	9	7928	0.0695	649.4	1.778	-0.0784
21	0	42	9	7927	0.6116	492.3	21.669	-0.0573
22	0	44	9	7927	0.00561	286.7	1.343	-0.0082
23	0	46	9	7927	0.0359	221.0	36.546	-0.0020
24	0	47	9	7927	0.0520	266.9	2.389	-0.0375
25	0	48	9	7927	0.0897	574.3	3.275	-0.0397
26	0	50	9	7927	0.3523	1957.8	4.254	-0.167
27	0	52	9	7925	1.2434	1076.6	5.510	-0.452
28	0	54	9	7925	0.0275	178.5	1.178	-0.0487
29	0	56	9	7925	0.00249	178.8	2.966	-0.0017
30	0	59	9	7925	0.1480	3502.8	89.089	-0.0033
31	0	60	9	7925	0.1720	600.4	1.359	-0.272
32	0	61	9	7925	0.2395	3321.2	10.000	-0.0402
33	0	63	9	7921	3.5564	3197.8	15.025	-0.398
34	0	65	9	7921	0.5638	2066.0	1.824	-0.684
35	0	67	9	7921	0.1264	356.2	1.488	-0.161
36	0	69	9	7921	0.00655	316.7	1.529	-0.0088
37	0	71	9	7921	0.0326	1781.5	20.297	-0.0032
38	0	73	9	7921	0.1035	2841.3	3.604	-0.0575
39	0	75	9	7919	1.7263	3378.0	24.050	-0.108
40	0	76	9	7917	2.1507	5414.0	2.760	-1.564
41								

		0	77	9		7913	3.6355	5328.6	3.411	-1.576
42		0	79	9		7911	1.4908	2022.9	1.081	-2.619
43		0	81	9		7911	0.0739	410.4	1.092	-0.144
44		0	83	9		7911	0.00893	404.7	1.939	-0.0091
45		0	85	9		7911	0.0674	2053.8	20.509	-0.0065
46		0	87	9		7911	0.2173	1618.9	4.493	-0.0967
47		0	90	9		7906	4.7685	12897.8	50.962	-0.213
48		0	91	9		7905	1.6734	13045.8	1.981	-6.017
49		0	92	9		7904	0.4015	11912.4	0.109	-3.841
50		0	93	9		7904	0.0994	11660.9	0.0205	-4.894
51		0	94	9		7904	0.0540	11532.2	0.0100	-5.428
52		0	95	9		7904	0.0592	11399.2	0.0100	-5.951
53		0	96	9		7904	0.0630	11264.5	0.0100	-6.331
54		0	97	9		7904	0.0655	11130.0	0.0100	-6.583
55		0	98	9		7904	0.00673	11116.8	0.00100	-6.731
56		0	99	9		7904	0.00693	11103.6	0.00100	-6.930
57		0	100	9		7904	0.00708	11090.7	0.00100	-7.081
58		0	101	9		7904	0.00718	11077.9	0.00100	-7.186
59		0	102	9		7904	0.00726	11065.3	0.00100	-7.259
60		0	103	9		7904	0.00730	11052.9	0.00100	-7.308
61		0	104	9		7904	0.00734	11040.7	0.00100	-7.339
62		0	105	9		7904	0.000736	11039.4	0.00010	-7.358
63		0	106	9		7904	0.000738	11038.3	0.00010	-7.381
64		0	107	9		7904	0.000074	11038.1	0.00001	-7.399
65		0	108	9		7904	0.000074	11038.0	0.00001	-7.414
66		0	109	9		7904	0.000074	11037.9	0.00001	-7.425
67		0	110	9		7904	0.000074	11037.8	0.00001	-7.434
68		0	111	9		7904	0.000074	11037.7	0.00001	-7.441
69		0	112	9		7904	0.000074	11037.6	0.00001	-7.447
70		0	113	9		7904	7.452E-6	11037.5	1E-6	-7.452
71		0	114	9		7904	7.456E-6	11037.5	1E-6	-7.456
72		0	115	9		7904	7.46E-6	11037.5	1E-6	-7.460
73		0	116	9		7904	7.464E-6	11037.5	1E-6	-7.464
74		0	117	9		7904	7.468E-6	11037.5	1E-6	-7.468
75		0	118	9		7904	7.471E-6	11037.5	1E-6	-7.471
76		0	119	9		7904	7.474E-7	11037.5	1E-7	-7.474
77		0	120	9		7904	7.477E-7	11037.5	1E-7	-7.477
78		0	121	9		7904	7.48E-7	11037.5	1E-7	-7.480
79		0	122	9		7904	7.483E-7	11037.5	1E-7	-7.483
80		0	123	9		7904	7.486E-7	11037.5	1E-7	-7.486
81										

		0	124	9		7904	7.489E-7	11037.5	1E-7	-7.489
82		0	125	9		7904	7.492E-7	11037.5	1E-7	-7.492
83		0	126	9		7904	7.495E-7	11037.5	1E-7	-7.495
84		0	127	9		7904	7.498E-7	11037.5	1E-7	-7.498
85		0	128	9		7904	7.501E-8	11037.5	1E-8	-7.501
86		0	129	9		7904	7.504E-8	11037.5	1E-8	-7.504
87		0	130	9		7904	7.507E-8	11037.5	1E-8	-7.507
88		0	131	9		7904	7.51E-8	11037.5	1E-8	-7.509
89		0	132	9		7904	7.512E-8	11037.5	1E-8	-7.512
90		0	133	9		7904	7.516E-8	11037.5	1E-8	-7.515
91		0	134	9		7904	7.514E-9	11037.5	1E-9	-7.518
92		0	135	9		7904	7.52E-9	11037.5	1E-9	-7.521
93		0	136	9		7904	7.526E-9	11037.5	1E-9	-7.524
94		0	137	9		7904	7.531E-9	11037.5	1E-9	-7.527
95		0	138	9		7904	7.49E-10	11037.5	1E-10	-7.530
96		0	139	9		7904	7.53E-10	11037.5	1E-10	-7.533
97		0	140	9		7904	0	11037.5	1E-12	-7.535

Optimization Results			
Iterations	97	Function Calls	141
Gradient Calls	167	Active Constraints	9
Objective Function	7903.8948029	Max Abs Gradient Element	11037.480914
Slope of Search Direction	-7.535087992		

Convergence criterion (FCONV=2.220446E-16) satisfied.

Note: At least one element of the (projected) gradient is greater than 1e-3.

Illustration of ODS Graphics

The VARMAX Procedure

Optimization Results			
Parameter Estimates			
N	Parameter	Estimate	Gradient Objective Function
1	AR1_1_1	1.012099	422.316106
2	AR1_2_1	0.169274	-718.789501
3	AR1_3_1	0.000416	8731.982833
4	AR1_4_1	0.001444	11037
5	AR1_1_2	0	86.996104
6	AR1_2_2	0.178066	-146.745541
7	AR1_3_2	0.000896	1796.086731
8	AR1_4_2	0	1744.238545
9	AR1_1_3	0	-0.220862
10	AR1_2_3	0	-0.165076
11	AR1_3_3	0	-81.975042
12	AR1_4_3	0	14.957615
13	AR1_1_4	0	-0.314456
14	AR1_2_4	5.193816	2.115960
15	AR1_3_4	0	19.904869
16	AR1_4_4	0	-37.902831
17	DCCA	2.274387E-13	16.790211
18	DCCB	0.102056	-7.87661E-12
19	GCHC1_1	8.7358682E14	-5.1234E-15
20	GCHC2_2	5.6762351E13	1.729887E-14
21	GCHC3_3	64791730949	3.524876E-11
22	GCHC4_4	204919654655	4.901394E-12
23	ACH1_1_1	0.055448	-63.397946
24	ACH1_2_2	0.178580	7.832313
25	ACH1_3_3	0.187985	-30.929980
26	ACH1_4_4	0.011688	10.050297
27	PACH1_1_1	-0.000028844	-3.088961
28	PACH1_2_2	0.001591	-3.195205
29	PACH1_3_3	-0.007626	17.043611
30	PACH1_4_4	-0.000077154	-0.024751
31	GCH1_1_1	-0.000413	-5.918455
32	GCH1_2_2	-0.000138	-0.330086

33	GCH1_3_3	0.000563	7.434461
34	GCH1_4_4	0.000202	1.040393
35	LAMBDA1	1.004647	149.217018
36	LAMBDA2	1.011718	-30.260169
37	LAMBDA3	0.987774	-61.193092
38	LAMBDA4	0.992275	-26.378958

Value of Objective Function = 7903.8948029

Linear Constraints Evaluated at Solution

1	ACT	0	=	0	+	1.0000	*	AR1_1_2
2	ACT	0	=	0	+	1.0000	*	AR1_1_3
3	ACT	0	=	0	+	1.0000	*	AR1_1_4
4	ACT	0	=	0	+	1.0000	*	AR1_2_3
5	ACT	0	=	0	+	1.0000	*	AR1_3_3
6	ACT	0	=	0	+	1.0000	*	AR1_3_4
7	ACT	0	=	0	+	1.0000	*	AR1_4_2
8	ACT	0	=	0	+	1.0000	*	AR1_4_3
9	ACT	0	=	0	+	1.0000	*	AR1_4_4

First Order Lagrange Multipliers

Active Constraint		Lagrange Multiplier
Linear EC	[1]	86.996104
Linear EC	[2]	-0.220862
Linear EC	[3]	-0.314456
Linear EC	[4]	-0.165076
Linear EC	[5]	-81.975042
Linear EC	[6]	19.904869
Linear EC	[7]	1744.238545
Linear EC	[8]	14.957615
Linear EC	[9]	-37.902831

Projected Gradient

Free Dimension	Projected Gradient
1	422.316106
2	-718.789501
3	8731.982833
4	11037
5	146.745541
6	-1796.086731
7	-2.115960

8	-16.790211
9	7.87661E-12
10	5.123404E-15
11	-1.72989E-14
12	-3.52488E-11
13	-4.90139E-12
14	63.397946
15	-7.832313
16	30.929980
17	-10.050297
18	3.088961
19	3.195205
20	-17.043611
21	0.024751
22	5.918455
23	0.330086
24	-7.434461
25	-1.040393
26	-149.217018
27	30.260169
28	61.193092
29	26.378958

Illustration of ODS Graphics

The VARMAX Procedure

Number of Observations	132
Number of Pairwise Missing	0

Simple Summary Statistics						
Variable	Type	N	Mean	Standard Deviation	Min	Max
Gasoline_Gallons	Dependent	132	376804937.74	34812609.531	218414414.00	476873743.00
Diesel_Gallons	Dependent	132	80003756.470	9364707.9800	64939973.000	111638305.00
Kerosene_Gallons	Dependent	132	299988.92424	368176.38610	2214.00000	1725070.0000
Alternative_Fuels_Gallons	Dependent	132	482229.06818	509431.11286	53077.00000	2372859.0000

Illustration of ODS Graphics

The VARMAX Procedure

Type of Model	VAR(1)-GARCH(1,1)
Estimation Method	Maximum Likelihood Estimation
Representation Type	DCC

Schematic Representation of Parameter Estimates	
Variable/Lag	AR1
Gasoline_Gallons	+***
Diesel_Gallons	***+
Kerosene_Gallons	..**
Alternative_Fuels_Gallons	****

+ is > 2*std error, - is < -2*std error, . is between, * is N/A

Schematic Representation of GARCH Parameter Estimates			
Variable/Lag	GCHC	ACH1	GCH1
h1	*	.***	.***
h2	*	* .**	* .**
h3	*	****	****
h4	*	***.	***.

+ is > 2*std error, - is < -2*std error, . is between, * is N/A

Model Parameter Estimates						
Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
Gasoline_Gallons	AR1_1_1	1.01210	0.00697	145.16	0.0001	Gasoline_Gallons(t-1)
	AR1_1_2	0.00000	0.00000			Diesel_Gallons(t-1)
	AR1_1_3	0.00000	0.00000			Kerosene_Gallons(t-1)
	AR1_1_4	0.00000	0.00000			Alternative_Fuels_Gallons(t-1)
Diesel_Gallons	AR1_2_1	0.16927	0.00000			Gasoline_Gallons(t-1)
	AR1_2_2	0.17807	0.00000			Diesel_Gallons(t-1)
	AR1_2_3	0.00000	0.00000			Kerosene_Gallons(t-1)
	AR1_2_4	5.19382	0.95549	5.44	0.0001	Alternative_Fuels_Gallons(t-1)
Kerosene_Gallons	AR1_3_1	0.00042	0.00044	0.95	0.3419	Gasoline_Gallons(t-1)
	AR1_3_2	0.00090	0.00228	0.39	0.6947	Diesel_Gallons(t-1)
	AR1_3_3	0.00000	0.00000			Kerosene_Gallons(t-1)
	AR1_3_4	0.00000	0.00000			Alternative_Fuels_Gallons(t-1)

Alternative_Fuels_Gallons	AR1_4_1	0.00144	0.00000			Gasoline_Gallons(t-1)
	AR1_4_2	0.00000	0.00000			Diesel_Gallons(t-1)
	AR1_4_3	0.00000	0.00000			Kerosene_Gallons(t-1)
	AR1_4_4	0.00000	0.00000			Alternative_Fuels_Gallons(t-1)

GARCH Model Parameter Estimates				
Parameter	Estimate	Standard Error	t Value	Pr > |t|
DCCA	0.00000	0.00000		
DCCB	0.10206	0.00000		
GCHC1_1	8.7358682E14	0.00000		
GCHC2_2	5.6762351E13	0.00000		
GCHC3_3	64791730949	0.00000		
GCHC4_4	204919654655	0.00000		
ACH1_1_1	0.05545	0.03634	1.53	0.1294
ACH1_2_2	0.17858	0.10973	1.63	0.1060
ACH1_3_3	0.18799	0.00000		
ACH1_4_4	0.01169	0.13066	0.09	0.9289
PACH1_1_1	-0.00003	0.36864	-0.00	0.9999
PACH1_2_2	0.00159	0.35712	0.00	0.9965
PACH1_3_3	-0.00763	0.00000		
PACH1_4_4	-0.00008	2.09493	-0.00	1.0000
GCH1_1_1	-0.00041	0.00000		
GCH1_2_2	-0.00014	0.60225	-0.00	0.9998
GCH1_3_3	0.00056	0.13610	0.00	0.9967
GCH1_4_4	0.00020	0.00000		
LAMBDA1	1.00465	0.00000		
LAMBDA2	1.01172	0.02408	42.02	0.0001
LAMBDA3	0.98777	0.01096	90.15	0.0001
LAMBDA4	0.99228	0.00000		

Unconditional Correlation Matrix in DCC GARCH Model				
Variable	Gasoline_Gallons	Diesel_Gallons	Kerosene_Gallons	Alternative_Fuels_Gallons
Gasoline_Gallons	1.00000	0.73266	-0.02254	0.06436
Diesel_Gallons	0.73266	1.00000	-0.04628	0.26435
Kerosene_Gallons	-0.02254	-0.04628	1.00000	-0.02264
Alternative_Fuels_Gallons	0.06436	0.26435	-0.02264	1.00000

Testing of the Restricted Parameters					
Parameter	Estimate	Standard Error	t Value	Pr > |t|	Equation

Restrict0	-86.99610				AR1_1_2 = 0
Restrict1	0.22086	0.16753	1.32	0.1904	AR1_1_3 = 0
Restrict2	0.31446	0.17537	1.79	0.0759	AR1_1_4 = 0
Restrict3	0.16508	0.77848	0.21	0.8325	AR1_2_3 = 0
Restrict4	81.97504				AR1_3_3 = 0
Restrict5	-19.90487	15.54880	-1.28	0.2034	AR1_3_4 = 0
Restrict6	-1744.23854	127.87166	-13.64	0.0001	AR1_4_2 = 0
Restrict7	-14.95761	6.56651	-2.28	0.0248	AR1_4_3 = 0
Restrict8	37.90283	6.76752	5.60	0.0001	AR1_4_4 = 0

Covariances of Innovations				
Variable	**Gasoline_Gallons**	**Diesel_Gallons**	**Kerosene_Gallons**	**Alternative_Fuels_Gallons**
Gasoline_Gallons	9.2355529E14	1.749116E14	284127147598	1.1505131E12
Diesel_Gallons	1.749116E14	5.5948029E13	-79059745362	980391483864
Kerosene_Gallons	284127147598	-79059745362	147385979263	-11244579922
Alternative_Fuels_Gallons	1.1505131E12	980391483864	-11244579922	249396673922

Log-likelihood	-7903.89

Information Criteria	
AICC	15883.02
HQC	15899.67
AIC	15865.79
SBC	15949.17
FPEC	8.759E50