

# ARIMA

## SARIMAX Results

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Dep. Variable:          Price    No. Observations:          332
Model:                ARIMA(3, 1, 3)    Log Likelihood          167.889
Date:                Tue, 18 Mar 2025    AIC                    -321.779
Time:                12:03:49    BIC                    -295.164
Sample:                02-01-1990    HQIC                   -311.163
                                           - 09-01-2017
                                           Covariance Type:      opg
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              coef    std err          z      P>|z|      [0.025    0.975]
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ar.L1          0.7383     0.019    39.571     0.000     0.702     0.775
ar.L2          0.7162     0.032    22.286     0.000     0.653     0.779
ar.L3         -0.9815     0.018   -53.491     0.000    -1.017    -0.946
ma.L1         -0.7900     0.033   -23.806     0.000    -0.855    -0.725
ma.L2         -0.7377     0.061   -12.112     0.000    -0.857    -0.618
ma.L3          0.9573     0.038    25.453     0.000     0.884     1.031
sigma2         0.0210     0.001    14.967     0.000     0.018     0.024
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Ljung-Box (L1) (Q):          2.38    Jarque-Bera (JB):          24.38
Prob(Q):                    0.12    Prob(JB):              0.00
Heteroskedasticity (H):      2.55    Skew:                  0.35
Prob(H) (two-sided):         0.00    Kurtosis:              4.13
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# SARIMAX

## SARIMAX Results

Dep. Variable:	Price	No. Observations:	332
Model:	SARIMAX(0, 1, 0)x(1, 0, [1], 12)	Log Likelihood	283.314
Date:	Tue, 18 Mar 2025	AIC	-556.628
Time:	12:08:45	BIC	-537.617
Sample:	02-01-1990	HQIC	-549.046
			- 09-01-2017
	Covariance Type:		opg
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	coef	std err	z
			P> z
			[0.025
			0.975]
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Population	0.1416	0.404	0.351
GDP	-0.0008	0.003	-0.249
ar.S.L12	0.9851	0.010	96.285
ma.S.L12	-0.7041	0.048	-14.789
sigma2	0.0099	0.001	16.545
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Ljung-Box (L1) (Q):	2.01	Jarque-Bera (JB):	37.61
Prob(Q):	0.16	Prob(JB):	0.00
Heteroskedasticity (H):	1.92	Skew:	0.34
Prob(H) (two-sided):	0.00	Kurtosis:	4.51
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# VAR

## Summary of Regression Results

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Model:                VAR
Method:               OLS
Date:                Tue, 18, Mar, 2025
Time:                12:41:27
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No. of Equations:    5.00000    BIC:                10.2367
Nobs:                319.000    HQIC:              7.89716
Log likelihood:      -2944.70    FPE:               585.192
AIC:                 6.34164    Det(Omega_mle):    228.533
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## Results for equation Price

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               coefficient      std. error      t-stat      prob
-----
const          0.225682         0.126220         1.788        0.074
L1.Price        0.925193         0.060485        15.296        0.000
L1.Renewable    0.000540         0.000375         1.442        0.149
L1.Petroleum   -0.000086         0.001026        -0.084        0.933
L1.Electric    -0.000304         0.000148        -2.057        0.040
L1.Transportation 0.290517         0.136445         2.129        0.033
L2.Price        0.097464         0.082734         1.178        0.239
L2.Renewable    0.000300         0.000399         0.753        0.451
L2.Petroleum    0.000404         0.001162         0.348        0.728
L2.Electric     0.000294         0.000175         1.679        0.093
L2.Transportation -0.038013         0.130562        -0.291        0.771
L3.Price        -0.064266         0.083209        -0.772        0.440
L3.Renewable    -0.000590         0.000401        -1.471        0.141
L3.Petroleum    -0.002450         0.001161        -2.109        0.035
L3.Electric     0.000101         0.000179         0.568        0.570
L3.Transportation -0.459098         0.136485        -3.364        0.001
L4.Price        -0.042677         0.082992        -0.514        0.607
L4.Renewable    -0.000700         0.000408        -1.715        0.086
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L4.Petroleum	0.002850	0.001171	2.434	0.015
L4.Electric	-0.000305	0.000175	-1.747	0.081
L4.Transportation	-0.313427	0.138914	-2.256	0.024
L5.Price	0.014948	0.081162	0.184	0.854
L5.Renewable	0.000329	0.000404	0.815	0.415
L5.Petroleum	0.001139	0.001176	0.968	0.333
L5.Electric	-0.000141	0.000176	-0.803	0.422
L5.Transportation	0.498999	0.140490	3.552	0.000
L6.Price	0.005924	0.080359	0.074	0.941
L6.Renewable	0.000339	0.000402	0.841	0.400
L6.Petroleum	0.001588	0.001177	1.349	0.177
L6.Electric	0.000008	0.000177	0.043	0.966
L6.Transportation	0.116621	0.143654	0.812	0.417
L7.Price	0.099091	0.078338	1.265	0.206
L7.Renewable	0.000261	0.000407	0.641	0.522
L7.Petroleum	-0.001157	0.001190	-0.972	0.331
L7.Electric	0.000445	0.000174	2.560	0.010
L7.Transportation	-0.168111	0.143237	-1.174	0.241
L8.Price	0.013512	0.078162	0.173	0.863
L8.Renewable	-0.000126	0.000403	-0.313	0.754
L8.Petroleum	-0.001231	0.001196	-1.030	0.303
L8.Electric	-0.000268	0.000174	-1.539	0.124
L8.Transportation	0.214594	0.143379	1.497	0.134
L9.Price	-0.204655	0.078666	-2.602	0.009
L9.Renewable	0.000333	0.000405	0.821	0.412
L9.Petroleum	0.000524	0.001186	0.442	0.659
L9.Electric	-0.000177	0.000175	-1.014	0.311
L9.Transportation	-0.202984	0.152163	-1.334	0.182
L10.Price	0.164909	0.079487	2.075	0.038
L10.Renewable	-0.000557	0.000414	-1.345	0.178
L10.Petroleum	-0.000707	0.001193	-0.593	0.553
L10.Electric	0.000226	0.000176	1.282	0.200
L10.Transportation	-0.127022	0.155710	-0.816	0.415
L11.Price	-0.029163	0.080259	-0.363	0.716
L11.Renewable	-0.000028	0.000408	-0.068	0.946
L11.Petroleum	-0.000978	0.001193	-0.819	0.413

L11.Electric	0.000325	0.000176	1.846	0.065
L11.Transportation	-0.007058	0.159260	-0.044	0.965
L12.Price	0.229552	0.079400	2.891	0.004
L12.Renewable	0.000083	0.000407	0.203	0.839
L12.Petroleum	0.000744	0.001189	0.626	0.532
L12.Electric	-0.000028	0.000177	-0.158	0.874
L12.Transportation	-0.047585	0.148972	-0.319	0.749
L13.Price	-0.234575	0.059788	-3.923	0.000
L13.Renewable	-0.000257	0.000374	-0.686	0.493
L13.Petroleum	-0.000718	0.001046	-0.687	0.492
L13.Electric	-0.000218	0.000151	-1.441	0.149
L13.Transportation	0.285518	0.156264	1.827	0.068

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Results for equation Renewable

	coefficient	std. error	t-stat	prob
const	-52.237739	19.731504	-2.647	0.008
L1.Price	-6.425447	9.455349	-0.680	0.497
L1.Renewable	0.509721	0.058559	8.704	0.000
L1.Petroleum	-0.043218	0.160411	-0.269	0.788
L1.Electric	0.001147	0.023141	0.050	0.960
L1.Transportation	-20.497467	21.329861	-0.961	0.337
L2.Price	5.356897	12.933480	0.414	0.679
L2.Renewable	0.043658	0.062375	0.700	0.484
L2.Petroleum	0.003120	0.181643	0.017	0.986
L2.Electric	-0.041553	0.027338	-1.520	0.129
L2.Transportation	47.733350	20.410276	2.339	0.019
L3.Price	-0.887602	13.007755	-0.068	0.946
L3.Renewable	0.194601	0.062673	3.105	0.002
L3.Petroleum	-0.138395	0.181555	-0.762	0.446
L3.Electric	0.008059	0.027915	0.289	0.773
L3.Transportation	-17.085723	21.336156	-0.801	0.423
L4.Price	12.861526	12.973755	0.991	0.322
L4.Renewable	0.030084	0.063795	0.472	0.637

L4.Petroleum	-0.136833	0.183012	-0.748	0.455
L4.Electric	0.021393	0.027305	0.783	0.433
L4.Transportation	-3.648701	21.715966	-0.168	0.867
L5.Price	-7.344621	12.687777	-0.579	0.563
L5.Renewable	0.066768	0.063185	1.057	0.291
L5.Petroleum	-0.012893	0.183838	-0.070	0.944
L5.Electric	0.032933	0.027535	1.196	0.232
L5.Transportation	-4.180775	21.962294	-0.190	0.849
L6.Price	-4.584956	12.562194	-0.365	0.715
L6.Renewable	-0.138596	0.062920	-2.203	0.028
L6.Petroleum	0.239414	0.184020	1.301	0.193
L6.Electric	-0.035072	0.027742	-1.264	0.206
L6.Transportation	-5.207514	22.456911	-0.232	0.817
L7.Price	4.804560	12.246246	0.392	0.695
L7.Renewable	0.052933	0.063583	0.833	0.405
L7.Petroleum	-0.184374	0.186020	-0.991	0.322
L7.Electric	-0.005663	0.027173	-0.208	0.835
L7.Transportation	7.585503	22.391718	0.339	0.735
L8.Price	-29.834316	12.218753	-2.442	0.015
L8.Renewable	-0.101941	0.062946	-1.619	0.105
L8.Petroleum	-0.024979	0.186914	-0.134	0.894
L8.Electric	0.031579	0.027232	1.160	0.246
L8.Transportation	11.064673	22.413908	0.494	0.622
L9.Price	21.083235	12.297484	1.714	0.086
L9.Renewable	0.185231	0.063357	2.924	0.003
L9.Petroleum	-0.042640	0.185340	-0.230	0.818
L9.Electric	0.008630	0.027365	0.315	0.752
L9.Transportation	12.974322	23.787124	0.545	0.585
L10.Price	2.798414	12.425970	0.225	0.822
L10.Renewable	0.042953	0.064669	0.664	0.507
L10.Petroleum	0.138850	0.186440	0.745	0.456
L10.Electric	0.015859	0.027516	0.576	0.564
L10.Transportation	9.978936	24.341587	0.410	0.682
L11.Price	1.126087	12.546661	0.090	0.928
L11.Renewable	-0.036145	0.063728	-0.567	0.571
L11.Petroleum	-0.063041	0.186522	-0.338	0.735

L11.Electric	0.003119	0.027546	0.113	0.910
L11.Transportation	-12.612038	24.896586	-0.507	0.612
L12.Price	0.732879	12.412341	0.059	0.953
L12.Renewable	0.350188	0.063695	5.498	0.000
L12.Petroleum	-0.085978	0.185945	-0.462	0.644
L12.Electric	0.050727	0.027744	1.828	0.067
L12.Transportation	-6.542356	23.288226	-0.281	0.779
L13.Price	9.006685	9.346381	0.964	0.335
L13.Renewable	-0.285949	0.058505	-4.888	0.000
L13.Petroleum	0.430269	0.163587	2.630	0.009
L13.Electric	-0.054966	0.023650	-2.324	0.020
L13.Transportation	-26.125621	24.428170	-1.069	0.285

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Results for equation Petroleum

	coefficient	std. error	t-stat	prob
const	9.816996	7.762763	1.265	0.206
L1.Price	-5.641861	3.719921	-1.517	0.129
L1.Renewable	-0.009701	0.023038	-0.421	0.674
L1.Petroleum	0.591973	0.063109	9.380	0.000
L1.Electric	-0.002492	0.009104	-0.274	0.784
L1.Transportation	-2.644003	8.391588	-0.315	0.753
L2.Price	0.370938	5.088286	0.073	0.942
L2.Renewable	0.016605	0.024540	0.677	0.499
L2.Petroleum	0.049570	0.071462	0.694	0.488
L2.Electric	-0.018852	0.010755	-1.753	0.080
L2.Transportation	11.733981	8.029805	1.461	0.144
L3.Price	2.319814	5.117507	0.453	0.650
L3.Renewable	-0.001702	0.024657	-0.069	0.945
L3.Petroleum	-0.008619	0.071427	-0.121	0.904
L3.Electric	-0.003807	0.010982	-0.347	0.729
L3.Transportation	4.002143	8.394065	0.477	0.634
L4.Price	-1.541963	5.104131	-0.302	0.763
L4.Renewable	-0.014064	0.025098	-0.560	0.575

L4.Petroleum	-0.046700	0.072000	-0.649	0.517
L4.Electric	0.020051	0.010742	1.867	0.062
L4.Transportation	-1.236722	8.543489	-0.145	0.885
L5.Price	-0.240128	4.991622	-0.048	0.962
L5.Renewable	0.018704	0.024858	0.752	0.452
L5.Petroleum	0.019181	0.072325	0.265	0.791
L5.Electric	0.019774	0.010833	1.825	0.068
L5.Transportation	-2.270713	8.640400	-0.263	0.793
L6.Price	4.806320	4.942215	0.973	0.331
L6.Renewable	-0.018401	0.024754	-0.743	0.457
L6.Petroleum	0.142771	0.072397	1.972	0.049
L6.Electric	0.005573	0.010914	0.511	0.610
L6.Transportation	-6.601260	8.834992	-0.747	0.455
L7.Price	5.727055	4.817915	1.189	0.235
L7.Renewable	-0.008707	0.025015	-0.348	0.728
L7.Petroleum	-0.056372	0.073184	-0.770	0.441
L7.Electric	-0.008361	0.010690	-0.782	0.434
L7.Transportation	0.368903	8.809343	0.042	0.967
L8.Price	-2.528673	4.807099	-0.526	0.599
L8.Renewable	0.022117	0.024764	0.893	0.372
L8.Petroleum	0.084834	0.073536	1.154	0.249
L8.Electric	0.002751	0.010714	0.257	0.797
L8.Transportation	-5.169737	8.818073	-0.586	0.558
L9.Price	-0.860360	4.838073	-0.178	0.859
L9.Renewable	0.001616	0.024926	0.065	0.948
L9.Petroleum	0.069464	0.072916	0.953	0.341
L9.Electric	-0.011949	0.010766	-1.110	0.267
L9.Transportation	18.172876	9.358324	1.942	0.052
L10.Price	-4.809499	4.888622	-0.984	0.325
L10.Renewable	0.004784	0.025442	0.188	0.851
L10.Petroleum	-0.008422	0.073349	-0.115	0.909
L10.Electric	0.004415	0.010825	0.408	0.683
L10.Transportation	2.128940	9.576460	0.222	0.824
L11.Price	-3.011030	4.936104	-0.610	0.542
L11.Renewable	-0.032013	0.025072	-1.277	0.202
L11.Petroleum	0.068714	0.073382	0.936	0.349



L11.Electric	-0.005819	0.010837	-0.537	0.591
L11.Transportation	0.104965	9.794808	0.011	0.991
L12.Price	6.614464	4.883260	1.355	0.176
L12.Renewable	0.042650	0.025059	1.702	0.089
L12.Petroleum	0.104791	0.073154	1.432	0.152
L12.Electric	0.009829	0.010915	0.901	0.368
L12.Transportation	-8.704925	9.162048	-0.950	0.342
L13.Price	-1.595037	3.677051	-0.434	0.664
L13.Renewable	-0.023140	0.023017	-1.005	0.315
L13.Petroleum	-0.150021	0.064358	-2.331	0.020
L13.Electric	-0.005472	0.009304	-0.588	0.556
L13.Transportation	-10.747136	9.610524	-1.118	0.263

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Results for equation Electric

	coefficient	std. error	t-stat	prob
const	79.927617	53.077323	1.506	0.132
L1.Price	35.431964	25.434688	1.393	0.164
L1.Renewable	-0.281479	0.157523	-1.787	0.074
L1.Petroleum	0.320560	0.431502	0.743	0.458
L1.Electric	0.639035	0.062249	10.266	0.000
L1.Transportation	-136.198297	57.376869	-2.374	0.018
L2.Price	-58.074297	34.790784	-1.669	0.095
L2.Renewable	0.028023	0.167788	0.167	0.867
L2.Petroleum	-0.226928	0.488615	-0.464	0.642
L2.Electric	-0.100508	0.073538	-1.367	0.172
L2.Transportation	53.038317	54.903205	0.966	0.334
L3.Price	-44.899077	34.990582	-1.283	0.199
L3.Renewable	-0.010798	0.168589	-0.064	0.949
L3.Petroleum	-0.254749	0.488380	-0.522	0.602
L3.Electric	0.032131	0.075091	0.428	0.669
L3.Transportation	76.285398	57.393803	1.329	0.184
L4.Price	26.695236	34.899124	0.765	0.444
L4.Renewable	0.076617	0.171606	0.446	0.655

L4.Petroleum	0.181789	0.492298	0.369	0.712
L4.Electric	-0.043449	0.073450	-0.592	0.554
L4.Transportation	14.161485	58.415484	0.242	0.808
L5.Price	12.360161	34.129850	0.362	0.717
L5.Renewable	-0.011532	0.169967	-0.068	0.946
L5.Petroleum	-0.134688	0.494519	-0.272	0.785
L5.Electric	-0.011157	0.074070	-0.151	0.880
L5.Transportation	-85.313125	59.078101	-1.444	0.149
L6.Price	64.549054	33.792034	1.910	0.056
L6.Renewable	-0.121823	0.169255	-0.720	0.472
L6.Petroleum	0.526424	0.495011	1.063	0.288
L6.Electric	-0.002120	0.074626	-0.028	0.977
L6.Transportation	-5.534935	60.408612	-0.092	0.927
L7.Price	-53.833906	32.942141	-1.634	0.102
L7.Renewable	0.166950	0.171036	0.976	0.329
L7.Petroleum	0.618703	0.500390	1.236	0.216
L7.Electric	-0.024268	0.073095	-0.332	0.740
L7.Transportation	63.134512	60.233242	1.048	0.295
L8.Price	-40.967665	32.868186	-1.246	0.213
L8.Renewable	-0.027141	0.169324	-0.160	0.873
L8.Petroleum	-0.021881	0.502796	-0.044	0.965
L8.Electric	-0.030525	0.073255	-0.417	0.677
L8.Transportation	-18.946602	60.292932	-0.314	0.753
L9.Price	4.264335	33.079968	0.129	0.897
L9.Renewable	0.030235	0.170430	0.177	0.859
L9.Petroleum	-0.473779	0.498560	-0.950	0.342
L9.Electric	-0.102426	0.073612	-1.391	0.164
L9.Transportation	0.352637	63.986856	0.006	0.996
L10.Price	61.937508	33.425595	1.853	0.064
L10.Renewable	-0.033366	0.173958	-0.192	0.848
L10.Petroleum	-0.020714	0.501518	-0.041	0.967
L10.Electric	0.117010	0.074017	1.581	0.114
L10.Transportation	-25.249431	65.478349	-0.386	0.700
L11.Price	-7.499860	33.750249	-0.222	0.824
L11.Renewable	-0.050921	0.171426	-0.297	0.766
L11.Petroleum	-0.051825	0.501742	-0.103	0.918

L11.Electric	0.034150	0.074098	0.461	0.645
L11.Transportation	-1.526025	66.971285	-0.023	0.982
L12.Price	45.186611	33.388932	1.353	0.176
L12.Renewable	0.335793	0.171337	1.960	0.050
L12.Petroleum	-0.131977	0.500188	-0.264	0.792
L12.Electric	0.237943	0.074630	3.188	0.001
L12.Transportation	74.866406	62.644832	1.195	0.232
L13.Price	-43.925136	25.141564	-1.747	0.081
L13.Renewable	0.041636	0.157376	0.265	0.791
L13.Petroleum	-0.523285	0.440046	-1.189	0.234
L13.Electric	-0.153702	0.063618	-2.416	0.016
L13.Transportation	47.363081	65.711255	0.721	0.471

=====

Results for equation Transportation

	coefficient	std. error	t-stat	prob
const	0.056798	0.054328	1.045	0.296
L1.Price	0.042960	0.026034	1.650	0.099
L1.Renewable	0.000240	0.000161	1.491	0.136
L1.Petroleum	0.000716	0.000442	1.622	0.105
L1.Electric	-0.000046	0.000064	-0.726	0.468
L1.Transportation	0.595284	0.058729	10.136	0.000
L2.Price	-0.027104	0.035611	-0.761	0.447
L2.Renewable	-0.000073	0.000172	-0.428	0.669
L2.Petroleum	0.000068	0.000500	0.136	0.892
L2.Electric	-0.000010	0.000075	-0.126	0.900
L2.Transportation	0.335981	0.056197	5.979	0.000
L3.Price	-0.009801	0.035815	-0.274	0.784
L3.Renewable	0.000067	0.000173	0.385	0.700
L3.Petroleum	-0.000017	0.000500	-0.033	0.973
L3.Electric	-0.000089	0.000077	-1.152	0.249
L3.Transportation	0.113587	0.058747	1.934	0.053
L4.Price	-0.005495	0.035722	-0.154	0.878
L4.Renewable	0.000006	0.000176	0.034	0.973

L4.Petroleum	0.000074	0.000504	0.146	0.884
L4.Electric	0.000083	0.000075	1.110	0.267
L4.Transportation	-0.037534	0.059792	-0.628	0.530
L5.Price	-0.022120	0.034934	-0.633	0.527
L5.Renewable	-0.000067	0.000174	-0.386	0.699
L5.Petroleum	-0.000515	0.000506	-1.017	0.309
L5.Electric	0.000029	0.000076	0.377	0.706
L5.Transportation	-0.024435	0.060471	-0.404	0.686
L6.Price	-0.006849	0.034589	-0.198	0.843
L6.Renewable	0.000101	0.000173	0.584	0.559
L6.Petroleum	-0.000066	0.000507	-0.130	0.897
L6.Electric	0.000007	0.000076	0.094	0.925
L6.Transportation	-0.021887	0.061833	-0.354	0.723
L7.Price	0.039257	0.033719	1.164	0.244
L7.Renewable	-0.000177	0.000175	-1.011	0.312
L7.Petroleum	-0.000595	0.000512	-1.162	0.245
L7.Electric	-0.000020	0.000075	-0.261	0.794
L7.Transportation	-0.000378	0.061653	-0.006	0.995
L8.Price	-0.050096	0.033643	-1.489	0.136
L8.Renewable	0.000063	0.000173	0.363	0.717
L8.Petroleum	0.000157	0.000515	0.304	0.761
L8.Electric	0.000018	0.000075	0.235	0.814
L8.Transportation	-0.050053	0.061714	-0.811	0.417
L9.Price	0.027857	0.033860	0.823	0.411
L9.Renewable	-0.000048	0.000174	-0.273	0.785
L9.Petroleum	0.000432	0.000510	0.847	0.397
L9.Electric	-0.000073	0.000075	-0.964	0.335
L9.Transportation	0.059179	0.065495	0.904	0.366
L10.Price	0.017345	0.034213	0.507	0.612
L10.Renewable	0.000243	0.000178	1.367	0.172
L10.Petroleum	0.000017	0.000513	0.032	0.974
L10.Electric	0.000024	0.000076	0.314	0.753
L10.Transportation	-0.025619	0.067022	-0.382	0.702
L11.Price	0.023116	0.034546	0.669	0.503
L11.Renewable	-0.000257	0.000175	-1.464	0.143
L11.Petroleum	0.000530	0.000514	1.032	0.302

L11.Electric	-0.000084	0.000076	-1.107	0.268
L11.Transportation	-0.212691	0.068550	-3.103	0.002
L12.Price	-0.026896	0.034176	-0.787	0.431
L12.Renewable	0.000331	0.000175	1.887	0.059
L12.Petroleum	0.000143	0.000512	0.280	0.780
L12.Electric	0.000144	0.000076	1.883	0.060
L12.Transportation	0.722906	0.064121	11.274	0.000
L13.Price	-0.016351	0.025734	-0.635	0.525
L13.Renewable	-0.000258	0.000161	-1.603	0.109
L13.Petroleum	-0.000747	0.000450	-1.659	0.097
L13.Electric	-0.000019	0.000065	-0.297	0.766
L13.Transportation	-0.440123	0.067260	-6.544	0.000

=====

Correlation matrix of residuals

	Price	Renewable	Petroleum	Electric	Transportation
Price	1.000000	-0.054557	-0.053675	-0.034504	0.021661
Renewable	-0.054557	1.000000	0.037046	-0.051544	0.050631
Petroleum	-0.053675	0.037046	1.000000	0.128843	0.121257
Electric	-0.034504	-0.051544	0.128843	1.000000	0.009865
Transportation	0.021661	0.050631	0.121257	0.009865	1.000000

## **Facebook Prophet**

N/A

# Exponential Smoothing

## ExponentialSmoothing Model Results

```
=====
Dep. Variable:          Price  No. Observations:          332
Model:                  ExponentialSmoothing  SSE          3.526
Optimized:              True    AIC          -1476.901
Trend:                  Additive  BIC          -1416.019
Seasonal:               Additive  AICC         -1474.716
Seasonal Periods:       12    Date:          Tue, 18 Mar 2025
Box-Cox:                False    Time:         12:39:26
                               Box-Cox Coeff.:          None
=====
```

	coeff	code	optimized
smoothing_level	0.7986300	alpha	True
smoothing_trend	2.2408e-16	beta	True
smoothing_seasonal	0.2013700	gamma	True
initial_level	7.3508009	l.0	True
initial_trend	0.0098599	b.0	True
initial_seasons.0	-0.2106641	s.0	True
initial_seasons.1	-0.1397264	s.1	True
initial_seasons.2	-0.1062771	s.2	True
initial_seasons.3	0.0915257	s.3	True
initial_seasons.4	0.2977833	s.4	True
initial_seasons.5	0.3014866	s.5	True
initial_seasons.6	0.2327778	s.6	True
initial_seasons.7	0.1799308	s.7	True
initial_seasons.8	0.1654044	s.8	True
initial_seasons.9	-0.1347590	s.9	True
initial_seasons.10	-0.3130930	s.10	True
initial_seasons.11	-0.3507399	s.11	True