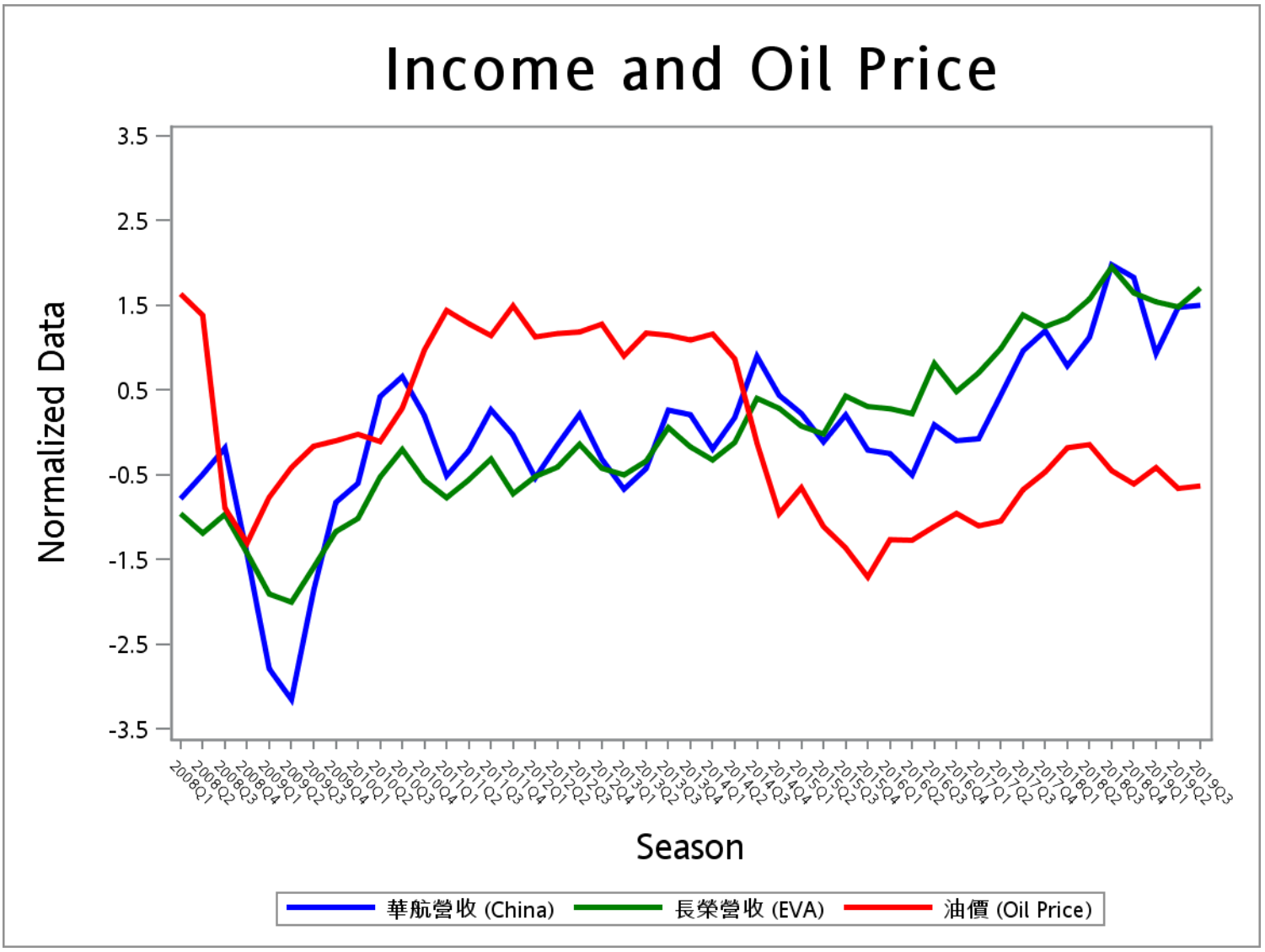
Obs	time	income_China	income_Eva	net_China	net_Eva	Oil_Price	season
1	200803	32558850	25666911	1869432	325532	122.2439177	2008Q1
2	200806	33877134	23950573	-1098628	-1652777	115.6047174	2008Q2
3	200809	35303015	25610852	1141696	-176836	55.77905072	2008Q3
4	200812	29541863	22195282	3505199	1043809	44.93356061	2008Q4
5	200903	23369555	18594170	2976190	1733069	59.18047619	2009Q1
6	200906	21708890	17879176	282551	-414058	68.36734488	2009Q2
7	200909	27597226	20937317	1611646	628078	74.97691919	2009Q3
8	200912	32354351	24085666	4141096	2754236	76.66638785	2009Q4
9	201003	33387059	25240676	5948628	3373843	78.67259019	2010Q1
10	201006	38074869	28892524	7449310	6024057	76.40515152	2010Q2
11	201009	39160671	31322921	9151309	8209996	86.79487233	2010Q3
12	201012	37043408	28598332	4513085	3949832	104.8970221	2010Q4
13	201103	33791797	27072445	2672331	2857583	117.1221284	2011Q1
14	201106	35159619	28642277	2302862	2659192	112.9963583	2011Q2
15	201109	37365477	30480808	4434156	3712718	109.3143795	2011Q3
16	201112	35993787	27423843	-64177	1025811	118.5415512	2011Q4
17	201203	33686686	28944597	642056	1484381	108.9005797	2012Q1
18	201206	35471724	29762217	2696584	2658879	109.9544697	2012Q2
19	201209	37117310	31787371	4478924	4187686	110.4417655	2012Q3
20	201212	34696419	29664282	2061207	2572014	112.8745652	2012Q4
21	201303	33075918	29080135	1943039	2146588	103.004137	2013Q1
22	201306	34187617	30295700	2883507	3154923	110.1008385	2013Q2
23	201309	37343853	33244731	4078100	4684201	109.3964778	2013Q3
24	201312	37095157	31543885	2122739	2982020	107.929383	2013Q4
25	201403	35246873	30392098	1675213	2095252	109.806645	2014Q1
26	201406	36947737	31938491	2640132	3487603	102.080596	2014Q2
27	201409	40244398	35820040	4548704	4501016	75.95686957	2014Q3
28	201412	38142734	34939379	4767321	2165129	54.04622727	2014Q4
29	201503	37163905	33374491	5716576	5296114	62.09896104	2015Q1
30	201506	35621247	32686440	4564806	4907729	50.03149445	2015Q2
31	201509	37089144	36014470	5290604	5906898	43.42099097	2015Q3
32	201512	35181921	35093143	4696388	4128701	34.35772257	2015Q4
33	201603	34999023	34906089	5748765	5072620	45.95284271	2016Q1
34	201606	33834966	34468468	3879073	4798619	45.80131219	2016Q2
35	201609	36552871	38887294	4924994	6138980	50.07821789	2016Q3
36	201612	35692247	36417814	3453074	3066432	54.11816271	2016Q4

Obs	time	income_China	income_Eva	net_China	net_Eva	Oil_Price	season
37	201703	35796465	38064697	2799380	3424482	50.27630501	2017Q1
38	201706	38156614	40200582	6022797	5128473	51.74080745	2017Q2
39	201709	40542703	43166421	7068240	7775831	61.46836219	2017Q3
40	201712	41626003	42130031	6081994	4865142	66.95132543	2017Q4
41	201803	39735027	42878322	3794007	4829346	74.48866805	2018Q1
42	201806	41275835	44554750	3959170	5415316	75.47547431	2018Q2
43	201809	45196764	47379049	5310156	7080708	67.36929356	2018Q3
44	201812	44503981	45095211	4144198	4792320	63.27252036	2018Q4
45	201903	40405348	44312727	4213439	7002903	68.33977997	2019Q1
46	201906	42892312	43864832	4296535	4479449	61.85909091	2019Q2
47	201909	43004648	45528073	5126524	5734779	62.65627706	2019Q3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2008Q2
2008Q3
2008Q4
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2016Q1
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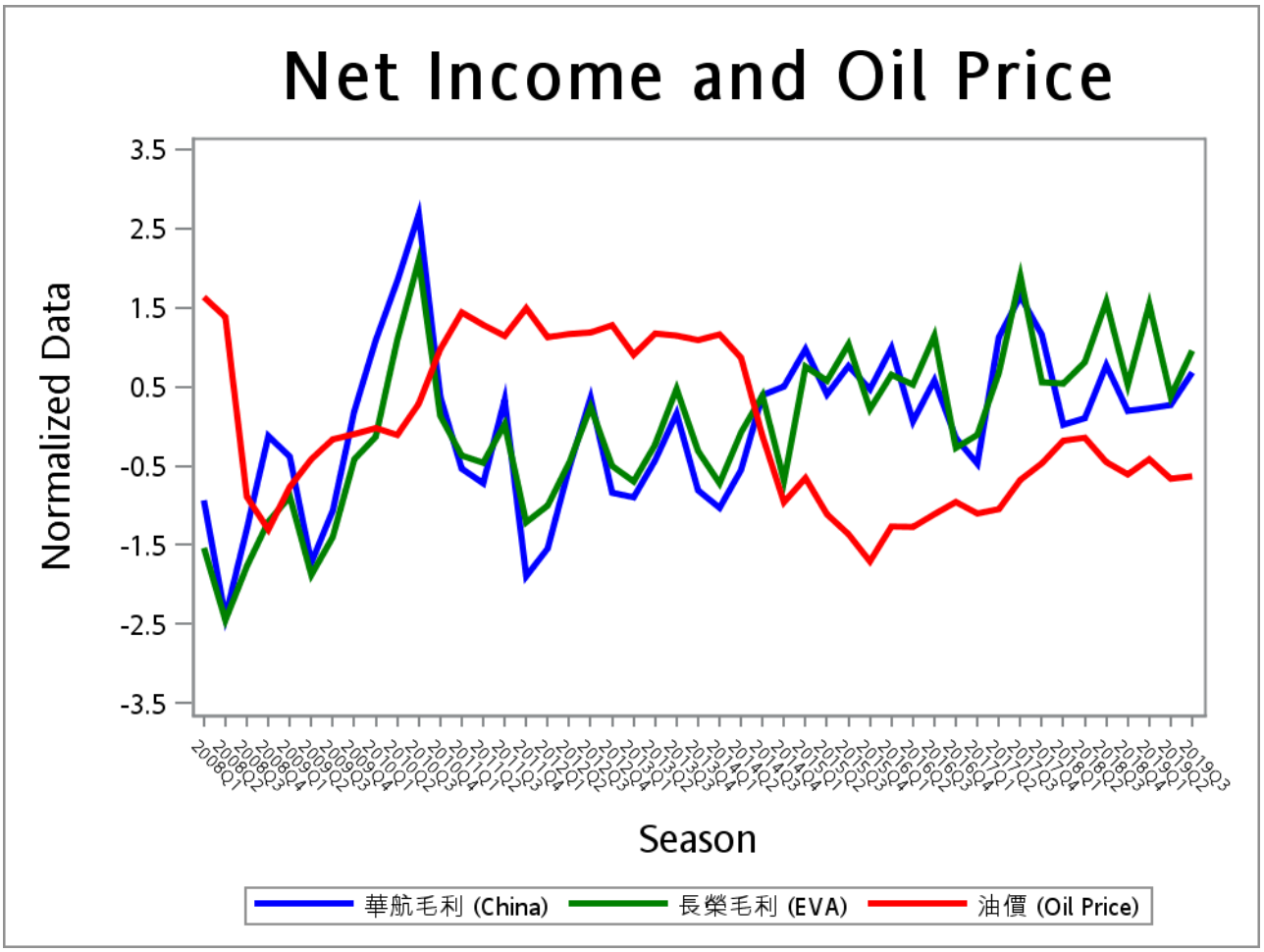
2016Q3
2016Q4
2017Q1
2017Q2
2017Q3
2017Q4
2018Q1
2018Q2
2018Q3
2018Q4
2019Q1
2019Q2
2019Q3
Season
華航營收 (China)
長榮營收 (EVA)
油價 (Oil Price)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Season
華航毛利 (China)
長榮毛利 (EVA)
油價 (Oil Price)

Check Breakpoint of Log Income of China

AUTOREG 程序

結構變更檢定					
檢定	轉折點	分子自由度	分母自由度	F 值	Pr > F
Chow	5	2	43	1.41	0.2552
Chow	6	2	43	1.41	0.2550
Chow	7	2	43	1.95	0.1541
Chow	8	2	43	2.57	0.0883

Check Breakpoint of Log Income of China

AUTOREG 程序

結構變更檢定					
檢定	轉折點	分子自由度	分母自由度	F 值	Pr > F
Chow	10	2	43	4.50	0.0168
Chow	11	2	43	5.47	0.0077
Chow	12	2	43	14.45	<.0001
Chow	13	2	43	13.60	<.0001

Check Breakpoint of Log Income of China

Obs	time	income_China	income_Eva	net_China	net_Eva	Oil_Price	season
1	200803	32558850	25666911	1869432	325532	122.2439177	2008Q1
2	200806	33877134	23950573	-1098628	-1652777	115.6047174	2008Q2
3	200809	35303015	25610852	1141696	-176836	55.77905072	2008Q3
4	200812	29541863	22195282	3505199	1043809	44.93356061	2008Q4
5	200903	23369555	18594170	2976190	1733069	59.18047619	2009Q1
6	200906	21708890	17879176	282551	-414058	68.36734488	2009Q2
7	200909	27597226	20937317	1611646	628078	74.97691919	2009Q3
8	200912	32354351	24085666	4141096	2754236	76.66638785	2009Q4
9	201003	33387059	25240676	5948628	3373843	78.67259019	2010Q1
10	201006	38074869	28892524	7449310	6024057	76.40515152	2010Q2
11	201009	39160671	31322921	9151309	8209996	86.79487233	2010Q3
12	201012	37043408	28598332	4513085	3949832	104.8970221	2010Q4
13	201103	33791797	27072445	2672331	2857583	117.1221284	2011Q1
14	201106	35159619	28642277	2302862	2659192	112.9963583	2011Q2
15	201109	37365477	30480808	4434156	3712718	109.3143795	2011Q3
16	201112	35993787	27423843	-64177	1025811	118.5415512	2011Q4
17	201203	33686686	28944597	642056	1484381	108.9005797	2012Q1
18	201206	35471724	29762217	2696584	2658879	109.9544697	2012Q2
19	201209	37117310	31787371	4478924	4187686	110.4417655	2012Q3
20	201212	34696419	29664282	2061207	2572014	112.8745652	2012Q4
21	201303	33075918	29080135	1943039	2146588	103.004137	2013Q1
22	201306	34187617	30295700	2883507	3154923	110.1008385	2013Q2
23	201309	37343853	33244731	4078100	4684201	109.3964778	2013Q3
24	201312	37095157	31543885	2122739	2982020	107.929383	2013Q4
25	201403	35246873	30392098	1675213	2095252	109.806645	2014Q1
26	201406	36947737	31938491	2640132	3487603	102.080596	2014Q2
27	201409	40244398	35820040	4548704	4501016	75.95686957	2014Q3
28	201412	38142734	34939379	4767321	2165129	54.04622727	2014Q4
29	201503	37163905	33374491	5716576	5296114	62.09896104	2015Q1
30	201506	35621247	32686440	4564806	4907729	50.03149445	2015Q2
31	201509	37089144	36014470	5290604	5906898	43.42099097	2015Q3
32	201512	35181921	35093143	4696388	4128701	34.35772257	2015Q4
33	201603	34999023	34906089	5748765	5072620	45.95284271	2016Q1
34	201606	33834966	34468468	3879073	4798619	45.80131219	2016Q2
35	201609	36552871	38887294	4924994	6138980	50.07821789	2016Q3
36	201612	35692247	36417814	3453074	3066432	54.11816271	2016Q4

Check Breakpoint of Log Income of China

Obs	time	income_China	income_Eva	net_China	net_Eva	Oil_Price	season
37	201703	35796465	38064697	2799380	3424482	50.27630501	2017Q1
38	201706	38156614	40200582	6022797	5128473	51.74080745	2017Q2
39	201709	40542703	43166421	7068240	7775831	61.46836219	2017Q3
40	201712	41626003	42130031	6081994	4865142	66.95132543	2017Q4
41	201803	39735027	42878322	3794007	4829346	74.48866805	2018Q1
42	201806	41275835	44554750	3959170	5415316	75.47547431	2018Q2
43	201809	45196764	47379049	5310156	7080708	67.36929356	2018Q3
44	201812	44503981	45095211	4144198	4792320	63.27252036	2018Q4
45	201903	40405348	44312727	4213439	7002903	68.33977997	2019Q1
46	201906	42892312	43864832	4296535	4479449	61.85909091	2019Q2
47	201909	43004648	45528073	5126524	5734779	62.65627706	2019Q3

Obs	time	income_China	income_Eva	net_China	net_Eva	Oil_Price	season	LogChina	LogEva
1	201903	40405348	44312727	5312068	8655681	68.33977997	2019Q1	17.5145	17.6068
2	201906	42892312	43864832	5395164	6132227	61.85909091	2019Q2	17.5742	17.5966
3	201909	43004648	45528073	6225153	7387557	62.65627706	2019Q3	17.5768	17.6338

Obs	net_LogChina	net_LogEva	LogOil
1	15.4855	15.9737	4.22449
2	15.5010	15.6291	4.12486
3	15.6441	15.8153	4.13766

Adjust Flight Data Table -- Remove Terms before the Breakpoint

Obs	time	income_China	income_Eva	net_China	net_Eva	Oil_Price	season	LogChina	LogEva
1	200912	32354351	24085666	5239725	4407014	76.66638785	2009Q4	17.2923	16.9971
2	201003	33387059	25240676	7047257	5026621	78.67259019	2010Q1	17.3237	17.0440
3	201006	38074869	28892524	8547939	7676835	76.40515152	2010Q2	17.4551	17.1791
4	201009	39160671	31322921	10249938	9862774	86.79487233	2010Q3	17.4832	17.2599
5	201012	37043408	28598332	5611714	5602610	104.8970221	2010Q4	17.4276	17.1689
6	201103	33791797	27072445	3770960	4510361	117.1221284	2011Q1	17.3357	17.1140
7	201106	35159619	28642277	3401491	4311970	112.9963583	2011Q2	17.3754	17.1704
8	201109	37365477	30480808	5532785	5365496	109.3143795	2011Q3	17.4363	17.2326
9	201112	35993787	27423843	1034452	2678589	118.5415512	2011Q4	17.3989	17.1269
10	201203	33686686	28944597	1740685	3137159	108.9005797	2012Q1	17.3326	17.1809
11	201206	35471724	29762217	3795213	4311657	109.9544697	2012Q2	17.3842	17.2088
12	201209	37117310	31787371	5577553	5840464	110.4417655	2012Q3	17.4296	17.2746
13	201212	34696419	29664282	3159836	4224792	112.8745652	2012Q4	17.3621	17.2055
14	201303	33075918	29080135	3041668	3799366	103.004137	2013Q1	17.3143	17.1856
15	201306	34187617	30295700	3982136	4807701	110.1008385	2013Q2	17.3474	17.2265
16	201309	37343853	33244731	5176729	6336979	109.3964778	2013Q3	17.4357	17.3194
17	201312	37095157	31543885	3221368	4634798	107.929383	2013Q4	17.4290	17.2669

Obs	net_LogChina	net_LogEva	LogOil
1	15.4718	15.2987	4.33946
2	15.7681	15.4303	4.36529
3	15.9612	15.8537	4.33605
4	16.1428	16.1043	4.46355
5	15.5404	15.5387	4.65298
6	15.1428	15.3219	4.76322
7	15.0397	15.2769	4.72736
8	15.5262	15.4955	4.69423
9	13.8494	14.8008	4.77526
10	14.3698	14.9588	4.69044
11	15.1493	15.2768	4.70007
12	15.5343	15.5803	4.70449
13	14.9660	15.2565	4.72628
14	14.9279	15.1503	4.63477
15	15.1973	15.3857	4.70140
16	15.4597	15.6619	4.69498
17	14.9853	15.3491	4.68148

Adjust Flight Data Table -- Remove Terms before the Breakpoint

Obs	time	income_China	income_Eva	net_China	net_Eva	Oil_Price	season	LogChina	LogEva
18	201403	35246873	30392098	2773842	3748030	109.806645	2014Q1	17.3779	17.2297
19	201406	36947737	31938491	3738761	5140381	102.080596	2014Q2	17.4250	17.2793
20	201409	40244398	35820040	5647333	6153794	75.95686957	2014Q3	17.5105	17.3940
21	201412	38142734	34939379	5865950	3817907	54.04622727	2014Q4	17.4568	17.3691
22	201503	37163905	33374491	6815205	6948892	62.09896104	2015Q1	17.4308	17.3233
23	201506	35621247	32686440	5663435	6560507	50.03149445	2015Q2	17.3885	17.3025
24	201509	37089144	36014470	6389233	7559676	43.42099097	2015Q3	17.4288	17.3994
25	201512	35181921	35093143	5795017	5781479	34.35772257	2015Q4	17.3760	17.3735
26	201603	34999023	34906089	6847394	6725398	45.95284271	2016Q1	17.3708	17.3682
27	201606	33834966	34468468	4977702	6451397	45.80131219	2016Q2	17.3370	17.3556
28	201609	36552871	38887294	6023623	7791758	50.07821789	2016Q3	17.4143	17.4762
29	201612	35692247	36417814	4551703	4719210	54.11816271	2016Q4	17.3904	17.4106
30	201703	35796465	38064697	3898009	5077260	50.27630501	2017Q1	17.3934	17.4548
31	201706	38156614	40200582	7121426	6781251	51.74080745	2017Q2	17.4572	17.5094
32	201709	40542703	43166421	8166869	9428609	61.46836219	2017Q3	17.5179	17.5806
33	201712	41626003	42130031	7180623	6517920	66.95132543	2017Q4	17.5442	17.5563
34	201803	39735027	42878322	4892636	6482124	74.48866805	2018Q1	17.4977	17.5739

Obs	net_LogChina	net_LogEva	LogOil
18	14.8357	15.1367	4.69872
19	15.1343	15.4526	4.62576
20	15.5467	15.6326	4.33017
21	15.5847	15.1552	3.98984
22	15.7347	15.7541	4.12873
23	15.5495	15.6966	3.91265
24	15.6701	15.8383	3.77094
25	15.5725	15.5702	3.53683
26	15.7394	15.7214	3.82762
27	15.4205	15.6798	3.82431
28	15.6112	15.8686	3.91359
29	15.3310	15.3672	3.99117
30	15.1760	15.4403	3.91753
31	15.7786	15.7297	3.94625
32	15.9156	16.0593	4.11852
33	15.7869	15.6901	4.20397
34	15.4032	15.6846	4.31065

Adjust Flight Data Table -- Remove Terms before the Breakpoint

Obs	time	income_China	income_Eva	net_China	net_Eva	Oil_Price	season	LogChina	LogEva
35	201806	41275835	44554750	5057799	7068094	75.47547431	2018Q2	17.5358	17.6122
36	201809	45196764	47379049	6408785	8733486	67.36929356	2018Q3	17.6265	17.6737
37	201812	44503981	45095211	5242827	6445098	63.27252036	2018Q4	17.6111	17.6243

Obs	net_LogChina	net_LogEva	LogOil
35	15.4364	15.7711	4.32381
36	15.6732	15.9827	4.21019
37	15.4724	15.6788	4.14745

Adjust Flight Data Table -- Original Version

Obs	time	income_China	income_Eva	net_China	net_Eva	Oil_Price	season	LogChina	LogEva
1	200803	32558850	25666911	2968061	1978310	122.2439177	2008Q1	17.2986	17.0607
2	200806	33877134	23950573	1	1	115.6047174	2008Q2	17.3383	16.9915
3	200809	35303015	25610852	2240325	1475942	55.77905072	2008Q3	17.3795	17.0585
4	200812	29541863	22195282	4603828	2696587	44.93356061	2008Q4	17.2013	16.9154
5	200903	23369555	18594170	4074819	3385847	59.18047619	2009Q1	16.9669	16.7384
6	200906	21708890	17879176	1381180	1238720	68.36734488	2009Q2	16.8932	16.6991
7	200909	27597226	20937317	2710275	2280856	74.97691919	2009Q3	17.1332	16.8570
8	200912	32354351	24085666	5239725	4407014	76.66638785	2009Q4	17.2923	16.9971
9	201003	33387059	25240676	7047257	5026621	78.67259019	2010Q1	17.3237	17.0440
10	201006	38074869	28892524	8547939	7676835	76.40515152	2010Q2	17.4551	17.1791
11	201009	39160671	31322921	10249938	9862774	86.79487233	2010Q3	17.4832	17.2599
12	201012	37043408	28598332	5611714	5602610	104.8970221	2010Q4	17.4276	17.1689
13	201103	33791797	27072445	3770960	4510361	117.1221284	2011Q1	17.3357	17.1140
14	201106	35159619	28642277	3401491	4311970	112.9963583	2011Q2	17.3754	17.1704
15	201109	37365477	30480808	5532785	5365496	109.3143795	2011Q3	17.4363	17.2326
16	201112	35993787	27423843	1034452	2678589	118.5415512	2011Q4	17.3989	17.1269
17	201203	33686686	28944597	1740685	3137159	108.9005797	2012Q1	17.3326	17.1809

Obs	net_LogChina	net_LogEva	LogOil
1	14.9034	14.4978	4.80602
2	0.0000	0.0000	4.75018
3	14.6221	14.2048	4.02140
4	15.3424	14.8075	3.80518
5	15.2203	15.0351	4.08059
6	14.1384	14.0296	4.22490
7	14.8126	14.6401	4.31718
8	15.4718	15.2987	4.33946
9	15.7681	15.4303	4.36529
10	15.9612	15.8537	4.33605
11	16.1428	16.1043	4.46355
12	15.5404	15.5387	4.65298
13	15.1428	15.3219	4.76322
14	15.0397	15.2769	4.72736
15	15.5262	15.4955	4.69423
16	13.8494	14.8008	4.77526
17	14.3698	14.9588	4.69044

Adjust Flight Data Table -- Original Version

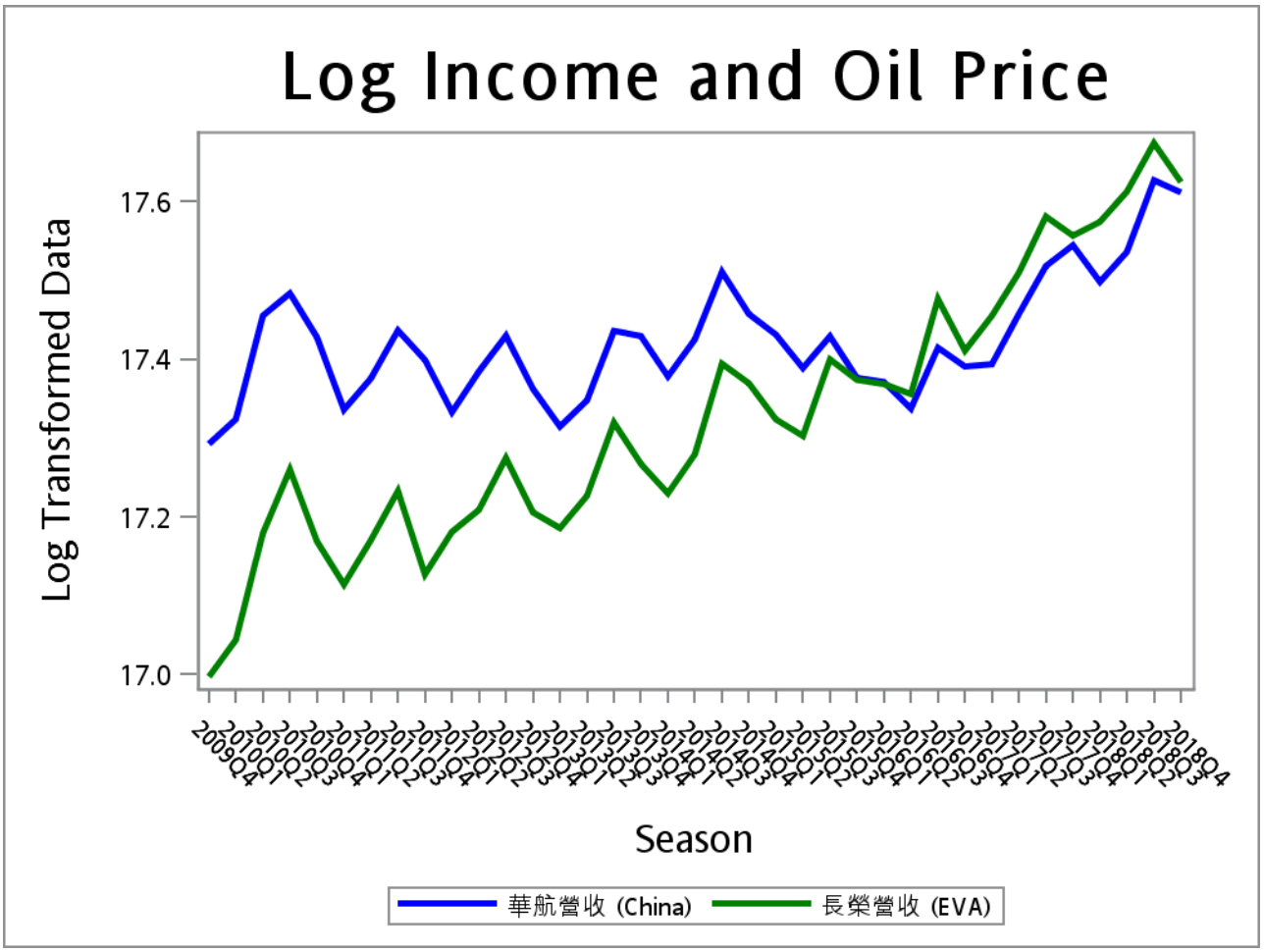
Obs	time	income_China	income_Eva	net_China	net_Eva	Oil_Price	season	LogChina	LogEva
18	201206	35471724	29762217	3795213	4311657	109.9544697	2012Q2	17.3842	17.2088
19	201209	37117310	31787371	5577553	5840464	110.4417655	2012Q3	17.4296	17.2746
20	201212	34696419	29664282	3159836	4224792	112.8745652	2012Q4	17.3621	17.2055
21	201303	33075918	29080135	3041668	3799366	103.004137	2013Q1	17.3143	17.1856
22	201306	34187617	30295700	3982136	4807701	110.1008385	2013Q2	17.3474	17.2265
23	201309	37343853	33244731	5176729	6336979	109.3964778	2013Q3	17.4357	17.3194
24	201312	37095157	31543885	3221368	4634798	107.929383	2013Q4	17.4290	17.2669
25	201403	35246873	30392098	2773842	3748030	109.806645	2014Q1	17.3779	17.2297
26	201406	36947737	31938491	3738761	5140381	102.080596	2014Q2	17.4250	17.2793
27	201409	40244398	35820040	5647333	6153794	75.95686957	2014Q3	17.5105	17.3940
28	201412	38142734	34939379	5865950	3817907	54.04622727	2014Q4	17.4568	17.3691
29	201503	37163905	33374491	6815205	6948892	62.09896104	2015Q1	17.4308	17.3233
30	201506	35621247	32686440	5663435	6560507	50.03149445	2015Q2	17.3885	17.3025
31	201509	37089144	36014470	6389233	7559676	43.42099097	2015Q3	17.4288	17.3994
32	201512	35181921	35093143	5795017	5781479	34.35772257	2015Q4	17.3760	17.3735
33	201603	34999023	34906089	6847394	6725398	45.95284271	2016Q1	17.3708	17.3682
34	201606	33834966	34468468	4977702	6451397	45.80131219	2016Q2	17.3370	17.3556

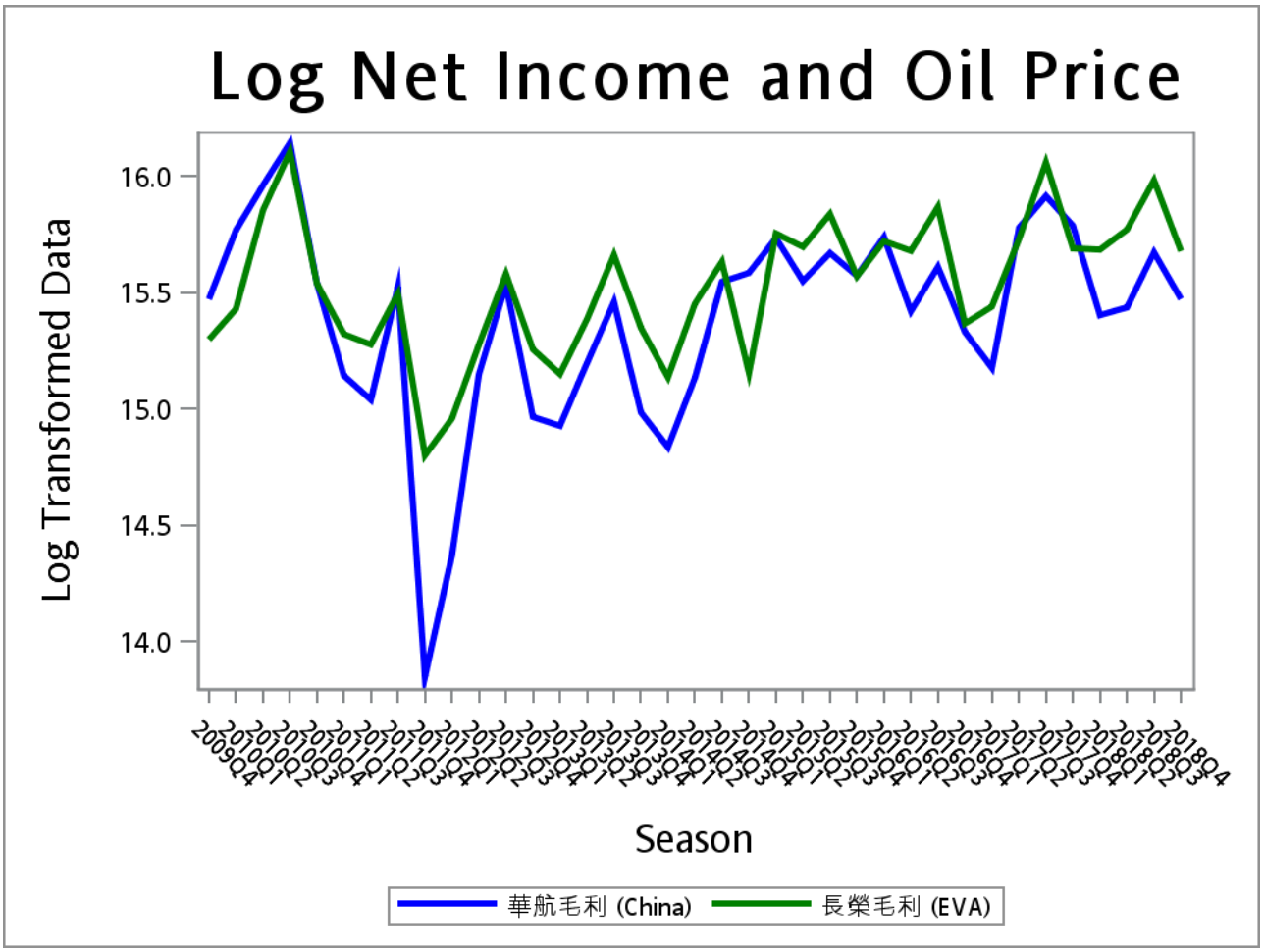
Obs	net_LogChina	net_LogEva	LogOil
18	15.1493	15.2768	4.70007
19	15.5343	15.5803	4.70449
20	14.9660	15.2565	4.72628
21	14.9279	15.1503	4.63477
22	15.1973	15.3857	4.70140
23	15.4597	15.6619	4.69498
24	14.9853	15.3491	4.68148
25	14.8357	15.1367	4.69872
26	15.1343	15.4526	4.62576
27	15.5467	15.6326	4.33017
28	15.5847	15.1552	3.98984
29	15.7347	15.7541	4.12873
30	15.5495	15.6966	3.91265
31	15.6701	15.8383	3.77094
32	15.5725	15.5702	3.53683
33	15.7394	15.7214	3.82762
34	15.4205	15.6798	3.82431

Adjust Flight Data Table -- Original Version

Obs	time	income_China	income_Eva	net_China	net_Eva	Oil_Price	season	LogChina	LogEva
35	201609	36552871	38887294	6023623	7791758	50.07821789	2016Q3	17.4143	17.4762
36	201612	35692247	36417814	4551703	4719210	54.11816271	2016Q4	17.3904	17.4106
37	201703	35796465	38064697	3898009	5077260	50.27630501	2017Q1	17.3934	17.4548
38	201706	38156614	40200582	7121426	6781251	51.74080745	2017Q2	17.4572	17.5094
39	201709	40542703	43166421	8166869	9428609	61.46836219	2017Q3	17.5179	17.5806
40	201712	41626003	42130031	7180623	6517920	66.95132543	2017Q4	17.5442	17.5563
41	201803	39735027	42878322	4892636	6482124	74.48866805	2018Q1	17.4977	17.5739
42	201806	41275835	44554750	5057799	7068094	75.47547431	2018Q2	17.5358	17.6122
43	201809	45196764	47379049	6408785	8733486	67.36929356	2018Q3	17.6265	17.6737
44	201812	44503981	45095211	5242827	6445098	63.27252036	2018Q4	17.6111	17.6243

Obs	net_LogChina	net_LogEva	LogOil
35	15.6112	15.8686	3.91359
36	15.3310	15.3672	3.99117
37	15.1760	15.4403	3.91753
38	15.7786	15.7297	3.94625
39	15.9156	16.0593	4.11852
40	15.7869	15.6901	4.20397
41	15.4032	15.6846	4.31065
42	15.4364	15.7711	4.32381
43	15.6732	15.9827	4.21019
44	15.4724	15.6788	4.14745


Log Income and Oil Price
Log Transformed Data
17.6
17.4
17.2
17.0
Season
華航營收 (China)
長榮營收 (EVA)


Log Net Income and Oil Price
Log Transformed Data
16.0
15.5
15.0
14.5
14.0
Season
華航毛利 (China)
長榮毛利 (EVA)

Dickey-Fuller Unit Root Test for Log Income

VARMAX 程序

Dickey-Fuller 單根檢定					
變數	類型	Rho	Pr < Rho	Tau	Pr < Tau
LogChina	Zero Mean	0.02	0.6802	0.79	0.8788
	Single Mean	-17.35	0.0112	-2.38	0.1541
	Trend	-30.15	0.0009	-3.24	0.0938
LogEva	Zero Mean	0.03	0.6842	1.66	0.9743
	Single Mean	-2.46	0.7108	-1.04	0.7269
	Trend	-40.83	<.0001	-4.18	0.0119

Obs	p	LogLike	AICC	HQC	AIC	SBC	FPEC
1	1	193.074062	-361.225046	-363.173908	-368.148123	-353.896453	0.000004151
2	2	194.910648	-346.487962	-356.841518	-363.821295	-343.601771	0.000003501
3	3	195.648202	-319.046404	-348.447349	-357.296404	-331.348275	0.000003134
4	4	205.173996	-284.347991	-357.773877	-368.347991	-336.921332	0.000001649
5	5	207.938087	-149.209508	-353.729925	-365.876175	-329.232777	0.000001288
6	6	212.937788	1372.124424	-354.319698	-367.875576	-326.289947	0.000000874
7	7	209.708688	-914.417377	-338.624959	-353.417377	-307.177863	0.000001033
8	8	205.177433	-648.799310	-320.510726	-336.354866	-285.764920	0.000001423
9	9	206.494970	-576.989941	-314.291945	-330.989941	-276.369556	0.000001450
10	10	219.307117	-566.508971	-331.274824	-348.614234	-290.301575	0.000000763

Model for Log Income with p = 4

VARMAX 程序

觀測值數目	37
成對遺漏數目	0

簡單摘要統計值							
變數	類型	N	平均值	標準差	最小值	最大值	標籤
LogChina	相依	37	17.42308	0.07815	17.29226	17.62654	華航營收 (China)
LogEva	相依	37	17.32506	0.16839	16.99713	17.67369	長榮營收 (EVA)

Dickey-Fuller 單根檢定					
變數	類型	Rho	Pr < Rho	Tau	Pr < Tau
LogChina	Zero Mean	0.02	0.6802	0.79	0.8788
	Single Mean	-17.35	0.0112	-2.38	0.1541
	Trend	-30.15	0.0009	-3.24	0.0938
LogEva	Zero Mean	0.03	0.6842	1.66	0.9743
	Single Mean	-2.46	0.7108	-1.04	0.7269
	Trend	-40.83	<.0001	-4.18	0.0119

使用追蹤的共整合秩檢定						
H0: Rank=r	H1: Rank>r	特徵值	追蹤	Pr > 追蹤	ECM 中的漂移	程序中的漂移
0	0	0.2633	10.2271	0.2636	Constant	Linear
1	1	0.0043	0.1411	0.7069		

使用限制下追蹤的共整合秩檢定						
H0: Rank=r	H1: Rank>r	特徵值	追蹤	Pr > 追蹤	ECM 中的漂移	程序中的漂移
0	0	0.6108	34.5433	0.0002	Constant	Constant
1	1	0.0980	3.4020	0.5086		

限制的假設		
假設	ECM 中的漂移	程序中的漂移
H0(Case 2)	Constant	Constant
H1(Case 3)	Constant	Linear

Model for Log Income with p = 4

VARMAX 程序

限制的假設檢定					
排名	特徵值	受限特徵值	自由度	卡方	Pr > ChiSq
0	0.2633	0.6108	2	24.32	<.0001
1	0.0043	0.0980	1	3.26	0.0710

長期參數 Beta 估計值		
變數	1	2
LogChina	-15.13186	27.44646
LogEva	10.51864	-2.58296

調整係數 Alpha 估計值		
變數	1	2
LogChina	0.01719	0.00089
LogEva	0.01669	-0.00081

以限制趨勢為基礎的長期係數 Beta		
變數	1	2
LogChina	-6.98515	8.85158
LogEva	4.42889	-9.00068
1	46.27627	2.28632

以限制趨勢為基礎的調整係數 Alpha		
變數	1	2
LogChina	0.02286	-0.00859
LogEva	0.03801	-0.00103

Model for Log Income with p = 4

VARMAX 程序

模型類型	VAR(4)
估計法	Least Squares Estimation

常數估計值	
變數	常數
LogChina	1.03805
LogEva	1.75643

AR 係數估計值			
滯後	變數	LogChina	LogEva
1	LogChina	0.70382	0.03270
	LogEva	0.02116	0.32625
2	LogChina	0.33254	-0.53896
	LogEva	0.23074	-0.16655
3	LogChina	0.08541	-0.06528
	LogEva	-0.02099	-0.01723
4	LogChina	-0.35745	0.75008
	LogEva	-0.50551	1.03513

參數估計值的圖示					
變數/滯後	C	AR1	AR2	AR3	AR4
LogChina	.	+.	.-	..	.+
LogEva	.	..	..	..	-+
+ is > 2*std error, - is < -2*std error, . is between, * is N/A					

模型參數估計值						
方程式	參數	估計值	標準誤差	t 值	Pr > |t|	變數
LogChina	CONST1	1.03805	2.86305	0.36	0.7201	1
	AR1_1_1	0.70382	0.26826	2.62	0.0149	LogChina(t-1)
	AR1_1_2	0.03270	0.22506	0.15	0.8857	LogEva(t-1)
	AR2_1_1	0.33254	0.32015	1.04	0.3093	LogChina(t-2)
	AR2_1_2	-0.53896	0.23412	-2.30	0.0303	LogEva(t-2)
	AR3_1_1	0.08541	0.28740	0.30	0.7689	LogChina(t-3)
	AR3_1_2	-0.06528	0.23711	-0.28	0.7854	LogEva(t-3)

Model for Log Income with p = 4

VARMAX 程序

模型參數估計值						
方程式	參數	估計值	標準誤差	t 值	Pr > |t|	變數
	AR4_1_1	-0.35745	0.24695	-1.45	0.1607	LogChina(t-4)
	AR4_1_2	0.75008	0.23266	3.22	0.0036	LogEva(t-4)
LogEva	CONST2	1.75643	2.74446	0.64	0.5282	1
	AR1_2_1	0.02116	0.25715	0.08	0.9351	LogChina(t-1)
	AR1_2_2	0.32625	0.21574	1.51	0.1435	LogEva(t-1)
	AR2_2_1	0.23074	0.30688	0.75	0.4594	LogChina(t-2)
	AR2_2_2	-0.16655	0.22443	-0.74	0.4652	LogEva(t-2)
	AR3_2_1	-0.02099	0.27550	-0.08	0.9399	LogChina(t-3)
	AR3_2_2	-0.01723	0.22728	-0.08	0.9402	LogEva(t-3)
	AR4_2_1	-0.50551	0.23672	-2.14	0.0431	LogChina(t-4)
	AR4_2_2	1.03513	0.22303	4.64	0.0001	LogEva(t-4)

創新的共變異數		
變數	LogChina	LogEva
LogChina	0.00139	0.00087
LogEva	0.00087	0.00128

對數概度	205.174

訊息準則	
AICC	-284.348
HQC	-357.774
AIC	-368.348
SBC	-336.921
FPEC	1.649E-6

殘差的交叉共變異數			
滯後	變數	LogChina	LogEva
0	LogChina	0.00101	0.00064
	LogEva	0.00064	0.00093
1	LogChina	-0.00003	-0.00001
	LogEva	-0.00012	-0.00010

Model for Log Income with p = 4

VARMAX 程序

殘差的交叉共變異數			
滯後	變數	LogChina	LogEva
2	LogChina	-0.00001	-0.00016
	LogEva	-0.00002	-0.00021
3	LogChina	-0.00004	-0.00014
	LogEva	-0.00004	-0.00010

殘差的交叉相關			
滯後	變數	LogChina	LogEva
0	LogChina	1.00000	0.65444
	LogEva	0.65444	1.00000
1	LogChina	-0.03122	-0.00694
	LogEva	-0.11867	-0.10318
2	LogChina	-0.01359	-0.16845
	LogEva	-0.02559	-0.23077
3	LogChina	-0.03881	-0.14168
	LogEva	-0.03853	-0.10777

殘差的交叉相關示意圖				
變數/滯後	0	1	2	3
LogChina	++	. .	. .	. .
LogEva	++	. .	. .	. .
+ is > 2*std error, - is < -2*std error, . is between				

單變量模型 ANOVA 診斷				
變數	R 平方	標準差	F 值	Pr > F
LogChina	0.8220	0.03731	13.85	<.0001
LogEva	0.9611	0.03576	74.04	<.0001

Model for Log Income with p = 4

VARMAX 程序

單變量模型白噪音診斷					
		常態性		ARCH	
變數	Durbin Watson	卡方	Pr > ChiSq	F 值	Pr > F
LogChina	2.01485	6.48	0.0392	1.27	0.2681
LogEva	2.11568	2.14	0.3432	1.31	0.2611

單變量模型 AR 診斷								
	AR1		AR2		AR3		AR4	
變數	F 值	Pr > F	F 值	Pr > F	F 值	Pr > F	F 值	Pr > F
LogChina	0.03	0.8610	0.02	0.9818	0.05	0.9850	0.58	0.6772
LogEva	0.35	0.5587	1.24	0.3045	1.35	0.2807	1.17	0.3475

預測值					
變數	觀測值	預測	標準誤差	95% 信賴界限	
LogChina	38	17.62068	0.03731	17.54756	17.69380
	39	17.66955	0.04608	17.57925	17.75986
	40	17.69558	0.05171	17.59423	17.79693
	41	17.67551	0.05761	17.56260	17.78843
	42	17.69260	0.06191	17.57126	17.81394
	43	17.72846	0.06435	17.60233	17.85459
	44	17.74988	0.06602	17.62049	17.87928
LogEva	38	17.67703	0.03576	17.60693	17.74712
	39	17.71661	0.03779	17.64255	17.79067
	40	17.74290	0.03866	17.66712	17.81868
	41	17.71228	0.03932	17.63522	17.78934
	42	17.75152	0.04709	17.65923	17.84381
	43	17.78043	0.04905	17.68429	17.87656
	44	17.80303	0.04966	17.70571	17.90036

VARMAX 程序

Granger-Causality Wald 檢定			
檢定	自由度	卡方	Pr > ChiSq
1	8	13.97	0.0825
2	4	5.48	0.2418
3	4	3.23	0.5200
4	4	5.79	0.2157

檢定 1: 群組 1 變數:	LogChina LogEva
群組 2 變數:	LogOil

檢定 2: 群組 1 變數:	LogChina
群組 2 變數:	LogOil

檢定 3: 群組 1 變數:	LogEva
群組 2 變數:	LogOil

檢定 4: 群組 1 變數:	LogEva
群組 2 變數:	LogChina

Dickey-Fuller Unit Root Test for Log Net Income

VARMAX 程序

Dickey-Fuller 單根檢定					
變數	類型	Rho	Pr < Rho	Tau	Pr < Tau
net_LogChina	Zero Mean	-0.03	0.6710	-0.17	0.6177
	Single Mean	-21.43	0.0027	-3.17	0.0302
	Trend	-24.27	0.0083	-3.42	0.0648
net_LogEva	Zero Mean	0.02	0.6803	0.17	0.7299
	Single Mean	-22.66	0.0017	-3.17	0.0301
	Trend	-32.11	0.0004	-3.76	0.0311

Model Criterion for Log Net Income

Obs	p	LogLike	AICC	HQC	AIC	SBC	FPEC
1	1	69.175874	-113.428671	-115.377533	-120.351748	-106.100077	0.004050
2	2	69.653828	-95.974323	-106.327879	-113.307656	-93.088131	0.004495
3	3	68.157429	-64.064857	-93.465802	-102.314857	-76.366728	0.005663
4	4	71.822537	-17.645073	-91.070959	-101.645073	-70.218414	0.005334
5	5	73.744942	119.176783	-85.343634	-97.489883	-60.846486	0.005652
6	6	71.844733	1654.310534	-72.133588	-85.689466	-44.103837	0.007848
7	7	70.697018	-636.394037	-60.601619	-75.394037	-29.154523	0.010934
8	8	76.098314	-390.641072	-62.352487	-78.196627	-27.606682	0.010455
9	9	105.818516	-375.637032	-112.939036	-129.637032	-75.016647	0.001925
10	10	117.003962	-361.902661	-126.668513	-144.007924	-85.695265	0.001491

Model for Log Net Income with p = 1

VARMAX 程序

觀測值數目	37
成對遺漏數目	0

簡單摘要統計值							
變數	類型	N	平均值	標準差	最小值	最大值	標籤
net_LogChina	相依	37	15.38931	0.43926	13.84938	16.14278	華航毛利 (China)
net_LogEva	相依	37	15.53108	0.29676	14.80080	16.10428	長榮毛利 (EVA)

Dickey-Fuller 單根檢定					
變數	類型	Rho	Pr < Rho	Tau	Pr < Tau
net_LogChina	Zero Mean	-0.03	0.6710	-0.17	0.6177
	Single Mean	-21.43	0.0027	-3.17	0.0302
	Trend	-24.27	0.0083	-3.42	0.0648
net_LogEva	Zero Mean	0.02	0.6803	0.17	0.7299
	Single Mean	-22.66	0.0017	-3.17	0.0301
	Trend	-32.11	0.0004	-3.76	0.0311

使用追蹤的共整合秩檢定						
H0: Rank=r	H1: Rank>r	特徵值	追蹤	Pr > 追蹤	ECM 中的漂移	程序中的漂移
0	0	0.4447	31.3272	0.0002	Constant	Linear
1	1	0.2457	10.1530	0.0012		

使用限制下追蹤的共整合秩檢定						
H0: Rank=r	H1: Rank>r	特徵值	追蹤	Pr > 追蹤	ECM 中的漂移	程序中的漂移
0	0	0.4463	31.4353	0.0006	Constant	Constant
1	1	0.2457	10.1530	0.0322		

限制的假設		
假設	ECM 中的漂移	程序中的漂移
H0(Case 2)	Constant	Constant
H1(Case 3)	Constant	Linear

Model for Log Net Income with p = 1

VARMAX 程序

限制的假設檢定					
排名	特徵值	受限特徵值	自由度	卡方	Pr > ChiSq
0	0.4447	0.4463	2	0.11	0.9474
1	0.2457	0.2457	1	0.00	0.9958

長期參數 Beta 估計值		
變數	1	2
net_LogChina	-4.00006	1.74885
net_LogEva	6.42117	0.88345

調整係數 Alpha 估計值		
變數	1	2
net_LogChina	0.00442	-0.21433
net_LogEva	-0.12587	-0.11931

以限制趨勢為基礎的長期係數 Beta		
變數	1	2
net_LogChina	3.98644	-1.74982
net_LogEva	-6.39966	-0.88189
1	38.11001	40.61924

以限制趨勢為基礎的調整係數 Alpha		
變數	1	2
net_LogChina	-0.00439	0.21433
net_LogEva	0.12632	0.11930

Model for Log Net Income with p = 1

VARMAX 程序

模型類型	VAR(1)
估計法	Least Squares Estimation

常數估計值	
變數	常數
net_LogChina	8.53872
net_LogEva	9.65990

AR 係數估計值			
滯後	變數	net_LogChina	net_LogEva
1	net_LogChina	0.60748	-0.16095
	net_LogEva	0.29482	0.08638

參數估計值的圖示		
變數/滯後	C	AR1
net_LogChina	+	+.
net_LogEva	+	..
+ is > 2*std error, - is < -2*std error, . is between, * is N/A		

模型參數估計值						
方程式	參數	估計值	標準誤差	t 值	Pr > |t|	變數
net_LogChina	CONST1	8.53872	3.64380	2.34	0.0253	1
	AR1_1_1	0.60748	0.28538	2.13	0.0408	net_LogChina(t-1)
	AR1_1_2	-0.16095	0.42370	-0.38	0.7065	net_LogEva(t-1)
net_LogEva	CONST2	9.65990	2.44473	3.95	0.0004	1
	AR1_2_1	0.29482	0.19147	1.54	0.1331	net_LogChina(t-1)
	AR1_2_2	0.08638	0.28427	0.30	0.7631	net_LogEva(t-1)

創新的共變異數		
變數	net_LogChina	net_LogEva
net_LogChina	0.15383	0.08486
net_LogEva	0.08486	0.06925

對數概度	69.17587

Model for Log Net Income with p = 1

VARMAX 程序

訊息準則	
AICC	-113.429
HQC	-115.378
AIC	-120.352
SBC	-106.1
FPEC	0.00405

殘差的交叉共變異數			
滯後	變數	net_LogChina	net_LogEva
0	net_LogChina	0.14101	0.07779
	net_LogEva	0.07779	0.06348
1	net_LogChina	0.00603	0.00079
	net_LogEva	0.00741	0.00063
2	net_LogChina	-0.02206	-0.01188
	net_LogEva	-0.01579	-0.01144
3	net_LogChina	-0.00464	0.00051
	net_LogEva	-0.00222	0.00002

殘差的交叉相關			
滯後	變數	net_LogChina	net_LogEva
0	net_LogChina	1.00000	0.82221
	net_LogEva	0.82221	1.00000
1	net_LogChina	0.04274	0.00839
	net_LogEva	0.07835	0.00995
2	net_LogChina	-0.15646	-0.12562
	net_LogEva	-0.16685	-0.18015
3	net_LogChina	-0.03289	0.00537
	net_LogEva	-0.02352	0.00026

殘差的交叉相關示意圖				
變數/滯後	0	1	2	3
net_LogChina	++	. .	. .	. .
net_LogEva	++	. .	. .	. .
+ is > 2*std error, - is < -2*std error, . is between				

Model for Log Net Income with p = 1

VARMAX 程序

殘差交叉相關的 Portmanteau 檢定			
滯後上限	自由度	卡方	Pr > ChiSq
2	4	2.59	0.6284
3	8	2.78	0.9473

單變量模型 ANOVA 診斷				
變數	R 平方	標準差	F 值	Pr > F
net_LogChina	0.2684	0.39222	6.05	0.0058
net_LogEva	0.2664	0.26315	5.99	0.0060

單變量模型白噪音診斷					
		常態性		ARCH	
變數	Durbin Watson	卡方	Pr > ChiSq	F 值	Pr > F
net_LogChina	1.89759	107.31	<.0001	0.03	0.8680
net_LogEva	1.97443	3.69	0.1578	0.93	0.3411

單變量模型 AR 診斷								
	AR1		AR2		AR3		AR4	
變數	F 值	Pr > F	F 值	Pr > F	F 值	Pr > F	F 值	Pr > F
net_LogChina	0.06	0.8056	0.43	0.6518	0.41	0.7481	1.29	0.2995
net_LogEva	0.00	0.9545	0.59	0.5597	0.32	0.8084	4.69	0.0053

VARMAX 程序

Granger-Causality Wald 檢定			
檢定	自由度	卡方	Pr > ChiSq
1	2	6.99	0.0303
2	1	5.69	0.0170
3	1	8.11	0.0044
4	1	0.14	0.7041

檢定 1: 群組 1 變數:	net_LogChina net_LogEva
群組 2 變數:	LogOil

檢定 2: 群組 1 變數:	net_LogChina
群組 2 變數:	LogOil

檢定 3: 群組 1 變數:	net_LogEva
群組 2 變數:	LogOil

檢定 4: 群組 1 變數:	net_LogChina
群組 2 變數:	net_LogEva

VARMAX 程序

Dickey-Fuller 單根檢定					
變數	類型	Rho	Pr < Rho	Tau	Pr < Tau
net_LogChina	Zero Mean	-0.03	0.6710	-0.17	0.6177
	Single Mean	-21.43	0.0027	-3.17	0.0302
	Trend	-24.27	0.0083	-3.42	0.0648
net_LogEva	Zero Mean	0.02	0.6803	0.17	0.7299
	Single Mean	-22.66	0.0017	-3.17	0.0301
	Trend	-32.11	0.0004	-3.76	0.0311

VARMAX 程序

觀測值數目	37
成對遺漏數目	0

簡單摘要統計值							
變數	類型	N	平均值	標準差	最小值	最大值	標籤
net_LogChina	相依	37	15.38931	0.43926	13.84938	16.14278	華航毛利 (China)
net_LogEva	相依	37	15.53108	0.29676	14.80080	16.10428	長榮毛利 (EVA)
LogOil	獨立	37	4.33459	0.35625	3.53683	4.77526	

Dickey-Fuller 單根檢定					
變數	類型	Rho	Pr < Rho	Tau	Pr < Tau
net_LogChina	Zero Mean	-0.03	0.6710	-0.17	0.6177
	Single Mean	-21.43	0.0027	-3.17	0.0302
	Trend	-24.27	0.0083	-3.42	0.0648
net_LogEva	Zero Mean	0.02	0.6803	0.17	0.7299
	Single Mean	-22.66	0.0017	-3.17	0.0301
	Trend	-32.11	0.0004	-3.76	0.0311

VARMAX 程序

模型類型	VARX(1,0)
估計法	Least Squares Estimation

常數估計值	
變數	常數
net_LogChina	14.59389
net_LogEva	13.25608

自變數的係數估計值		
滯後	變數	LogOil
0	net_LogChina	-0.48757
	net_LogEva	-0.28957

AR 係數估計值			
滯後	變數	net_LogChina	net_LogEva
1	net_LogChina	0.55277	-0.36060
	net_LogEva	0.26233	-0.03219

參數估計值的圖示			
變數/滯後	C	XL0	AR1
net_LogChina	+	-	+.
net_LogEva	+	-	..
+ is > 2*std error, - is < -2*std error, . is between, * is N/A			

模型參數估計值						
方程式	參數	估計值	標準誤差	t 值	Pr > |t|	變數
net_LogChina	CONST1	14.59389	4.13125	3.53	0.0013	1
	XL0_1_1	-0.48757	0.19182	-2.54	0.0161	LogOil(t)
	AR1_1_1	0.55277	0.26522	2.08	0.0452	net_LogChina(t-1)
	AR1_1_2	-0.36060	0.40025	-0.90	0.3744	net_LogEva(t-1)
net_LogEva	CONST2	13.25608	2.83168	4.68	0.0001	1
	XL0_2_1	-0.28957	0.13148	-2.20	0.0350	LogOil(t)
	AR1_2_1	0.26233	0.18179	1.44	0.1587	net_LogChina(t-1)
	AR1_2_2	-0.03219	0.27435	-0.12	0.9073	net_LogEva(t-1)

VARMAX 程序

創新的共變異數		
變數	net_LogChina	net_LogEva
net_LogChina	0.13199	0.07169
net_LogEva	0.07169	0.06201

對數概度	72.53065

訊息準則	
AICC	-112.061
HQC	-116.982
AIC	-123.061
SBC	-105.643
FPEC	0.003761

依變數排序轉換函數的簡單脈衝反應		
變數 回應\脈衝	滯後	LogOil
net_LogChina	0	-0.48757
	1	-0.16510
	2	-0.04850
	3	-0.01257
	4	-0.00282
	5	-0.00050
	6	-0.00004
	7	0.00002
net_LogEva	0	-0.28957
	1	-0.11858
	2	-0.03949
	3	-0.01145
	4	-0.00293
	5	-0.00065
	6	-0.00011
	7	-0.00001

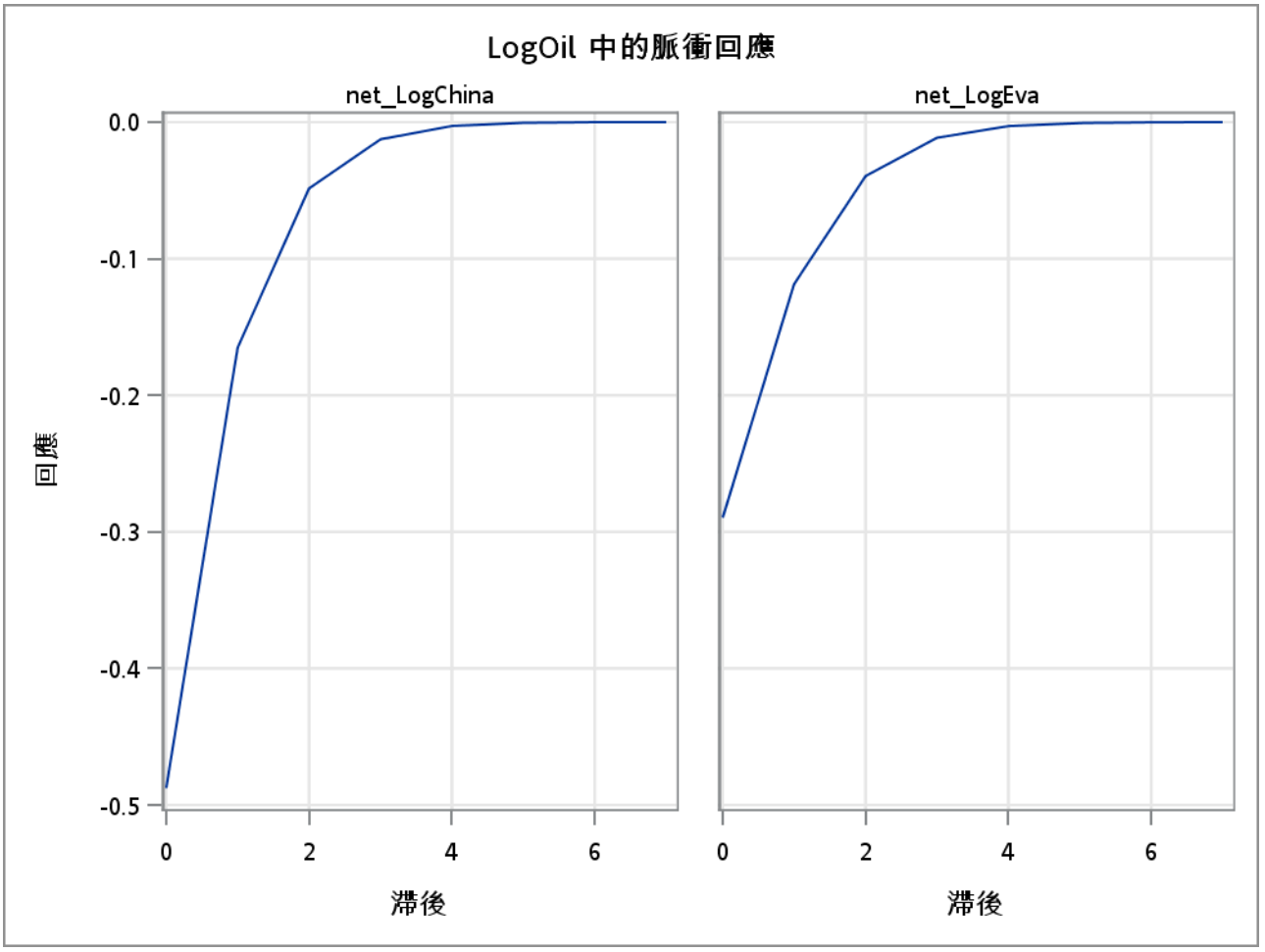
VARMAX 程序

依變數排序轉換函數的累積脈衝反應		
變數 回應\脈衝	滯後	LogOil
net_LogChina	0	-0.48757
	1	-0.65266
	2	-0.70116
	3	-0.71373
	4	-0.71655
	5	-0.71705
	6	-0.71710
	7	-0.71708
net_LogEva	0	-0.28957
	1	-0.40815
	2	-0.44764
	3	-0.45909
	4	-0.46202
	5	-0.46267
	6	-0.46278
	7	-0.46278

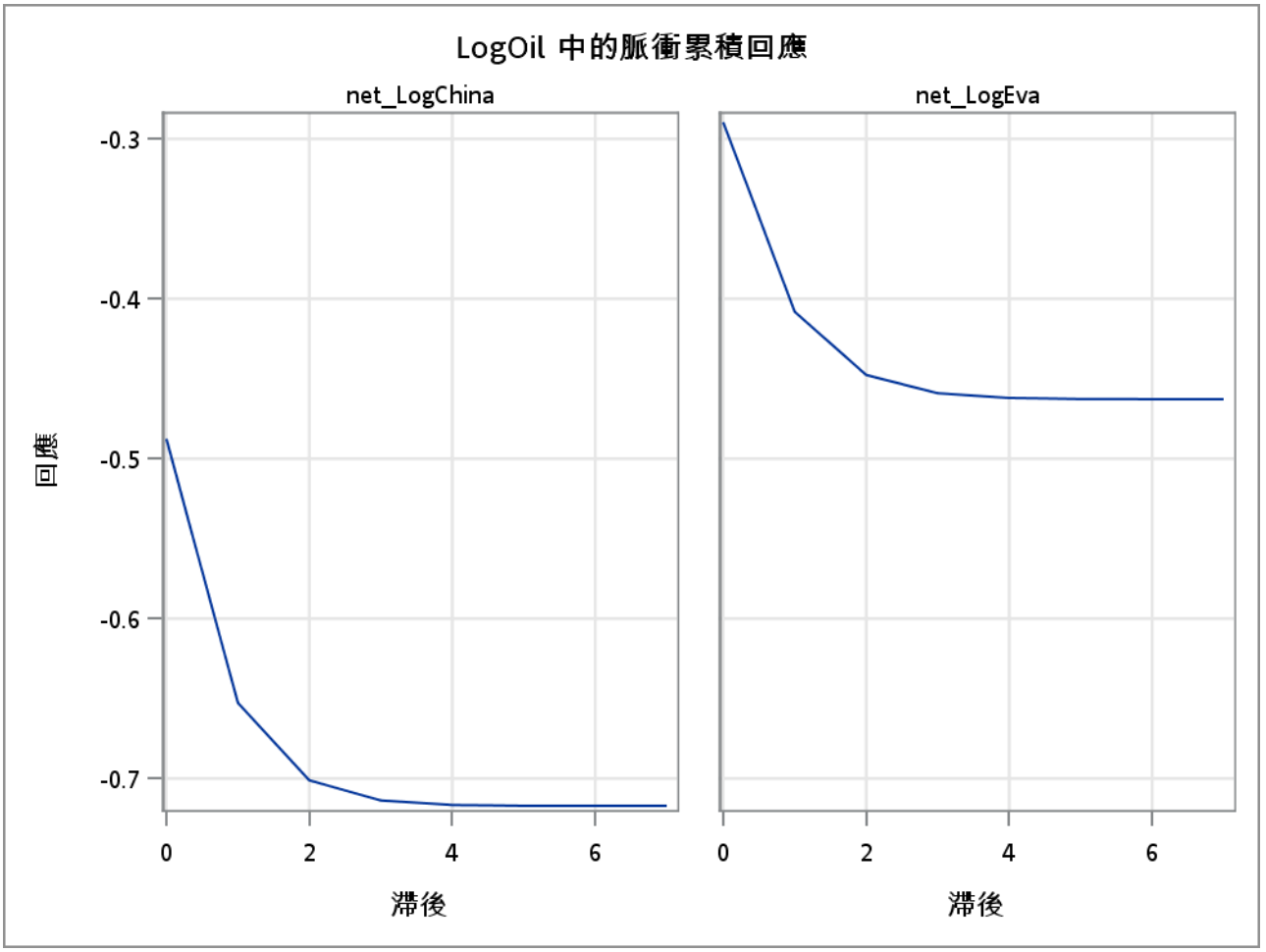
預測值					
變數	觀測值	預測	標準 誤差	95% 信賴界限	
net_LogChina	38	15.46725	0.36900	14.74403	16.19047
	39	15.48708	0.40342	14.69640	16.27777
	40	15.49542	0.41484	14.68234	16.30849
	41	15.49599	0.42272	14.66748	16.32450
	42	15.49356	0.42935	14.65204	16.33507
	43	15.49029	0.43508	14.63755	16.34303
	44	15.48694	0.44004	14.62448	16.34940
net_LogEva	38	15.60719	0.25196	15.11336	16.10101
	39	15.60627	0.27218	15.07281	16.13972
	40	15.60974	0.27949	15.06194	16.15754
	41	15.61016	0.28446	15.05262	16.16770
	42	15.60876	0.28863	15.04305	16.17446

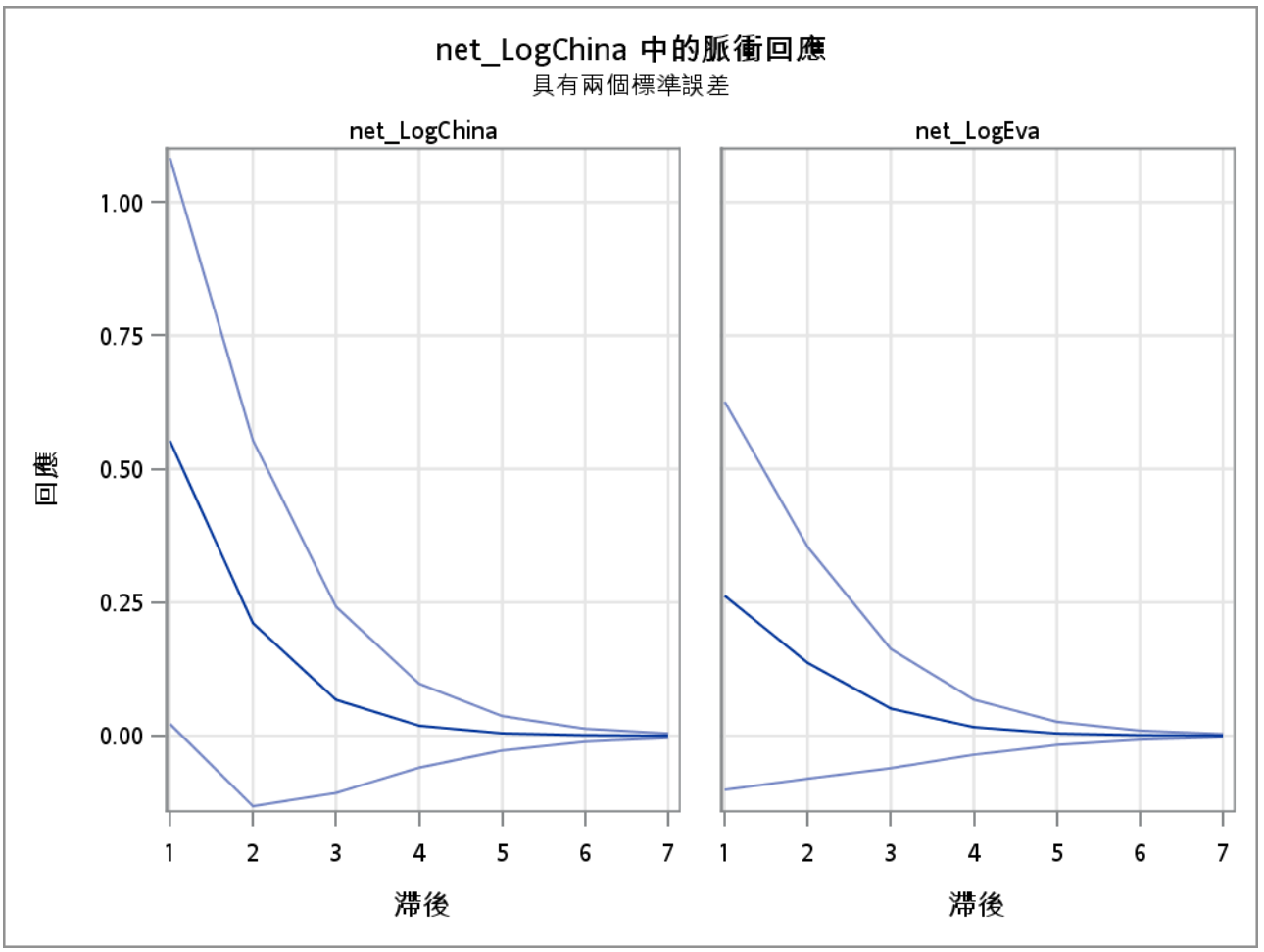
VARMAX 程序

預測值					
變數	觀測值	預測	標準誤差	95% 信賴界限	
	43	15.60672	0.29223	15.03397	16.17947
	44	15.60457	0.29534	15.02571	16.18344

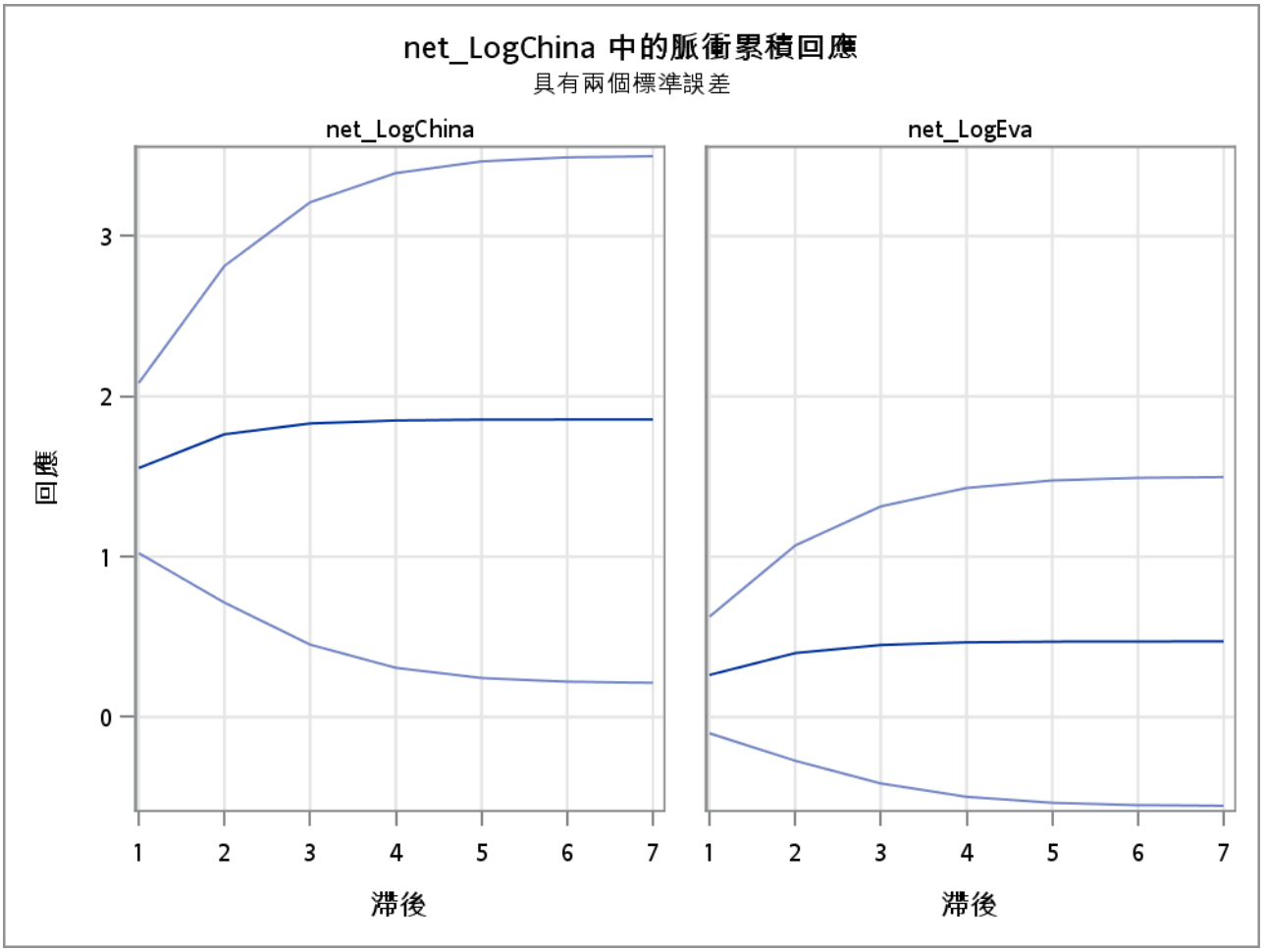


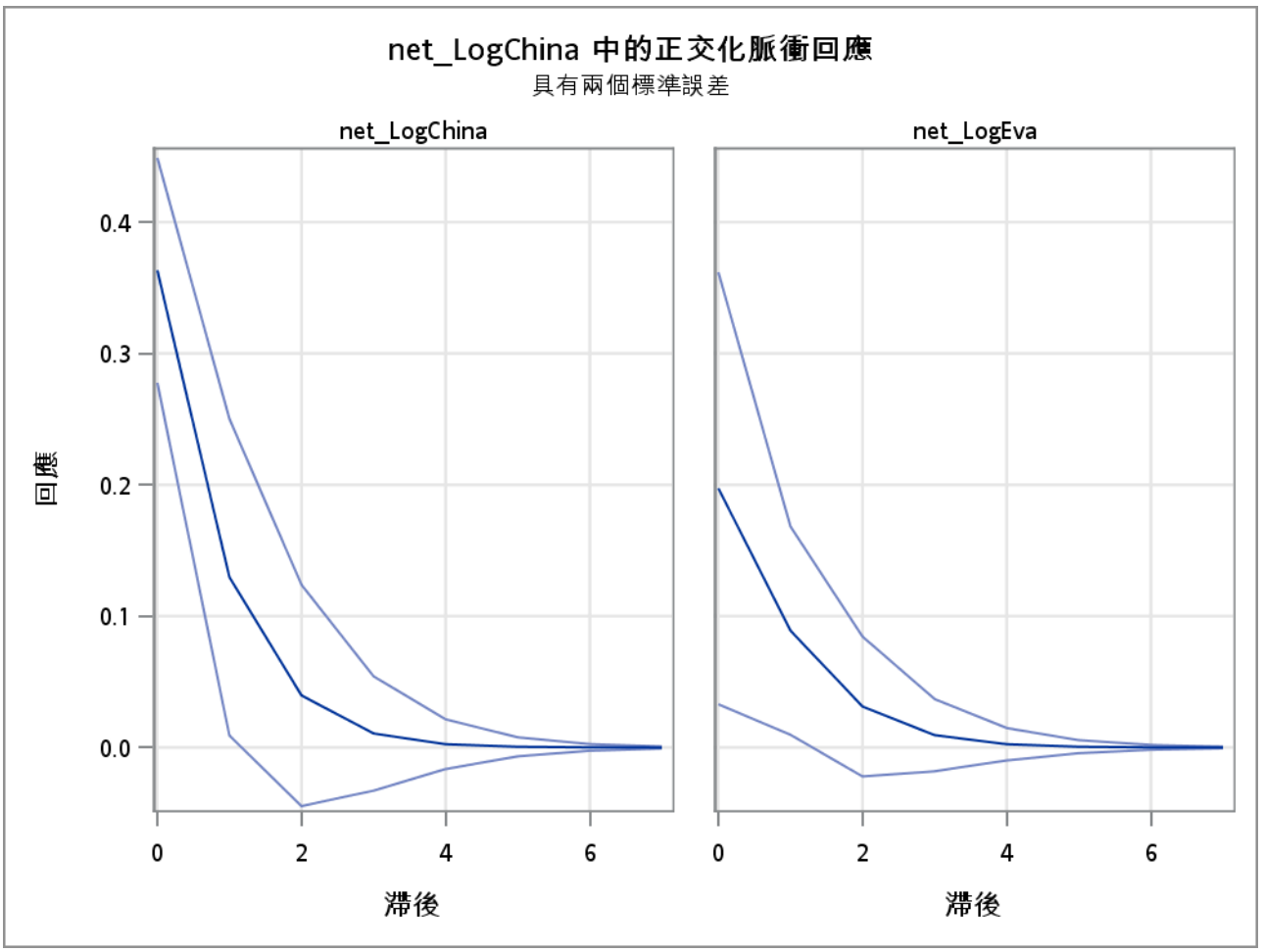
VARMAX 程序


LogOil 中的脈衝累積回應
net_LogChina
net_LogEva
回應
-0.3
-0.4
-0.5
-0.6
-0.7
0
2
4
6
滯後

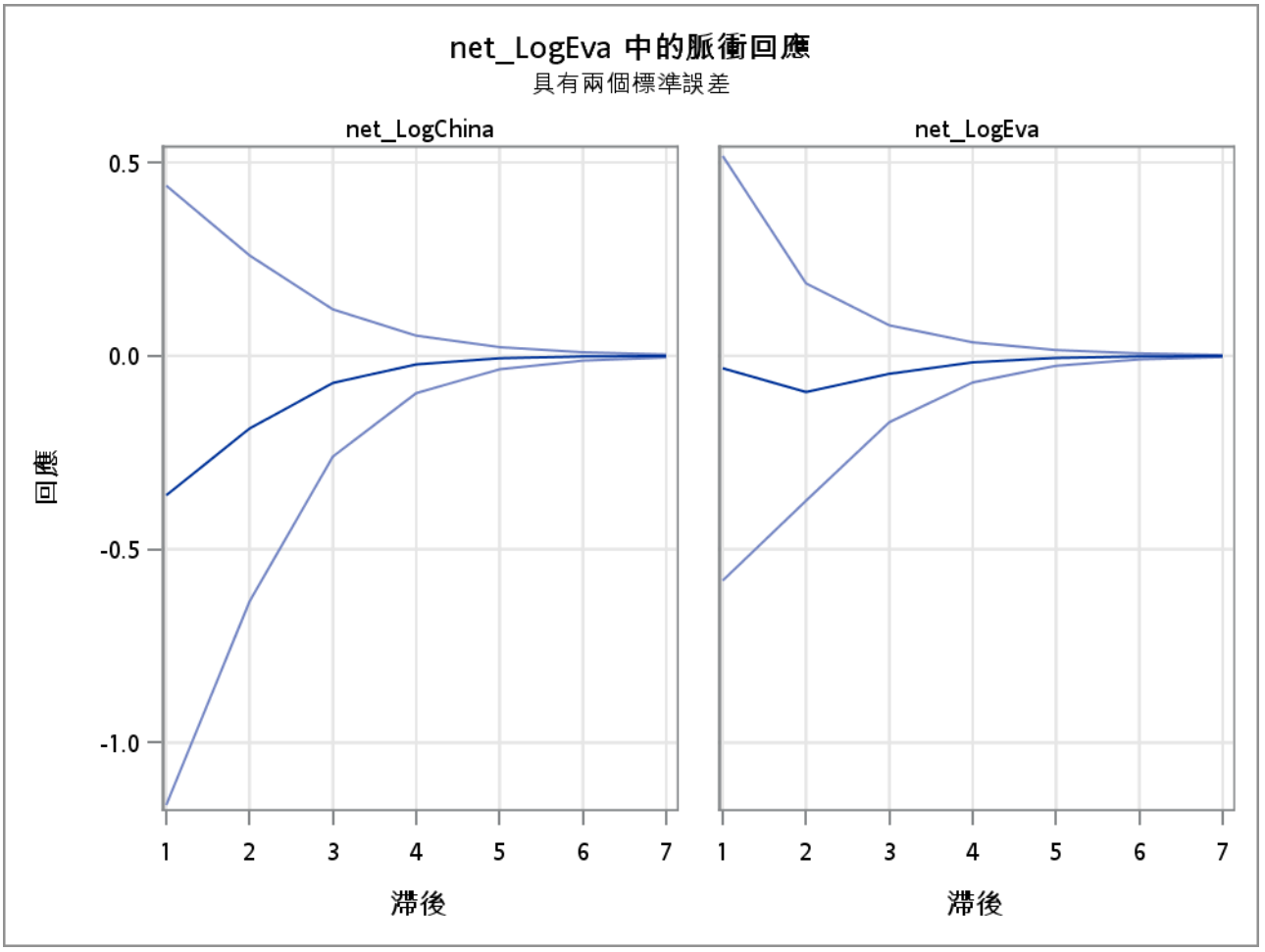

net_LogChina 中的脈衝回應
具有兩個標準誤差
net_LogChina
net_LogEva
回應
1.00
0.75
0.50
0.25
0.00
1
2
3
4
5
6
7
滯後

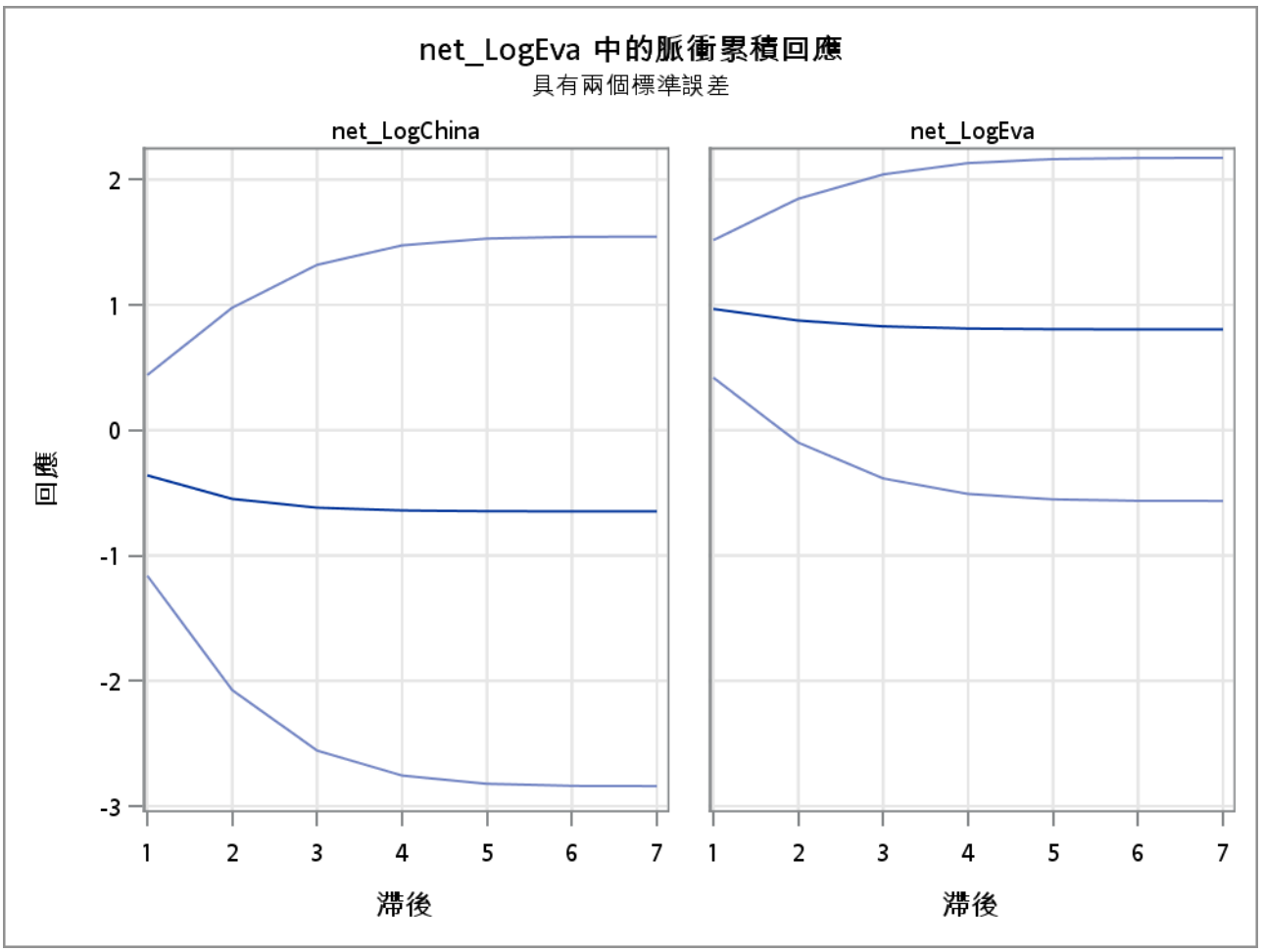
VARMAX 程序


net_LogChina 中的脈衝累積回應
具有兩個標準誤差
net_LogChina
net_LogEva
回應
滯後
滯後

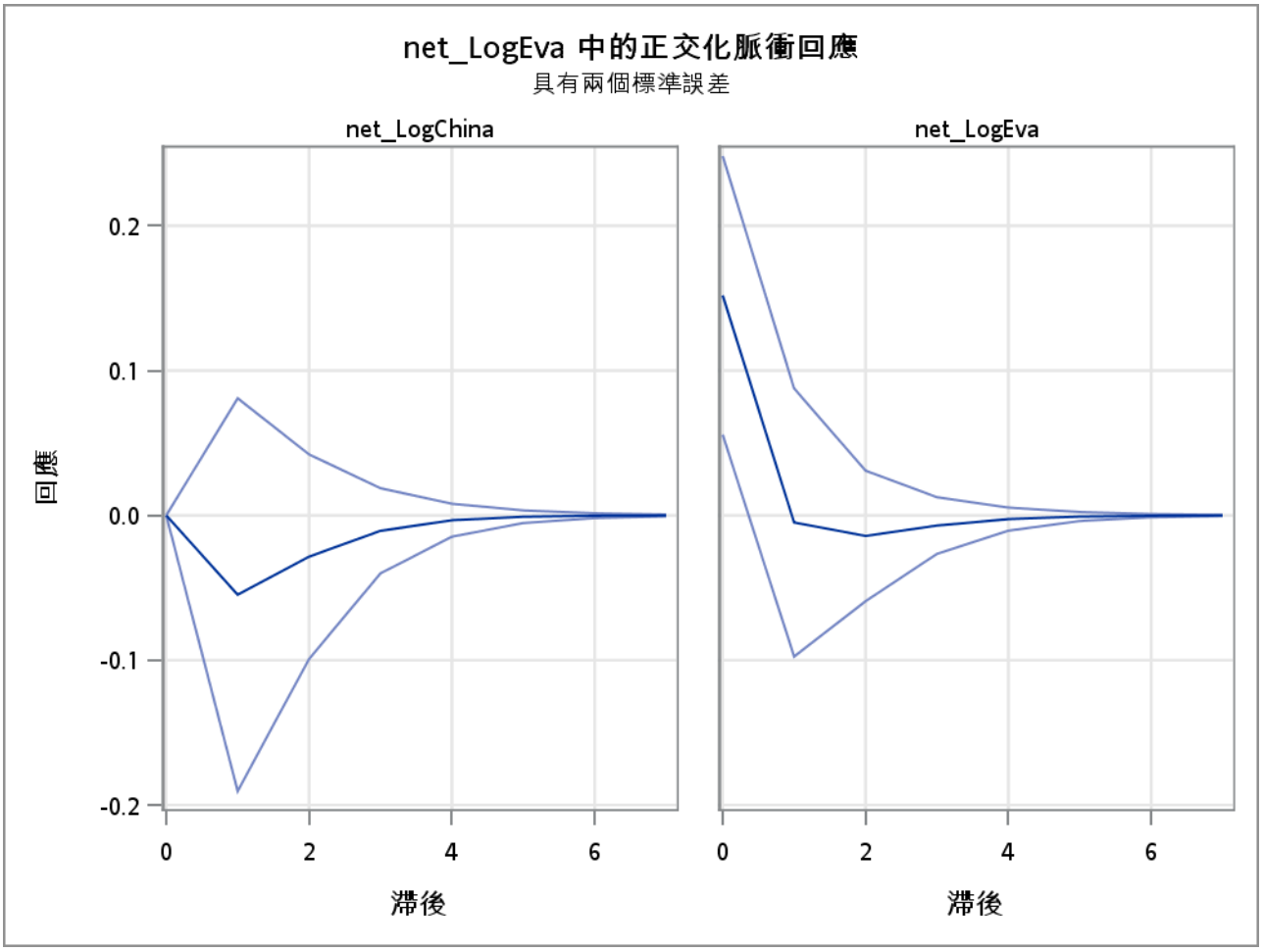

net_LogChina 中的正交化脈衝回應
具有兩個標準誤差
net_LogChina
net_LogEva
回應
滯後
滯後

VARMAX 程序


net_LogEva 中的脈衝回應
具有兩個標準誤差
net_LogChina
net_LogEva
回應
0.5
0.0
-0.5
-1.0
1
2
3
4
5
6
7
滯後


net_LogEva 中的脈衝累積回應
具有兩個標準誤差
net_LogChina
net_LogEva
回應
2
1
0
-1
-2
-3
1
2
3
4
5
6
7
滯後

VARMAX 程序


net_LogEva 中的正交化脈衝回應
具有兩個標準誤差
net_LogChina
net_LogEva
回應
0.2
0.1
0.0
-0.1
-0.2
0
2
4
6
滯後
滯後

Fit Model for Log Income of China

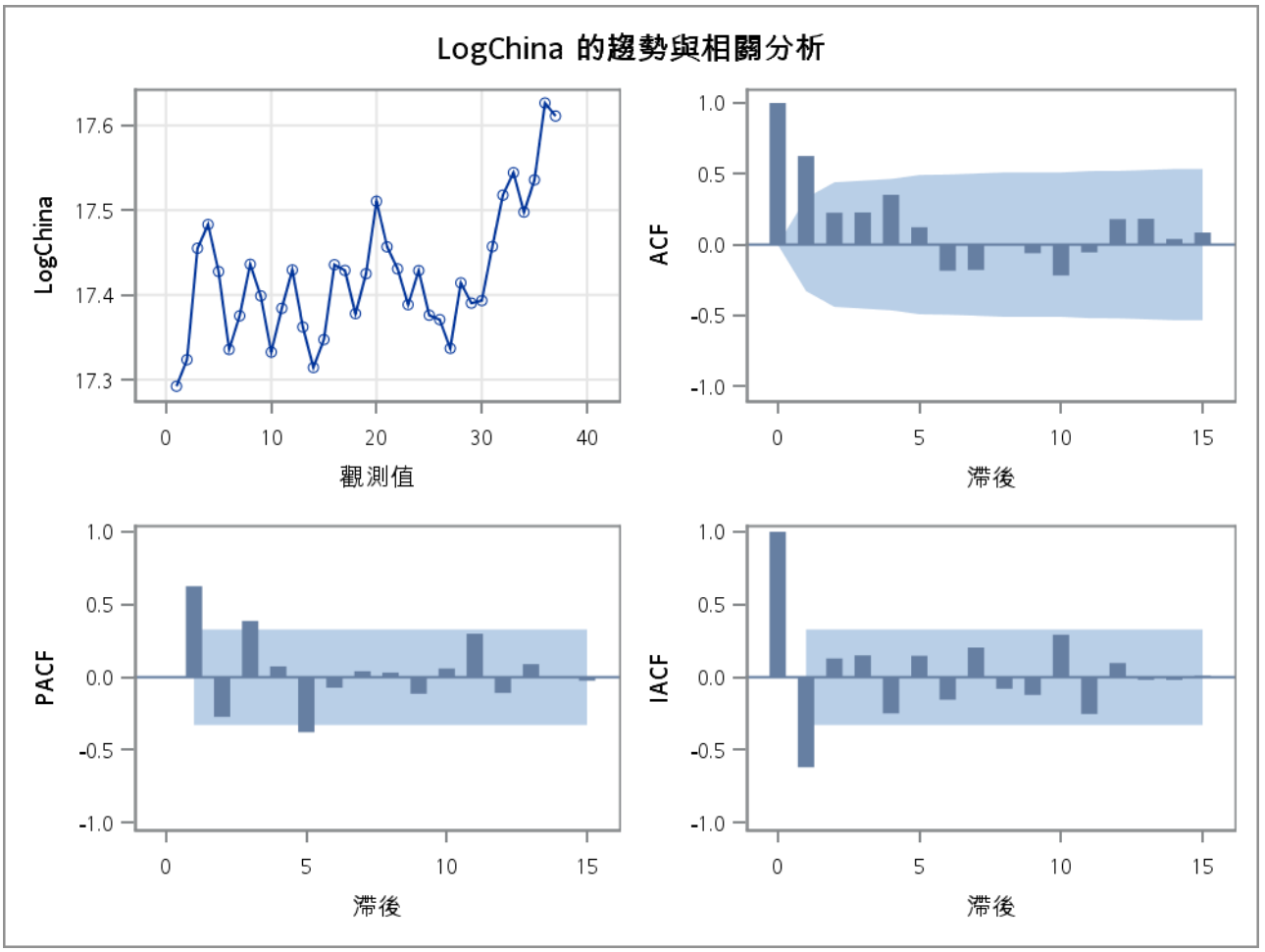
ARIMA 程序

白噪音的自相關檢查									
至滯後	卡方	DF	Pr > ChiSq	自相關					
6	27.60	6	0.0001	0.625	0.225	0.227	0.351	0.123	-0.185
12	33.90	12	0.0007	-0.179	0.002	-0.061	-0.218	-0.055	0.180

擴張的 Dickey-Fuller 單根檢定							
類型	滯後	Rho	Pr < Rho	Tau	Pr < Tau	F	Pr > F
零平均值	0	0.0182	0.6808	0.94	0.9045		
	1	0.0162	0.6802	0.79	0.8788		
	2	0.0105	0.6788	1.03	0.9164		
	3	0.0094	0.6783	1.16	0.9336		
	4	0.0069	0.6775	0.52	0.8221		
單一平均值	0	-8.8976	0.1476	-1.97	0.2986	2.43	0.4687
	1	-17.3512	0.0112	-2.38	0.1541	3.20	0.2815
	2	-0.4801	0.9231	-0.13	0.9379	0.52	0.9442
	3	1.9167	0.9960	0.68	0.9899	0.89	0.8427
	4	-11.1591	0.0748	-0.89	0.7796	0.53	0.9415
趨勢	0	-13.5344	0.1786	-2.60	0.2843	3.42	0.5127
	1	-30.1482	0.0009	-3.24	0.0938	5.35	0.1495
	2	-5.4206	0.7667	-1.11	0.9120	1.63	0.8511
	3	-1.5076	0.9767	-0.42	0.9822	2.22	0.7401
	4	-54.3176	<.0001	-2.26	0.4411	4.98	0.2188

Fit Model for Log Income of China

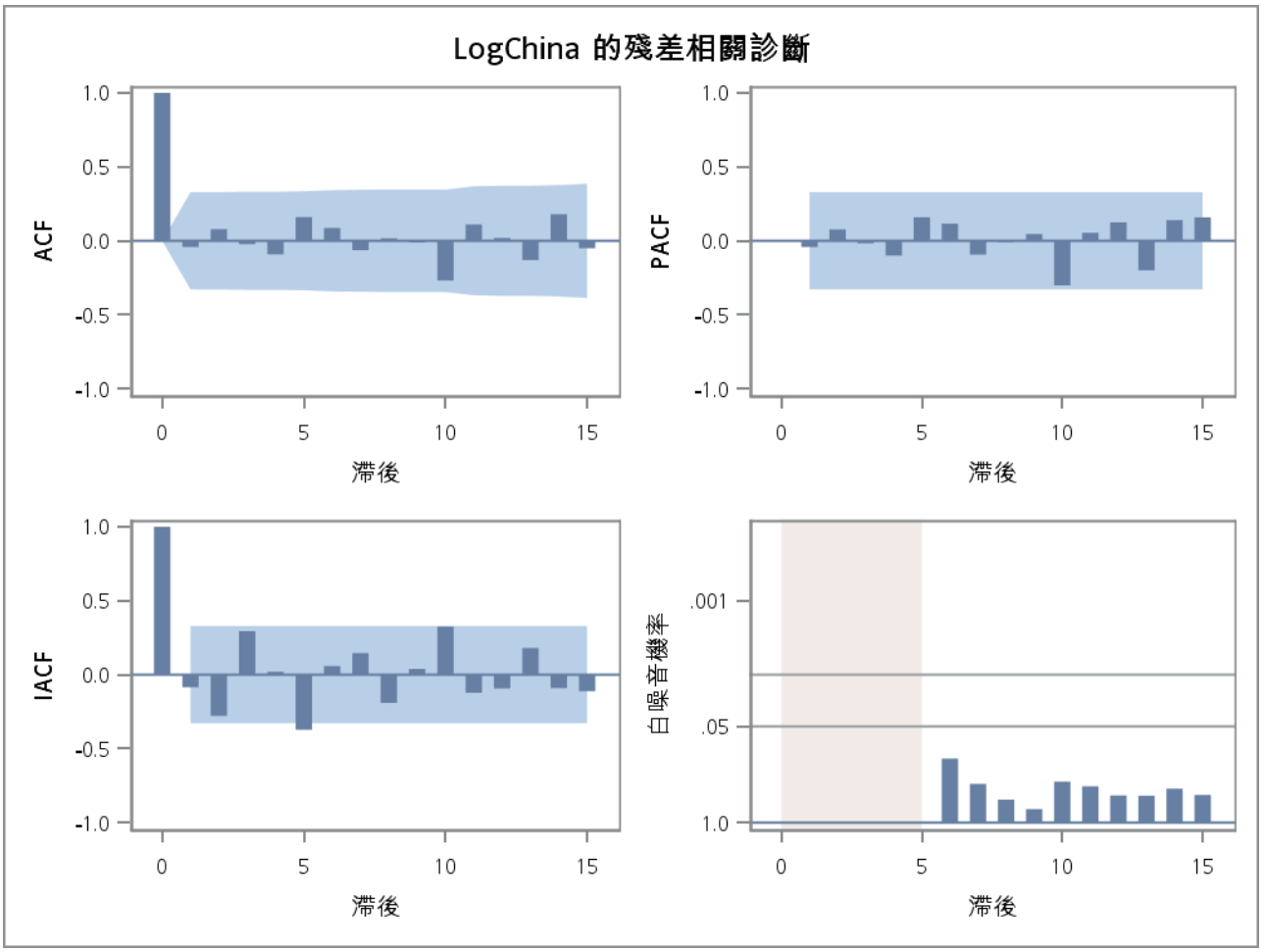
ARIMA 程序



殘差的自相關檢查									
至滯後	卡方	DF	Pr > ChiSq	自相關					
6	2.17	1	0.1409	-0.038	0.081	-0.024	-0.092	0.156	0.086
12	6.97	7	0.4319	-0.065	0.014	-0.012	-0.271	0.108	0.016
18	15.16	13	0.2974	-0.129	0.180	-0.047	0.036	0.201	-0.162
24	17.39	19	0.5633	0.053	-0.042	-0.087	-0.041	-0.015	-0.094

Fit Model for Log Income of China

ARIMA 程序



變數 LogChina 的模型	
估計的平均值	17.41795

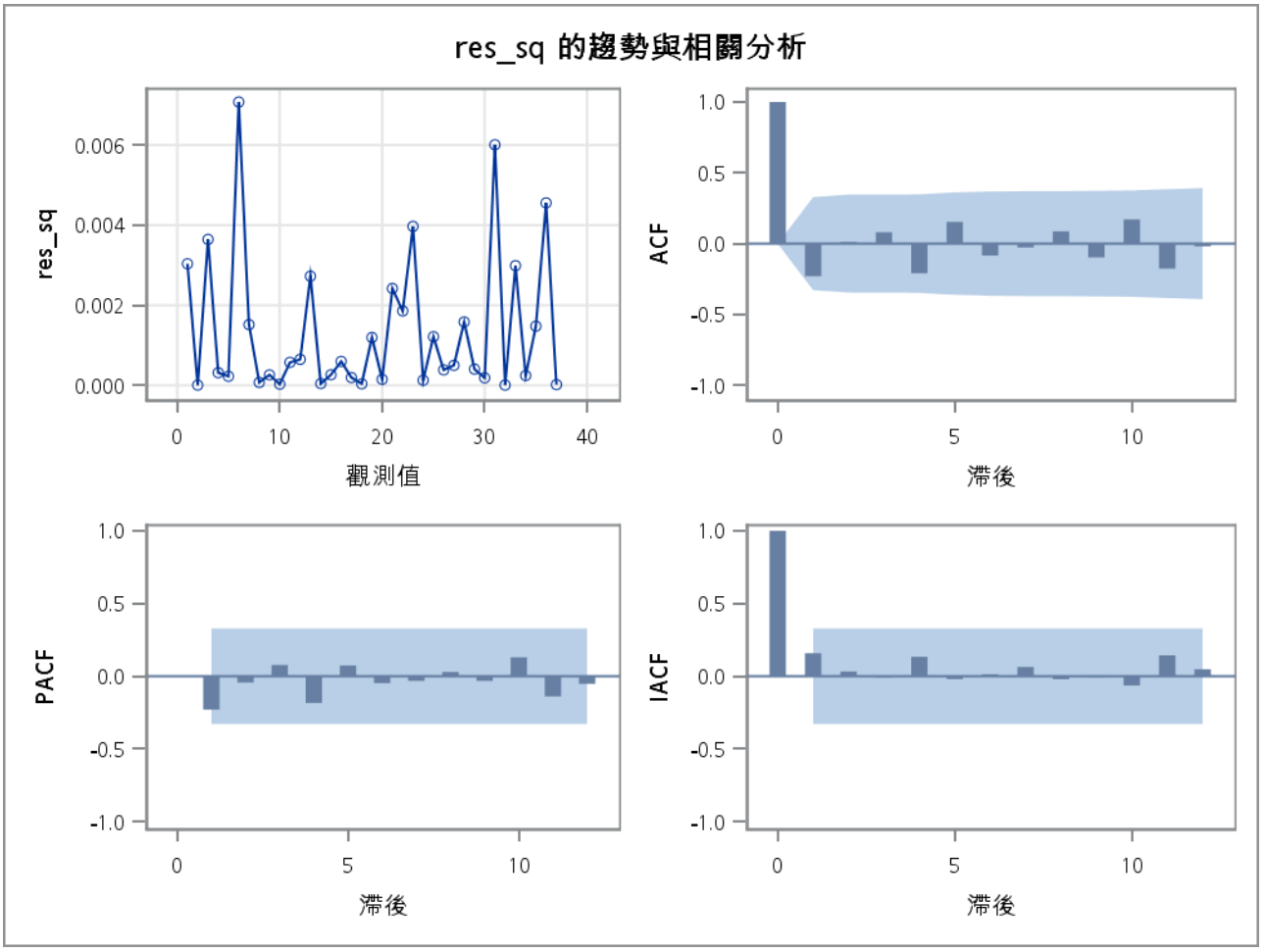
自迴歸因子	
因子 1:	1 - 1.05666 B**(1) + 0.4203 B**(2) - 0.07388 B**(3) - 0.65119 B**(4) + 0.61869 B**(5)

變數的預測 LogChina				
觀測值	預測	標準誤差	95% 信賴界限	
38	17.5169	0.0404	17.4378	17.5960
39	17.4841	0.0587	17.3690	17.5992
40	17.5235	0.0651	17.3958	17.6511
41	17.5057	0.0668	17.3748	17.6365
42	17.4161	0.0746	17.2700	17.5623
43	17.3688	0.0819	17.2084	17.5293
44	17.4011	0.0832	17.2380	17.5641

Fit Model for Log Income of China -- GARCH

ARIMA 程序

白噪音的自相關檢查									
至滯後	卡方	DF	Pr > ChiSq	自相關					
6	5.70	6	0.4581	-0.230	0.012	0.080	-0.209	0.153	-0.084
12	9.90	12	0.6246	-0.027	0.087	-0.097	0.171	-0.176	-0.019



ARIMA 程序

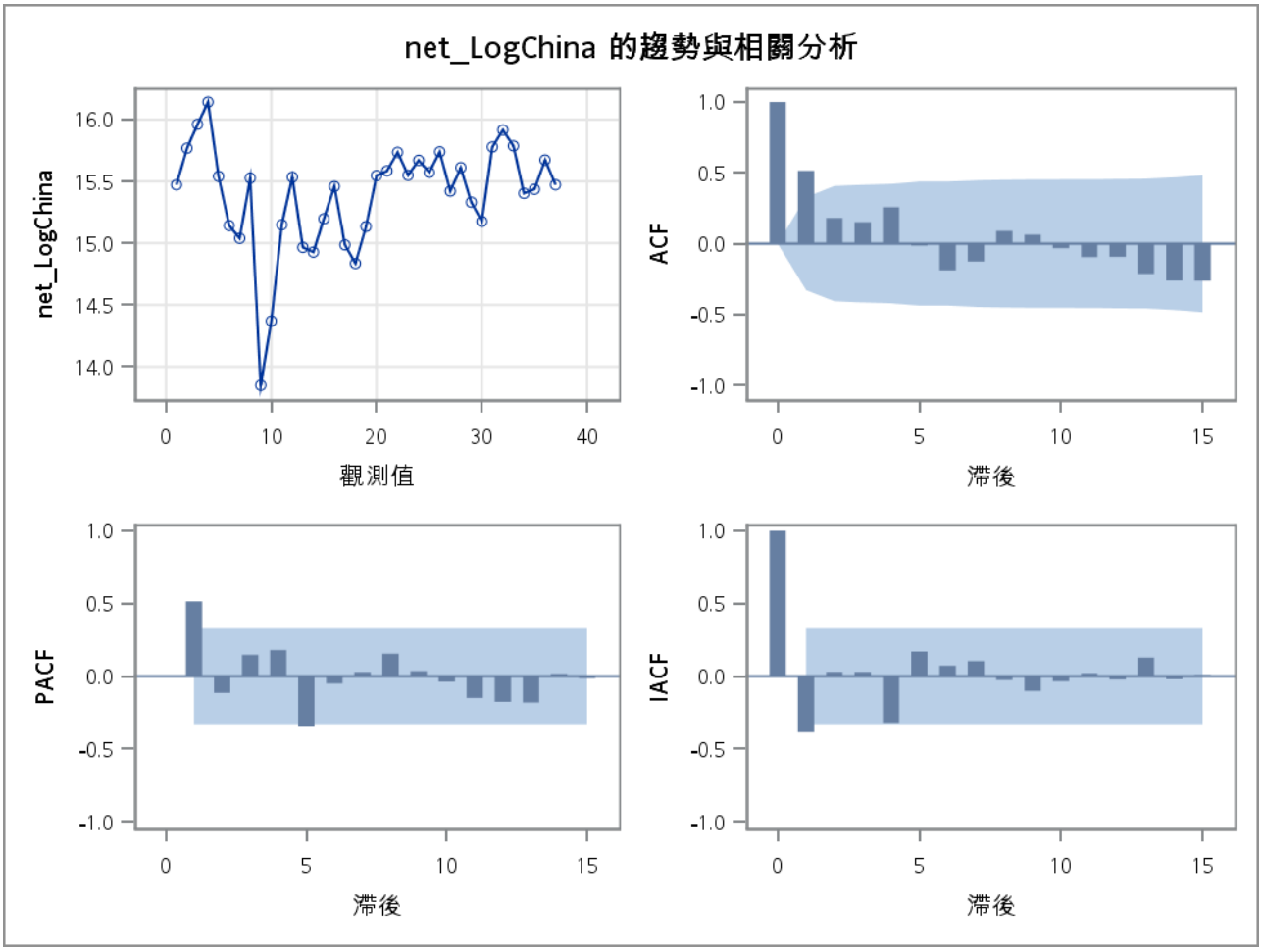
Warning: The value of NLAG is larger than 25% of the series length. The asymptotic approximations used for correlation based statistics and confidence intervals may be poor.

變數名稱 = net_LogChina	
工作序列的平均值	15.38931
標準差	0.43328
觀測值數目	37

白噪音的自相關檢查									
至滯後	卡方	DF	Pr > ChiSq	自相關					
6	17.48	6	0.0077	0.515	0.181	0.151	0.257	-0.014	-0.188
12	19.92	12	0.0687	-0.126	0.090	0.063	-0.033	-0.095	-0.094

擴張的 Dickey-Fuller 單根檢定							
類型	滯後	Rho	Pr < Rho	Tau	Pr < Tau	F	Pr > F
零平均值	0	-0.0142	0.6736	-0.08	0.6487		
	1	-0.0250	0.6710	-0.17	0.6177		
	2	-0.0266	0.6705	-0.26	0.5843		
	3	-0.0317	0.6692	-0.44	0.5136		
	4	-0.0254	0.6703	-0.27	0.5814		
單一平均值	0	-17.4600	0.0110	-3.30	0.0220	5.44	0.0345
	1	-21.4296	0.0027	-3.17	0.0302	5.03	0.0455
	2	-14.8198	0.0250	-2.44	0.1396	2.99	0.3311
	3	-9.8184	0.1117	-2.09	0.2515	2.27	0.5083
	4	-29.9787	0.0002	-2.47	0.1317	3.08	0.3098
趨勢	0	-18.5517	0.0495	-3.40	0.0665	5.80	0.0913
	1	-24.2715	0.0083	-3.42	0.0648	5.94	0.0855
	2	-19.5953	0.0350	-2.90	0.1751	4.46	0.3174
	3	-16.9690	0.0719	-3.08	0.1268	5.58	0.1050
	4	-74.8900	<.0001	-3.79	0.0302	7.53	0.0314

ARIMA 程序



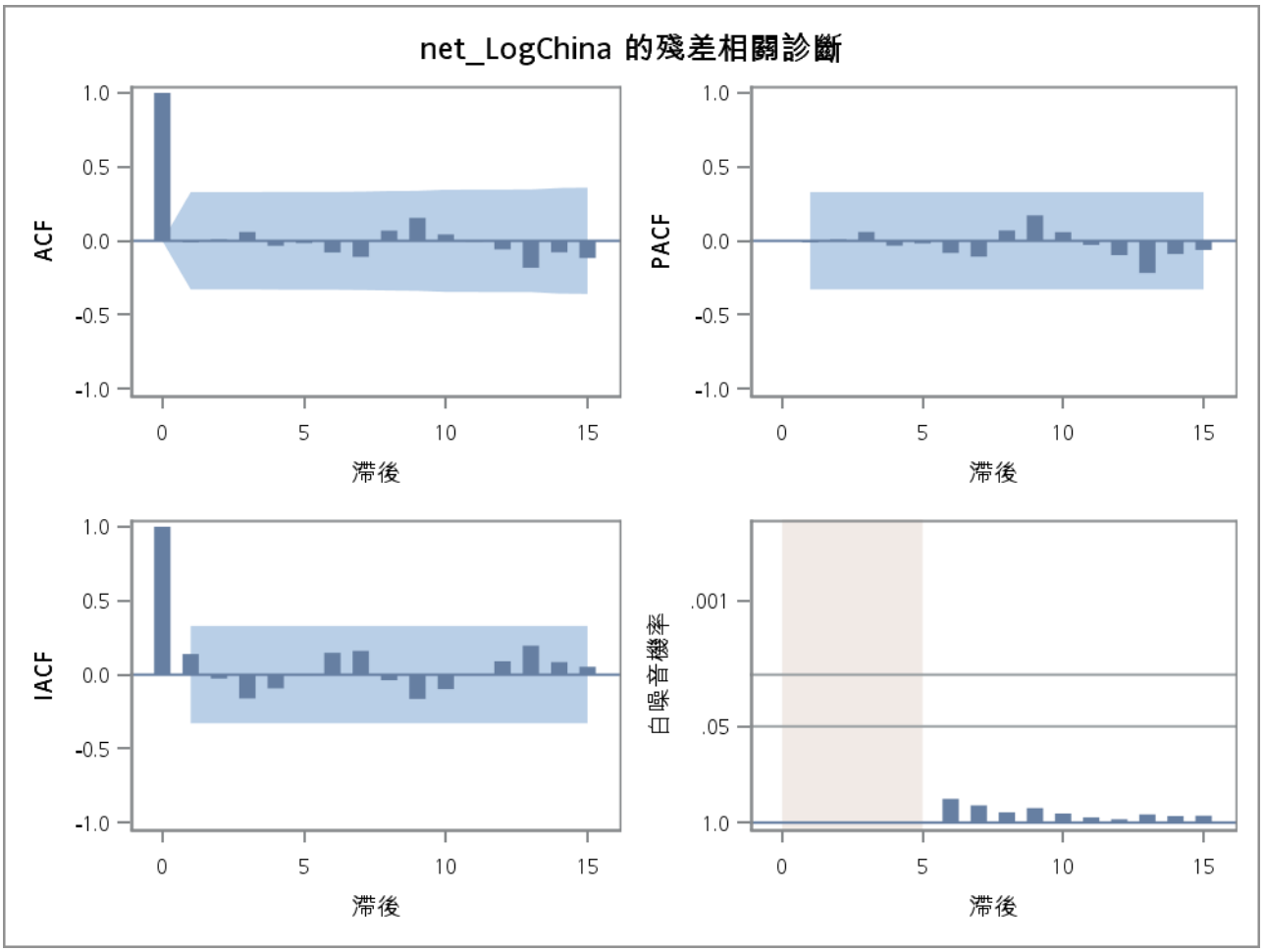
最大概度估計					
參數	估計值	標準誤差	t 值	近似 Pr > |t|	滯後
MU	15.38122	0.11583	132.79	<.0001	0
AR1,1	0.61402	0.16455	3.73	0.0002	1
AR1,2	-0.13850	0.18737	-0.74	0.4598	2
AR1,3	-0.01370	0.18912	-0.07	0.9422	3
AR1,4	0.37004	0.18655	1.98	0.0473	4
AR1,5	-0.34021	0.16808	-2.02	0.0430	5

常數 估計值	7.819042
變異數 估計值	0.133032
標準誤差 估計值	0.364736
AIC	36.95522
SBC	46.62073
殘差數目	37

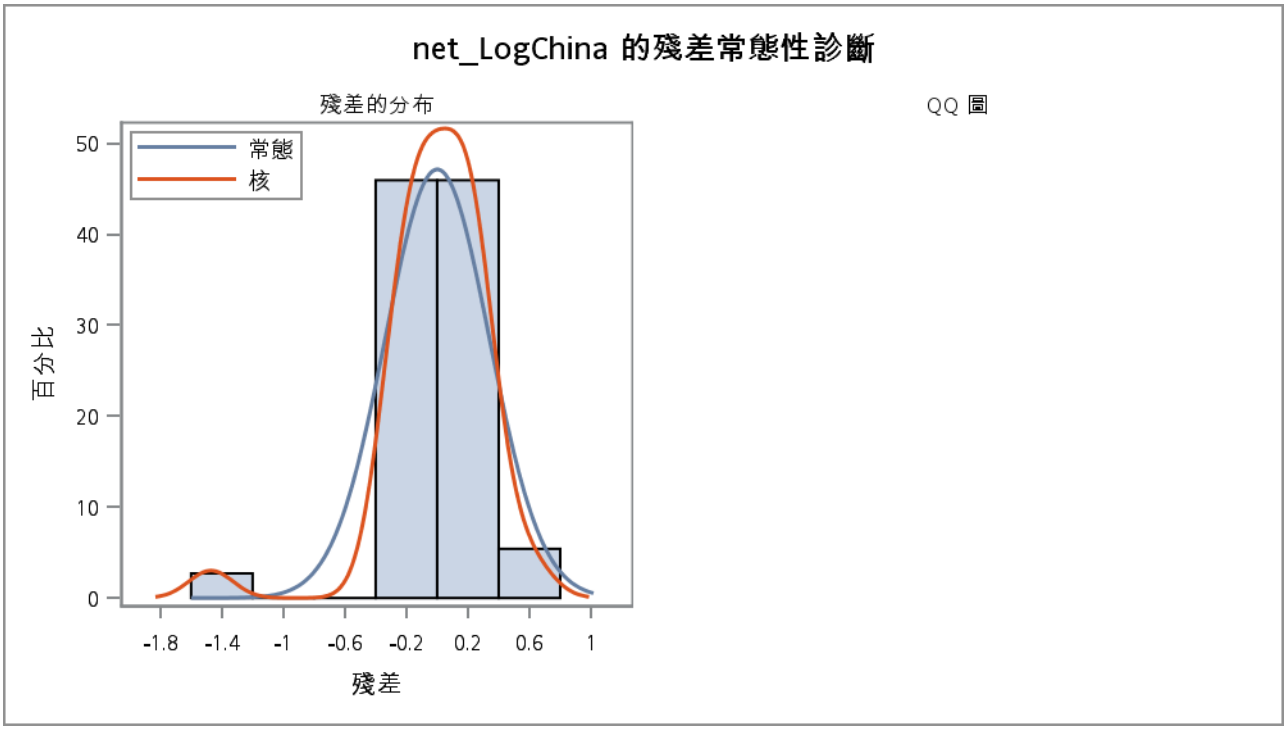
ARIMA 程序

參數估計值的相關						
參數	MU	AR1,1	AR1,2	AR1,3	AR1,4	AR1,5
MU	1.000	-0.014	0.014	0.005	-0.012	0.042
AR1,1	-0.014	1.000	-0.499	0.140	-0.008	-0.204
AR1,2	0.014	-0.499	1.000	-0.504	0.158	-0.016
AR1,3	0.005	0.140	-0.504	1.000	-0.504	0.129
AR1,4	-0.012	-0.008	0.158	-0.504	1.000	-0.499
AR1,5	0.042	-0.204	-0.016	0.129	-0.499	1.000

殘差的自相關檢查									
至滯後	卡方	DF	Pr > ChiSq	自相關					
6	0.51	1	0.4770	-0.009	0.009	0.059	-0.034	-0.015	-0.079
12	2.85	7	0.8989	-0.109	0.069	0.155	0.043	-0.004	-0.058
18	7.73	13	0.8605	-0.183	-0.077	-0.116	-0.071	-0.104	0.081
24	15.08	19	0.7177	-0.106	0.129	0.076	-0.207	0.003	-0.061



ARIMA 程序

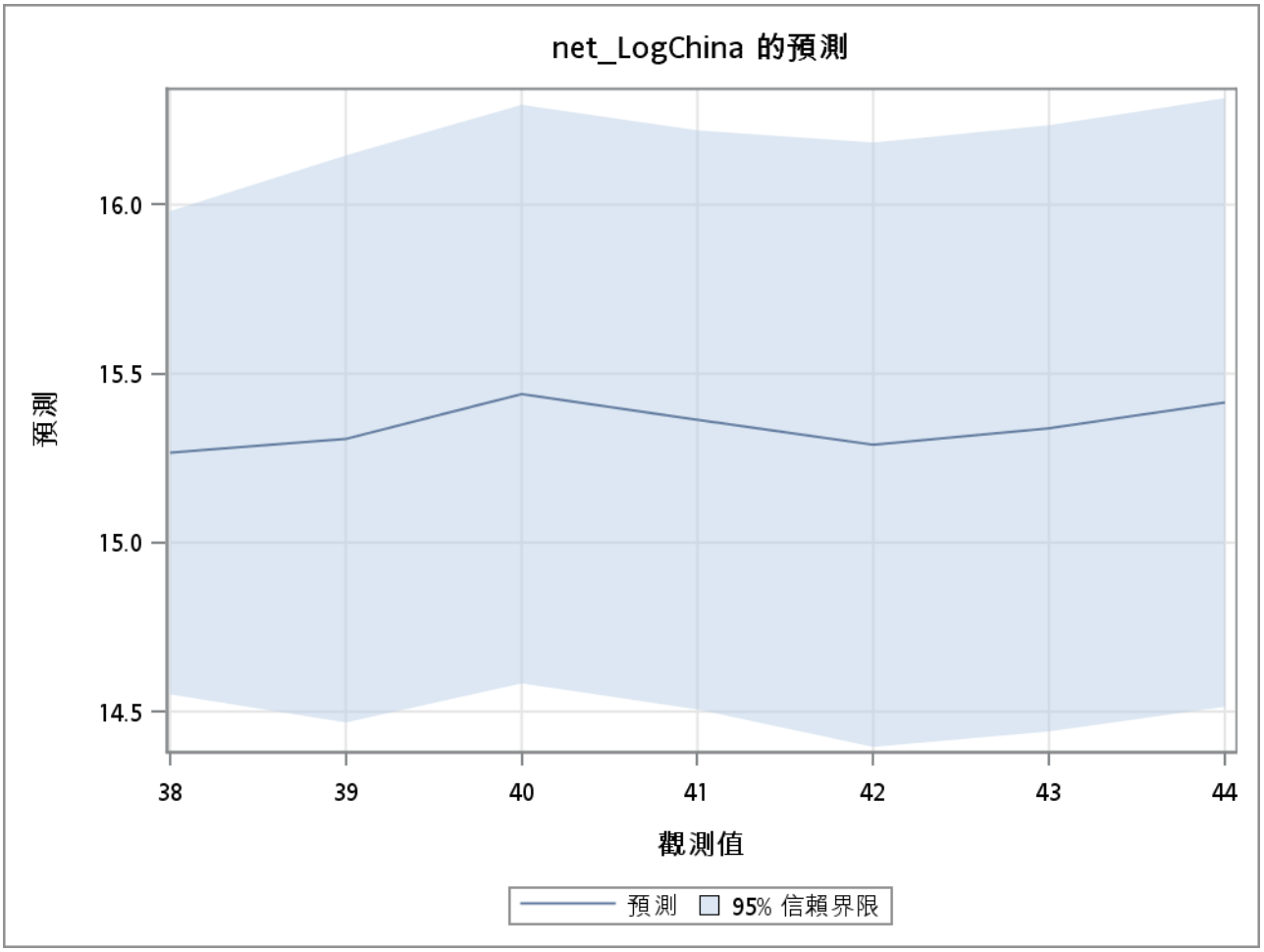


變數 net_LogChina 的模型	
估計的平均值	15.38122

自迴歸因子	
因子 1:	1 - 0.61402 B**(1) + 0.1385 B**(2) + 0.0137 B**(3) - 0.37004 B**(4) + 0.34021 B**(5)

變數的預測 net_LogChina				
觀測值	預測	標準誤差	95% 信賴界限	
38	15.2661	0.3647	14.5513	15.9810
39	15.3069	0.4280	14.4680	16.1457
40	15.4395	0.4368	14.5835	16.2955
41	15.3633	0.4371	14.5066	16.2200
42	15.2896	0.4562	14.3955	16.1836
43	15.3383	0.4575	14.4415	16.2350
44	15.4146	0.4593	14.5143	16.3149

ARIMA 程序


net_LogChina 的預測
16.0
15.5
15.0
14.5
預測
38
39
40
41
42
43
44
觀測值
預測
95% 信賴界限

Fit Model for Log Income of EVA

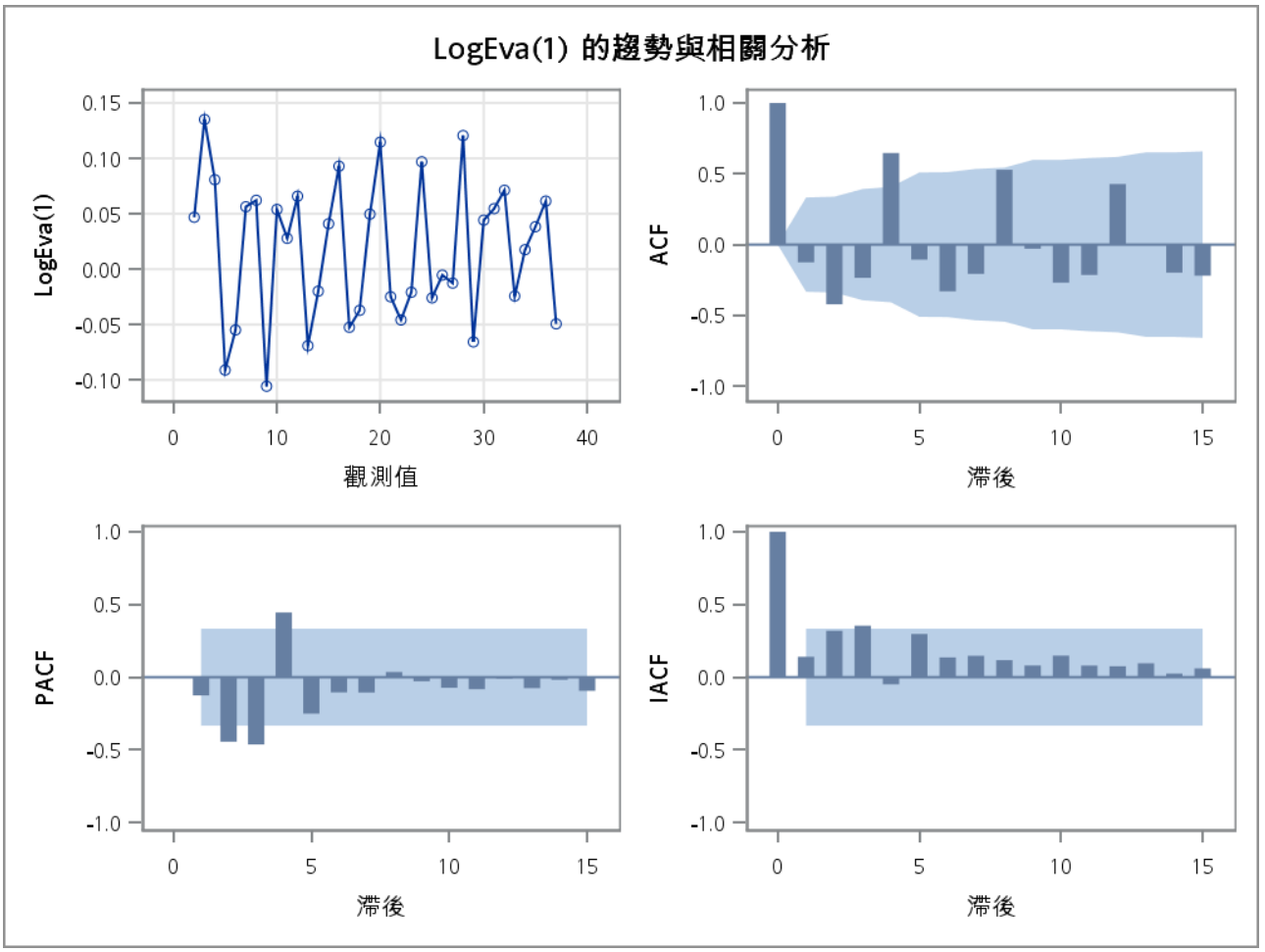
ARIMA 程序

白噪音的自相關檢查									
至滯後	卡方	DF	Pr > ChiSq	自相關					
6	33.35	6	<.0001	-0.125	-0.421	-0.234	0.647	-0.106	-0.330
12	65.77	12	<.0001	-0.206	0.528	-0.029	-0.268	-0.214	0.428

擴張的 Dickey-Fuller 單根檢定							
類型	滯後	Rho	Pr < Rho	Tau	Pr < Tau	F	Pr > F
零平均值	0	-36.4629	<.0001	-6.07	<.0001		
	1	-76.0005	<.0001	-6.54	<.0001		
	2	1476.248	0.9999	-6.76	<.0001		
	3	-10.4945	0.0186	-2.15	0.0321		
	4	-5.1679	0.1092	-1.31	0.1719		
單一平均值	0	-39.5110	0.0002	-6.45	0.0002	20.83	0.0010
	1	-105.597	0.0001	-7.44	0.0002	27.83	0.0010
	2	120.1468	0.9999	-10.25	0.0002	52.82	0.0010
	3	-56.3504	0.0002	-3.23	0.0270	5.28	0.0388
	4	-46.0108	0.0002	-2.47	0.1325	3.05	0.3178
趨勢	0	-39.5151	<.0001	-6.35	0.0001	20.17	0.0010
	1	-106.060	0.0001	-7.40	0.0001	27.51	0.0010
	2	115.2666	0.9999	-11.52	0.0001	66.81	0.0010
	3	-8201.15	0.0001	-4.53	0.0055	10.48	0.0010
	4	107.7448	0.9999	-3.52	0.0542	6.21	0.0731

Fit Model for Log Income of EVA

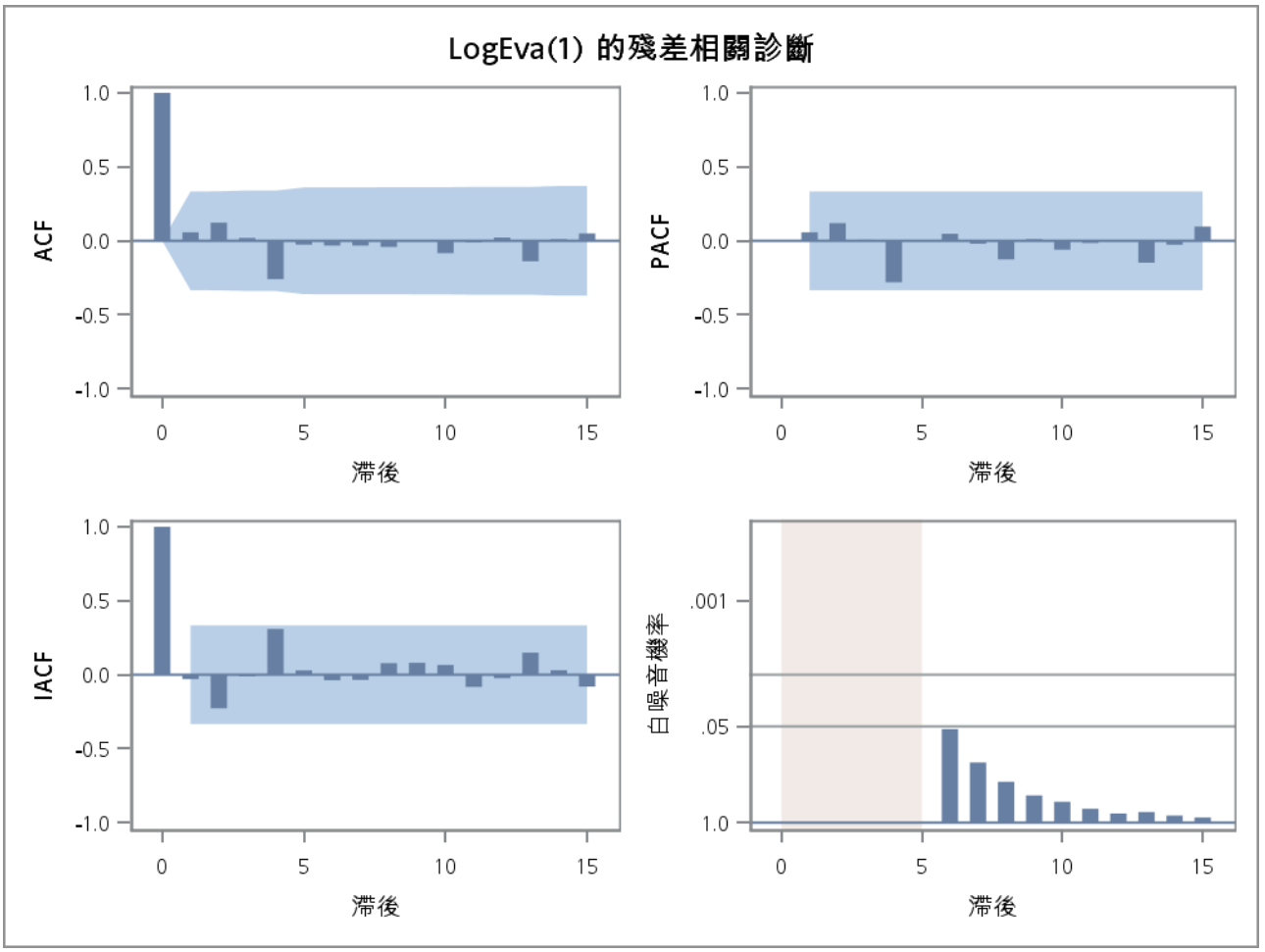
ARIMA 程序



殘差的自相關檢查									
至滯後	卡方	DF	Pr > ChiSq	自相關					
6	3.82	1	0.0508	0.060	0.122	0.016	-0.264	-0.031	-0.035
12	4.40	7	0.7331	-0.036	-0.045	-0.002	-0.087	-0.013	0.018
18	7.69	13	0.8633	-0.138	0.011	0.051	0.099	-0.015	0.130
24	20.36	19	0.3733	-0.243	-0.019	-0.059	-0.228	0.063	-0.135

Fit Model for Log Income of EVA

ARIMA 程序



變數 LogEva 的模型	
估計的平均值	0.015896
差分的週期	1

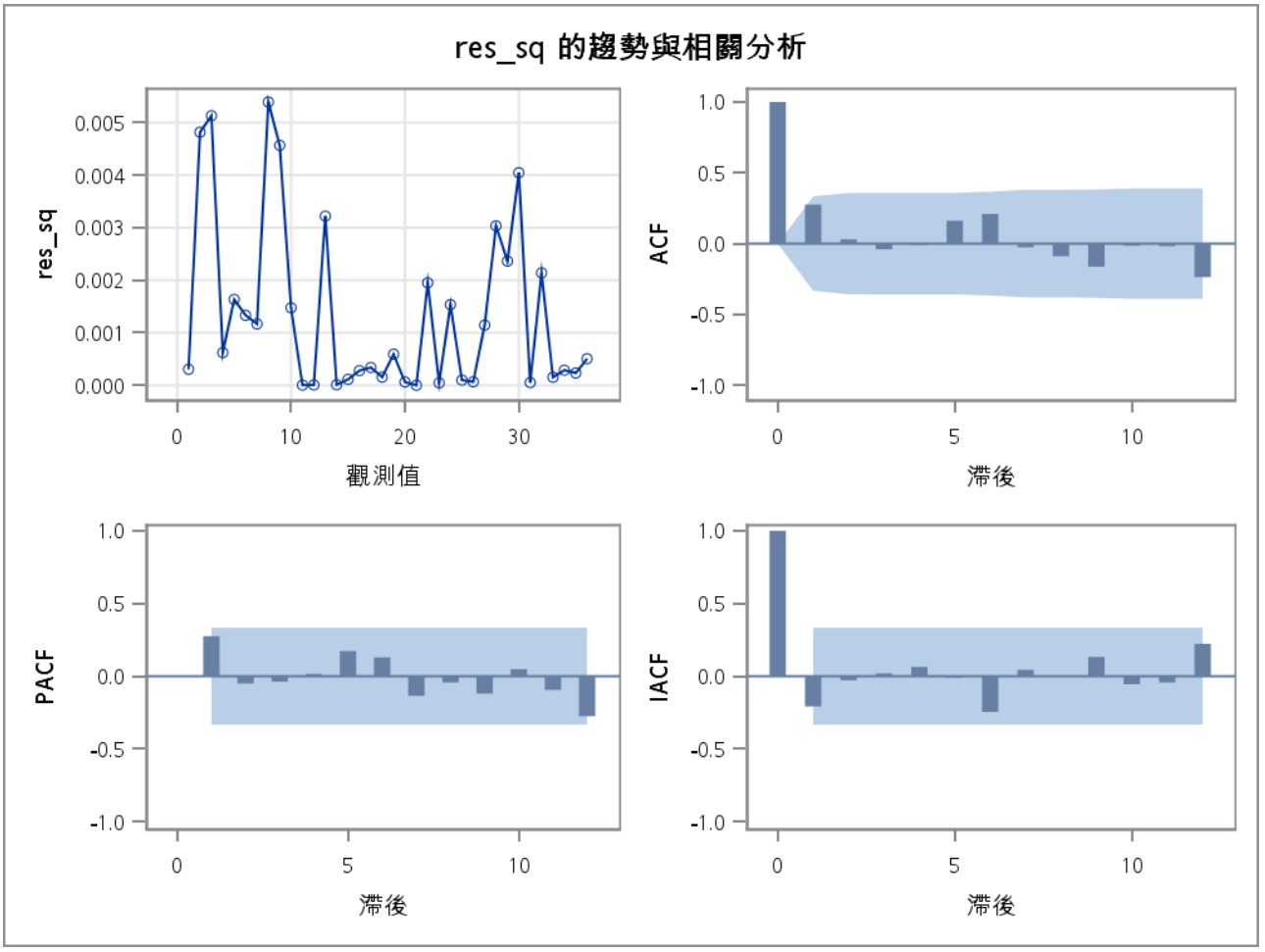
自迴歸因子	
因子 1:	1 + 0.19447 B**(1) + 0.42914 B**(2) + 0.43218 B**(3) - 0.41328 B**(4) + 0.1258 B**(5)

變數的預測 LogEva				
觀測值	預測	標準誤差	95% 信賴界限	
38	17.6294	0.0404	17.5503	17.7085
39	17.6648	0.0518	17.5632	17.7664
40	17.7257	0.0545	17.6190	17.8325
41	17.6965	0.0548	17.5891	17.8038
42	17.6971	0.0648	17.5700	17.8242
43	17.7253	0.0724	17.5833	17.8673
44	17.7811	0.0750	17.6340	17.9281

Fit Model for Log Income of EVA

ARIMA 程序

白噪音的自相關檢查									
至滯後	卡方	DF	Pr > ChiSq	自相關					
6	6.23	6	0.3981	0.276	0.030	-0.040	-0.008	0.161	0.210
12	11.18	12	0.5133	-0.026	-0.089	-0.162	-0.015	-0.018	-0.236

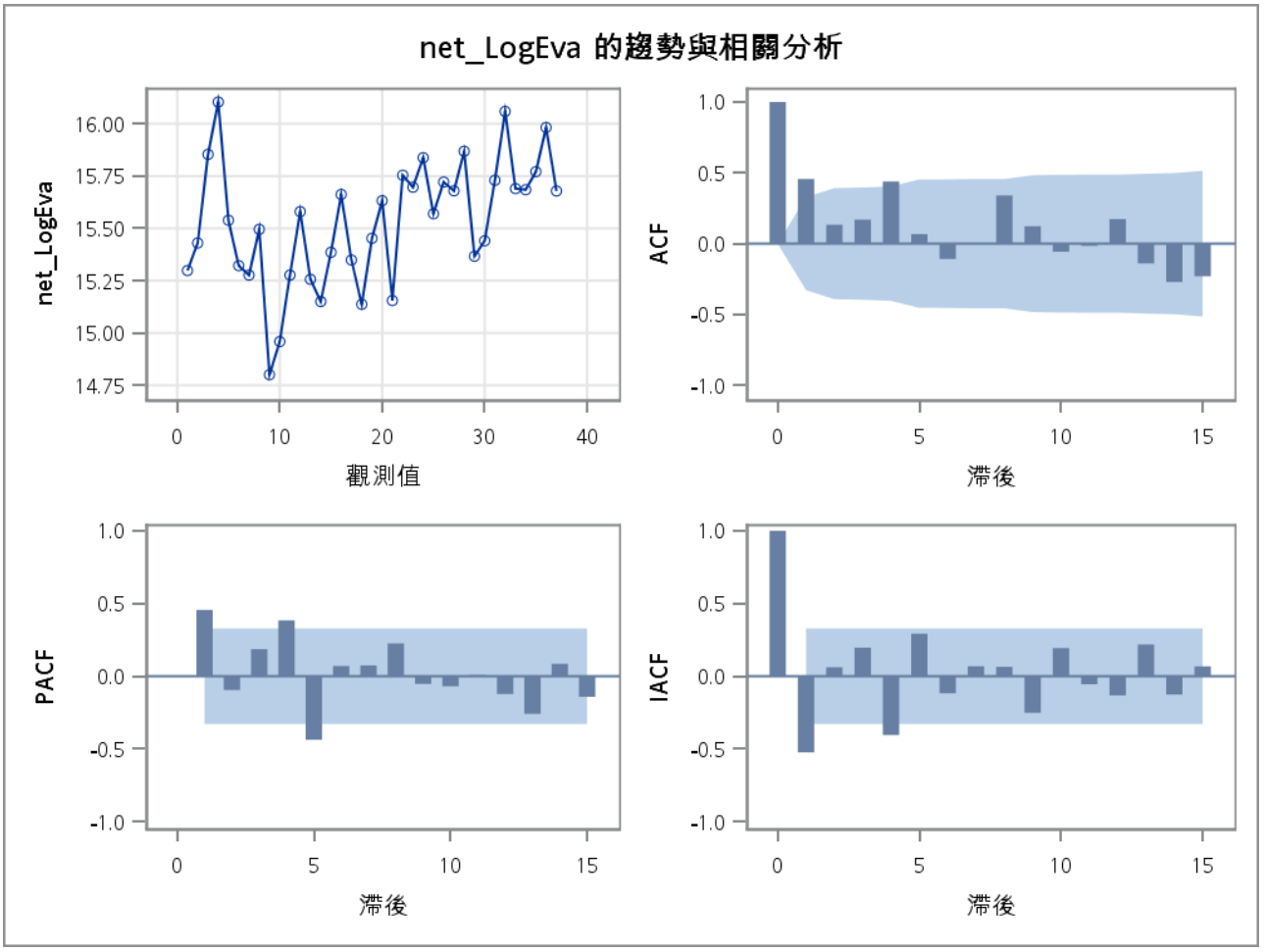


ARIMA 程序

白噪音的自相關檢查									
至滯後	卡方	DF	Pr > ChiSq	自相關					
6	19.43	6	0.0035	0.456	0.133	0.169	0.438	0.067	-0.108
12	27.88	12	0.0058	-0.000	0.340	0.123	-0.057	-0.016	0.173

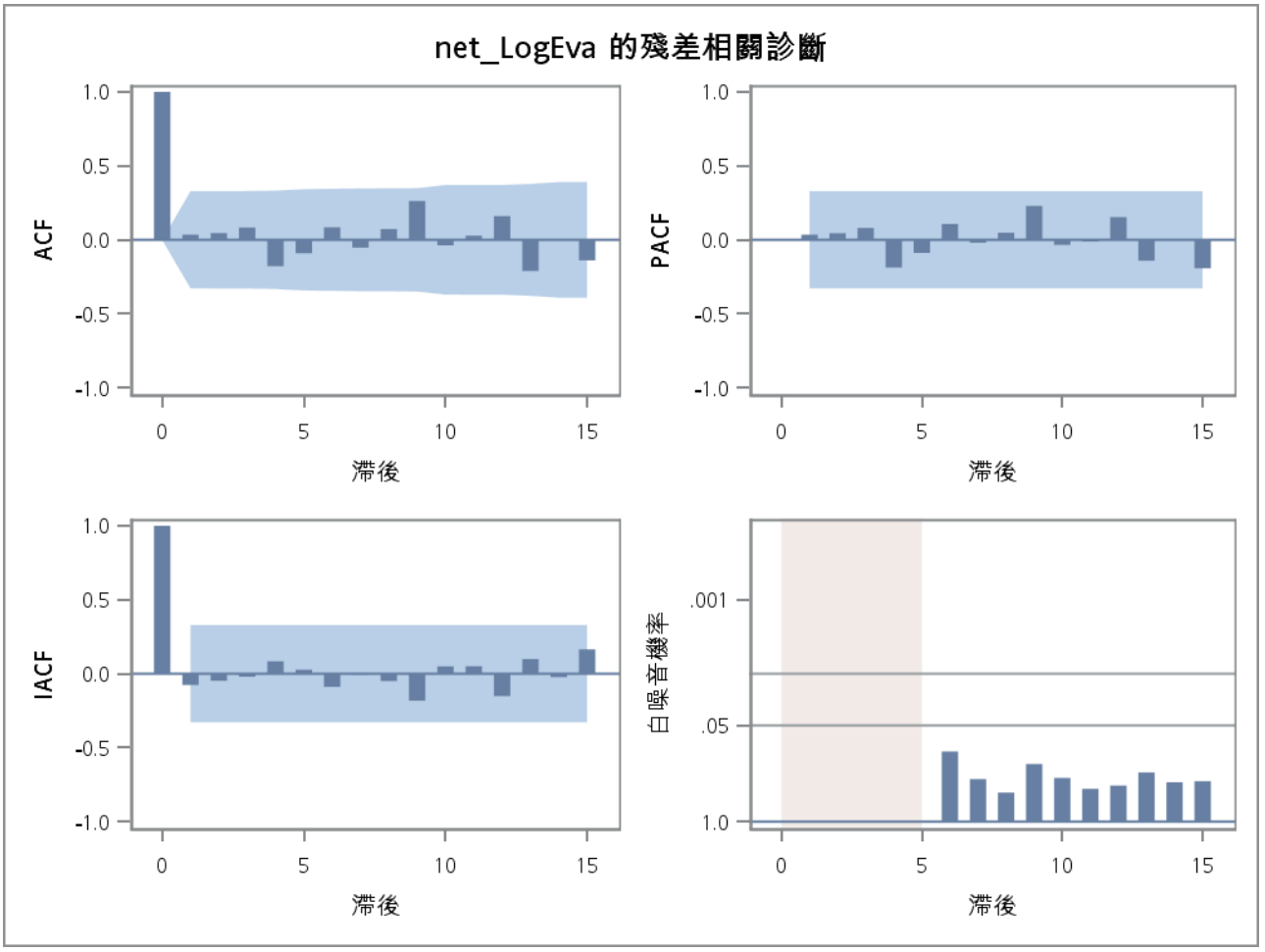
擴張的 Dickey-Fuller 單根檢定							
類型	滯後	Rho	Pr < Rho	Tau	Pr < Tau	F	Pr > F
零平均值	0	0.0174	0.6807	0.15	0.7224		
	1	0.0167	0.6803	0.17	0.7299		
	2	0.0049	0.6775	0.08	0.7005		
	3	0.0001	0.6762	0.00	0.6771		
	4	-0.0011	0.6757	-0.02	0.6688		
單一平均值	0	-19.4472	0.0056	-3.57	0.0112	6.40	0.0135
	1	-22.6604	0.0017	-3.17	0.0301	5.06	0.0448
	2	-12.6372	0.0492	-2.10	0.2445	2.22	0.5197
	3	-3.5330	0.5730	-1.15	0.6847	0.66	0.9003
	4	-15.5271	0.0192	-1.89	0.3351	1.78	0.6275
趨勢	0	-23.5619	0.0110	-4.00	0.0176	8.01	0.0217
	1	-32.1063	0.0004	-3.76	0.0311	7.08	0.0419
	2	-25.0214	0.0061	-3.02	0.1430	4.78	0.2567
	3	-12.2165	0.2346	-2.92	0.1699	5.95	0.0846
	4	-73.8289	<.0001	-4.47	0.0063	11.04	0.0010

ARIMA 程序



殘差的自相關檢查									
至滯後	卡方	DF	Pr > ChiSq	自相關					
6	2.53	1	0.1120	0.035	0.046	0.083	-0.179	-0.091	0.084
12	8.09	7	0.3247	-0.053	0.072	0.263	-0.037	0.028	0.160
18	14.10	13	0.3670	-0.211	0.000	-0.139	-0.114	-0.127	-0.014
24	16.10	19	0.6505	0.007	0.088	-0.008	-0.035	-0.088	-0.061

ARIMA 程序



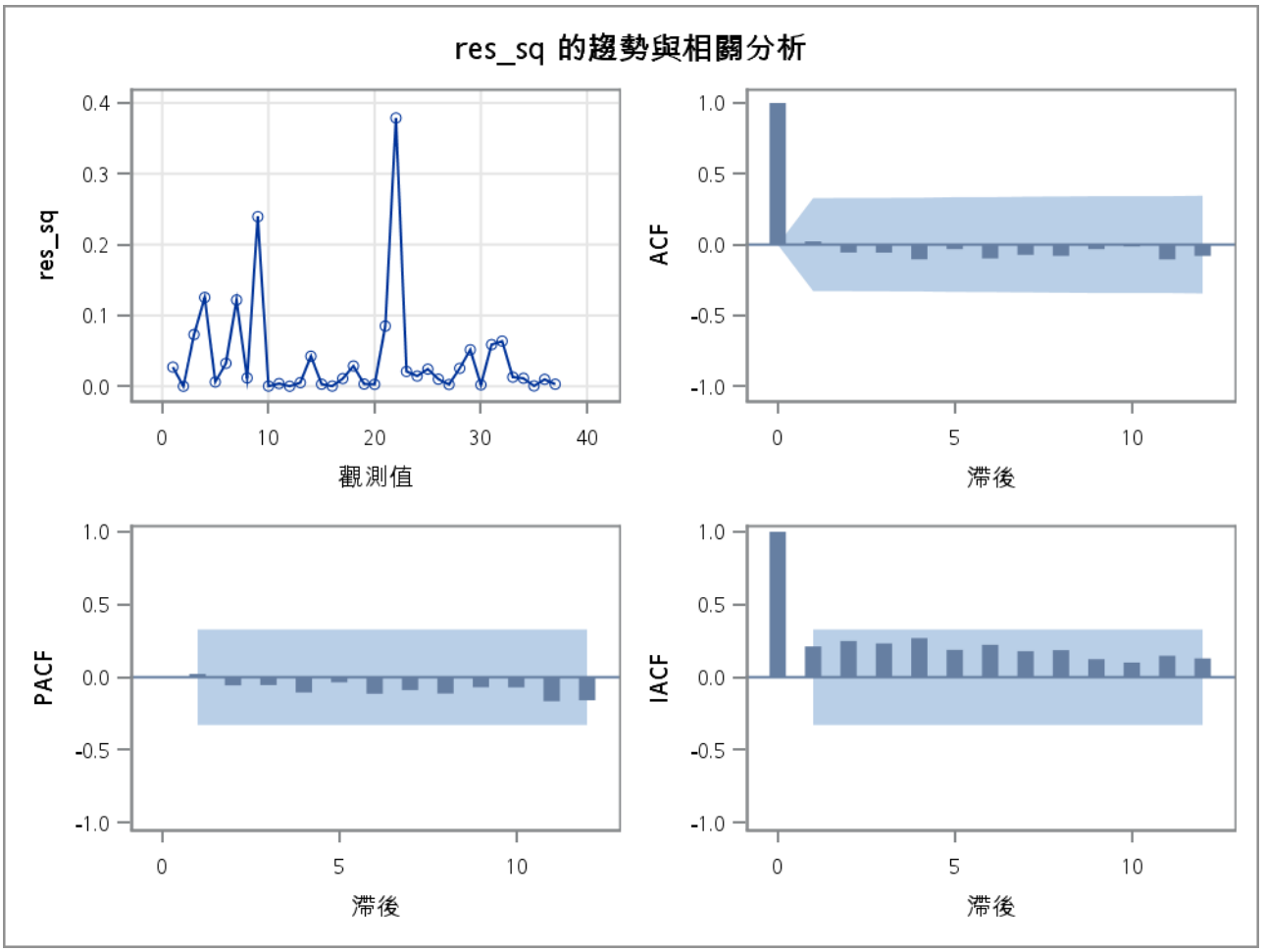
變數 net_LogEva 的模型	
估計的平均值	15.53381

自迴歸因子	
因子 1:	1 - 0.60552 B**(1) + 0.11896 B**(2) + 0.03796 B**(3) - 0.60975 B**(4) + 0.45953 B**(5)

變數的預測 net_LogEva				
觀測值	預測	標準誤差	95% 信賴界限	
38	15.5793	0.2209	15.1465	16.0122
39	15.6025	0.2582	15.0965	16.1085
40	15.7291	0.2639	15.2119	16.2464
41	15.5243	0.2641	15.0068	16.0419
42	15.4634	0.2936	14.8878	16.0389
43	15.5058	0.2987	14.9204	16.0912
44	15.6131	0.2989	15.0274	16.1989

ARIMA 程序

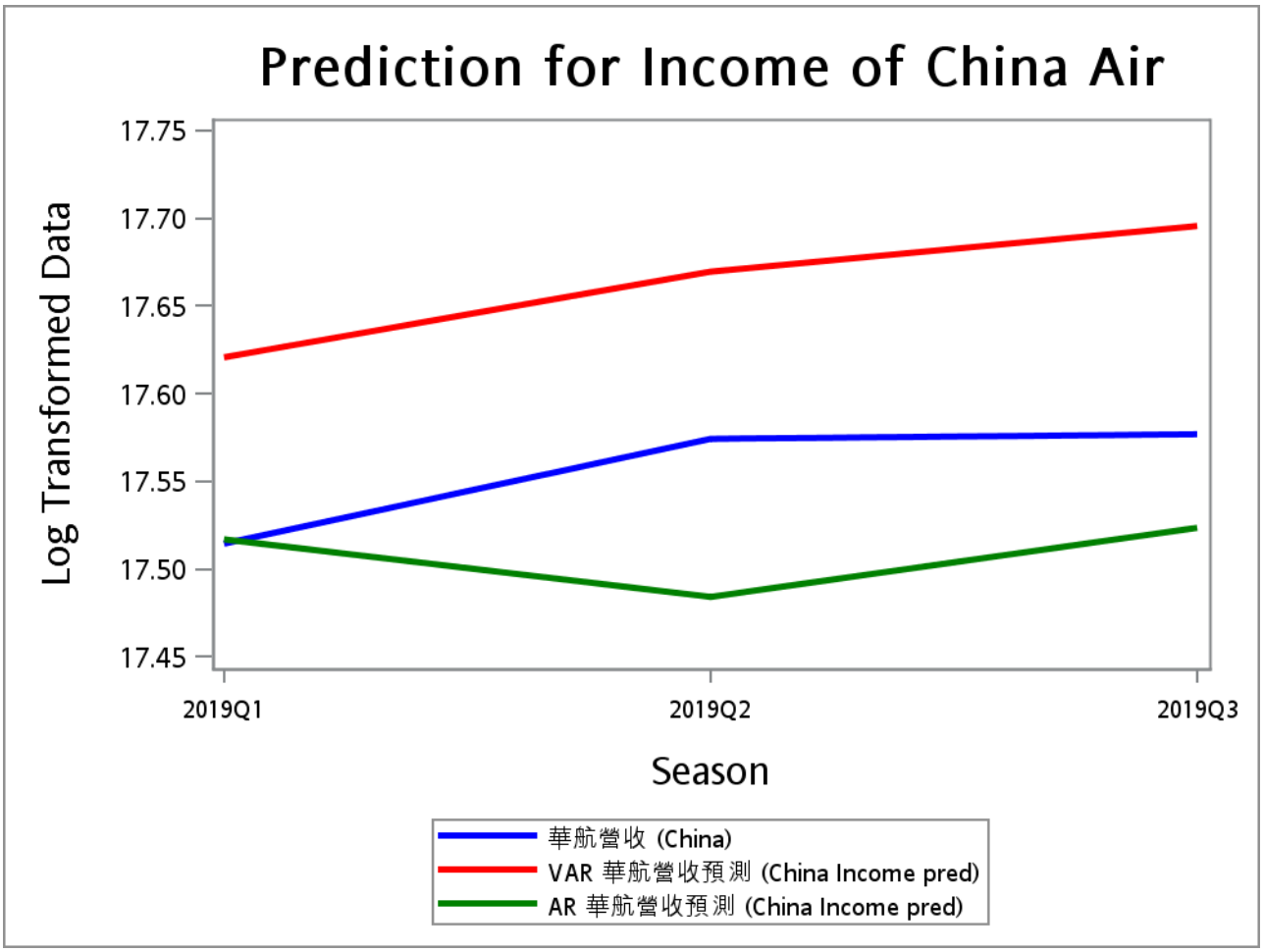
白噪音的自相關檢查									
至滯後	卡方	DF	Pr > ChiSq	自相關					
6	1.25	6	0.9746	0.023	-0.056	-0.057	-0.104	-0.032	-0.097
12	2.84	12	0.9966	-0.072	-0.079	-0.032	-0.014	-0.104	-0.080

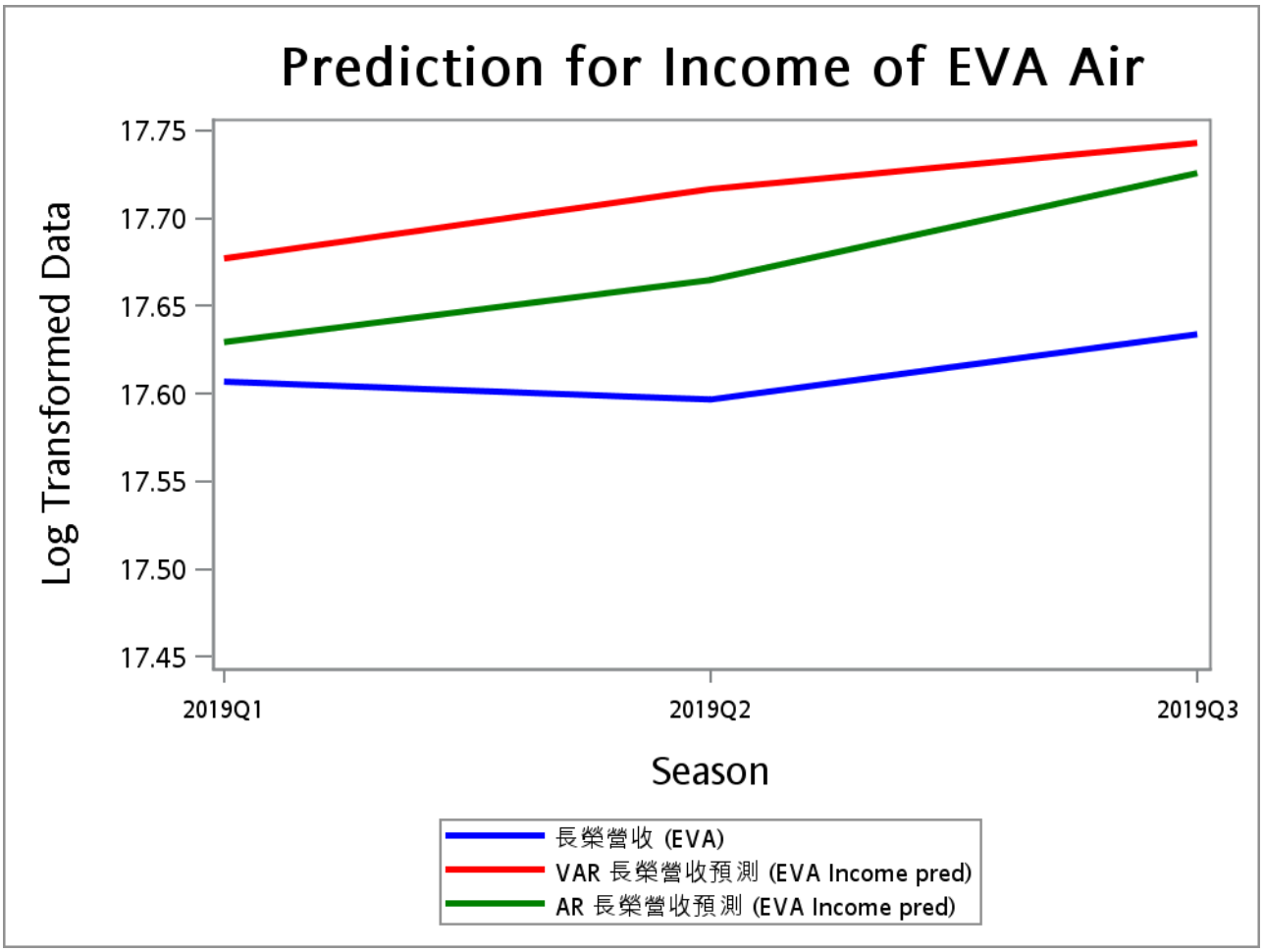


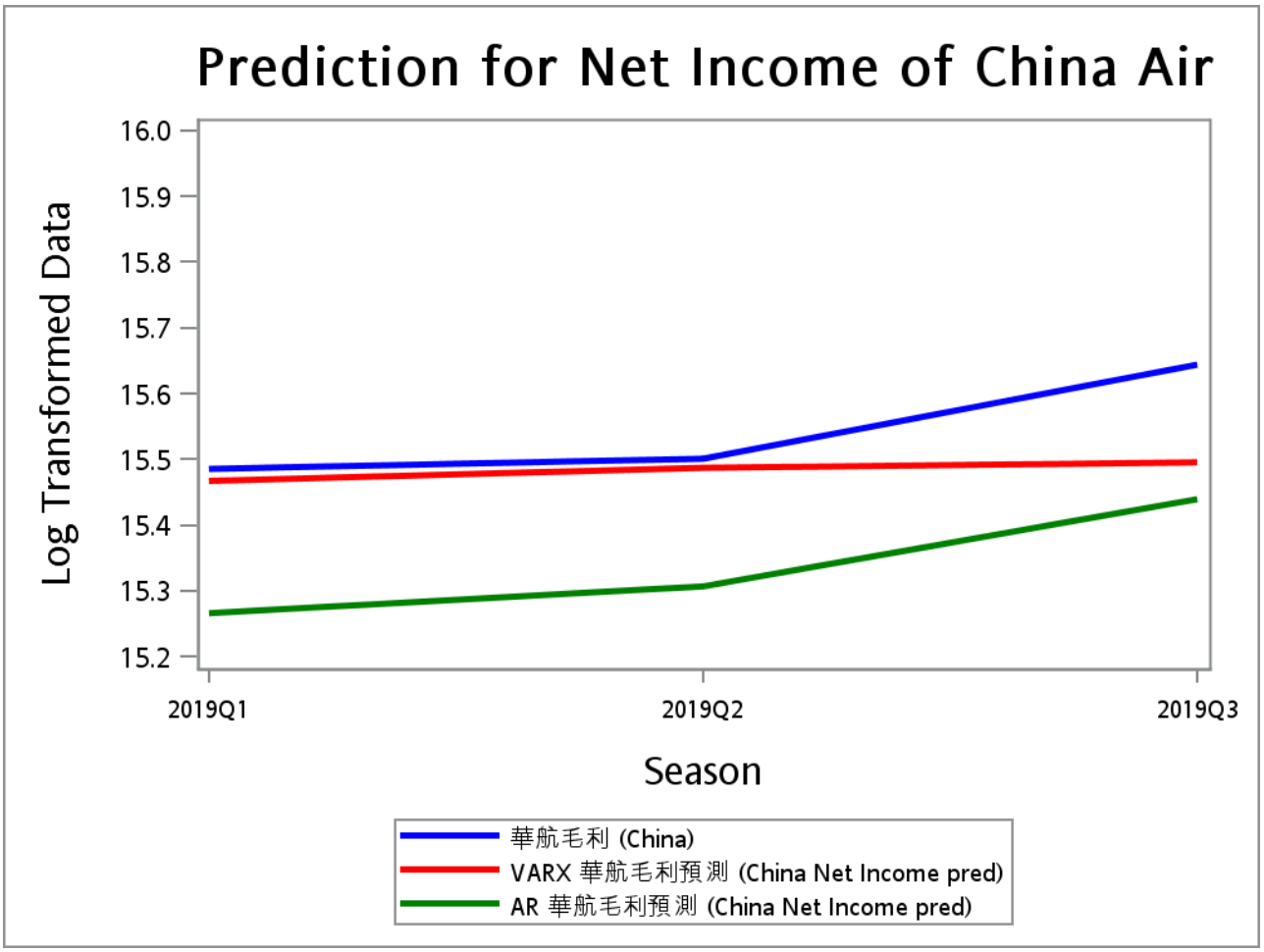
Obs	VAR 華航營收預測 (China Income pred)	VAR 長榮營收預測 (EVA Income pred)	VARX 華航毛利預測 (China Net Income pred)	VARX 長榮毛利預測 (EVA Net Income pred)	AR 華航營收預測 (China Income pred)	AR 長榮營收預測 (EVA Income pred)	AR 華航毛利預測 (China Net Income pred)	AR 長榮毛利預測 (EVA Net Income pred)	season
1	17.6207	17.6770	15.4672	15.6072	17.5169	17.6294	15.2661	15.5793	2019Q1
2	17.6696	17.7166	15.4871	15.6063	17.4841	17.6648	15.3069	15.6025	2019Q2
3	17.6956	17.7429	15.4954	15.6097	17.5235	17.7257	15.4395	15.7291	2019Q3
4	17.6755	17.7123	15.4960	15.6102	17.5057	17.6965	15.3633	15.5243	2019Q4
5	17.6926	17.7515	15.4936	15.6088	17.4161	17.6971	15.2896	15.4634	2020Q1
6	17.7285	17.7804	15.4903	15.6067	17.3688	17.7253	15.3383	15.5058	2020Q2
7	17.7499	17.8030	15.4869	15.6046	17.4011	17.7811	15.4146	15.6131	2019Q3

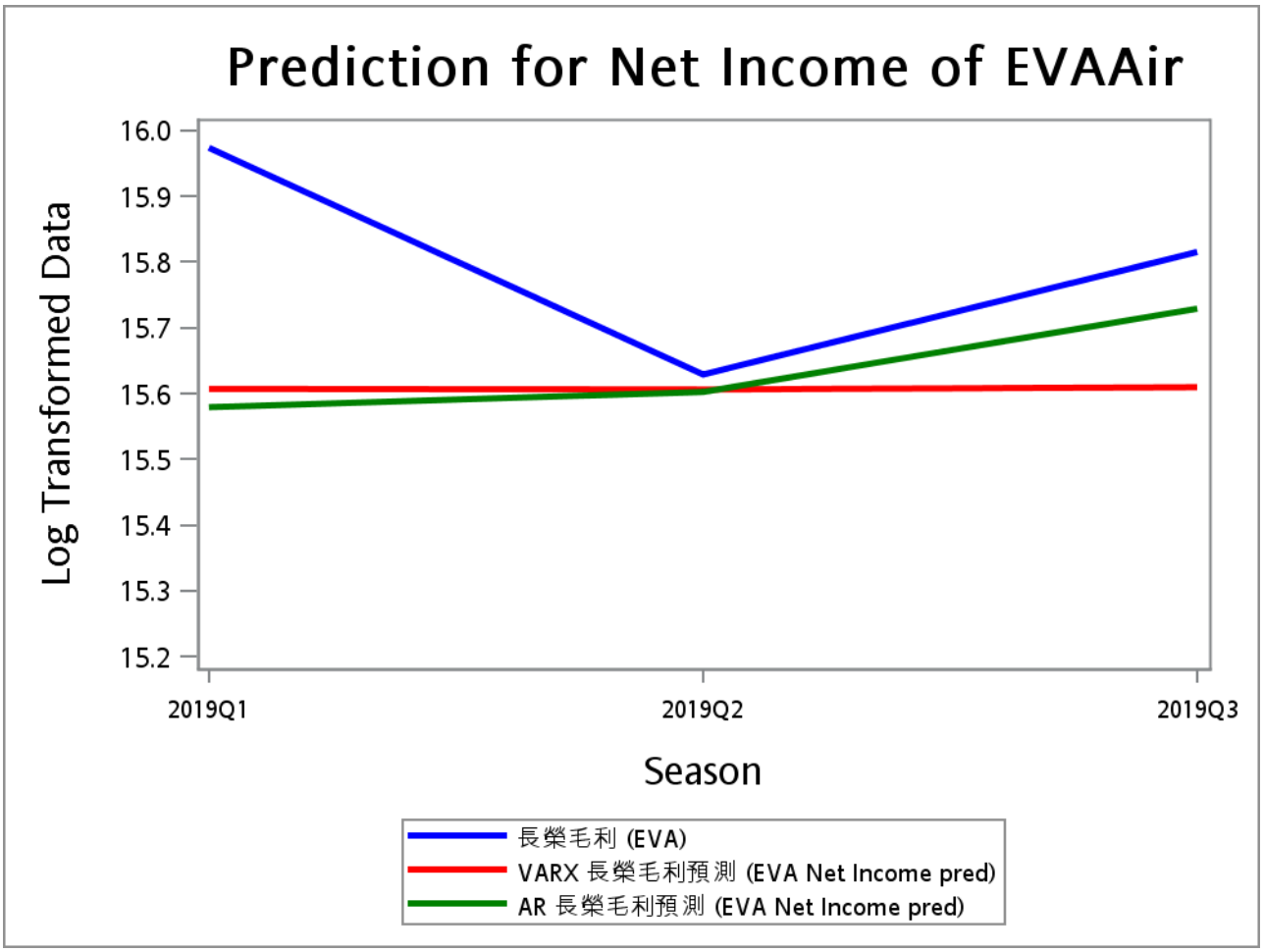
Obs	Var_China	Var_Eva	Varx_NetChina	Varx_NetEva	AR_China	AR_Eva	AR_NetChina	AR_NetEva	season	time
1	17.6207	17.6770	15.4672	15.6072	17.5169	17.6294	15.2661	15.5793	2019Q1	201903
2	17.6696	17.7166	15.4871	15.6063	17.4841	17.6648	15.3069	15.6025	2019Q2	201906
3	17.6956	17.7429	15.4954	15.6097	17.5235	17.7257	15.4395	15.7291	2019Q3	201909

Obs	income_China	income_Eva	net_China	net_Eva	Oil_Price	LogChina	LogEva	net_LogChina	net_LogEva	LogOil
1	40405348	44312727	5312068	8655681	68.33977997	17.5145	17.6068	15.4855	15.9737	4.22449
2	42892312	43864832	5395164	6132227	61.85909091	17.5742	17.5966	15.5010	15.6291	4.12486
3	43004648	45528073	6225153	7387557	62.65627706	17.5768	17.6338	15.6441	15.8153	4.13766


Prediction for Income of China Air
Log Transformed Data
17.75
17.70
17.65
17.60
17.55
17.50
17.45
2019Q1
2019Q2
2019Q3
Season
華航營收 (China)
VAR 華航營收預測 (China Income pred)
AR 華航營收預測 (China Income pred)


Prediction for Income of EVA Air
Log Transformed Data
17.75
17.70
17.65
17.60
17.55
17.50
17.45
2019Q1
2019Q2
2019Q3
Season
長榮營收 (EVA)
VAR 長榮營收預測 (EVA Income pred)
AR 長榮營收預測 (EVA Income pred)


Prediction for Net Income of China Air
Log Transformed Data
16.0
15.9
15.8
15.7
15.6
15.5
15.4
15.3
15.2
2019Q1
2019Q2
2019Q3
Season
華航毛利 (China)
VARX 華航毛利預測 (China Net Income pred)
AR 華航毛利預測 (China Net Income pred)


Prediction for Net Income of EVAAir
Log Transformed Data
16.0
15.9
15.8
15.7
15.6
15.5
15.4
15.3
15.2
2019Q1
2019Q2
2019Q3
Season
長榮毛利 (EVA)
VARX 長榮毛利預測 (EVA Net Income pred)
AR 長榮毛利預測 (EVA Net Income pred)

Prediction for Net Income of EVAAir

MEANS 程序

變數	N	平均值	標準差	最小值	最大值
res_VAR_China	3	0.0114917	0.0025127	0.0090915	0.0141035
res_AR_China	3	0.0036561	0.0041154	5.9018046E-6	0.0081162
res_VAR_Eva	3	0.0104084	0.0049027	0.0049344	0.0143958
res_AR_Eva	3	0.0045341	0.0039689	0.000510920	0.0084464
res_VARX_NetChina	3	0.0075455	0.0126132	0.000194015	0.0221097
res_AR_NetChina	3	0.0545585	0.0875208	0.000705768	0.1555444
res_VARX_NetEva	3	0.0590437	0.0684769	0.000519922	0.1343525
res_VAR_Income	3	0.0219000	0.0050814	0.0162145	0.0259983
res_AR_Income	3	0.0081903	0.0066858	0.000516822	0.0127613
res_VARX_Net	3	0.0665892	0.0670133	0.000713937	0.1346853
res_AR_Net	3	0.1091170	0.1750417	0.0014115	0.3110888