

*Supporting file to*  
**Causal Vector Autoregression Enhanced with Covariance and Order Selection**

**Estimated parameter matrices in the unrestricted causal VAR( $p$ ) models ( $p = 3, 4, 5$ ) for the financial data**

	NIK	EU	ISE	EM	BVSP	DAX	FTSE	SP
NIK	1	-0.0124	0.0114	-0.8830	0.1977	0.0248	0.1104	-0.0361
EU	0	1	-0.0436	-0.0055	-0.0263	-0.3768	-0.5116	-0.0119
ISE	0	0	1	-0.9742	0.1594	-0.1423	-0.3486	-0.1245
EM	0	0	0	1	-0.3557	-0.1057	-0.2304	0.0914
BVSP	0	0	0	0	1	-0.0141	-0.2771	-0.6434
DAX	0	0	0	0	0	1	-0.8207	-0.2223
FTSE	0	0	0	0	0	0	1	-0.6369
SP	0	0	0	0	0	0	0	1

Table 1:  $\mathbf{A}$  for the unrestricted Financial VAR(3) model (rounded to 4 decimals).

	NIK <sub>-1</sub>	EU <sub>-1</sub>	ISE <sub>-1</sub>	EM <sub>-1</sub>	BVSP <sub>-1</sub>	DAX <sub>-1</sub>	FTSE <sub>-1</sub>	SP <sub>-1</sub>
NIK	0.2103	-0.1510	-0.1084	0.0964	0.0705	0.0147	-0.1487	-0.2816
EU	-0.0052	0.1500	-0.0023	0.0262	-0.0183	-0.0424	-0.1021	-0.0123
ISE	0.0361	0.2760	-0.0809	0.2479	-0.2691	-0.0467	-0.0092	-0.1292
EM	0.0471	-0.0044	-0.0067	0.1719	-0.1296	-0.1013	0.0316	-0.1196
BVSP	-0.0116	0.1013	0.0310	-0.1612	0.1478	-0.1755	0.1426	-0.0900
DAX	-0.0148	0.2054	-0.0306	0.0124	-0.0386	-0.0497	-0.0996	-0.0470
FTSE	0.0684	0.0259	0.0226	0.0561	-0.1267	0.2303	0.1225	-0.3792
SP	0.0521	0.2681	-0.0533	-0.0128	-0.0012	-0.0959	-0.3289	0.2110

Table 2:  $\mathbf{B}_1$  for the unrestricted Financial VAR(3) model (rounded to 4 decimals).

	NIK <sub>-2</sub>	EU <sub>-2</sub>	ISE <sub>-2</sub>	EM <sub>-2</sub>	BVSP <sub>-2</sub>	DAX <sub>-2</sub>	FTSE <sub>-2</sub>	SP <sub>-2</sub>
NIK	-0.0314	-0.1852	-0.0402	0.0232	0.0928	-0.0222	0.1717	-0.0466
EU	0.0010	0.0927	-0.0060	0.0064	0.0021	0.0200	-0.0862	-0.0437
ISE	-0.0050	-0.1216	-0.0260	-0.0117	0.0243	0.0794	0.0630	0.0558
EM	0.0141	0.0996	-0.0226	0.1364	-0.0915	-0.1004	-0.0454	-0.0356
BVSP	-0.0581	-0.0143	-0.0494	0.2097	-0.0378	-0.0022	0.0117	0.0036
DAX	-0.0399	0.0306	0.0107	0.0632	-0.0467	-0.0291	-0.0321	0.0395
FTSE	0.0602	0.2642	-0.0426	0.1073	-0.0039	0.0533	-0.0195	-0.3782
SP	0.0455	-0.0563	0.0701	-0.1983	0.0747	0.0042	-0.1890	0.1686

Table 3:  $\mathbf{B}_2$  for the unrestricted Financial VAR(3) model (rounded to 4 decimals).

**Estimates of the concentration matrices with covariance selection**

The  $16 \times 16$  matrix  $\hat{\mathbf{K}}$ , estimated by using the lag 1 variables is shown in Table 16; while the  $24 \times 24$  matrix  $\hat{\mathbf{K}}$  by using the lag 1 and lag 2 variables is shown in Table 17, for the financial data. The  $12 \times 12$  matrix  $\hat{\mathbf{K}}$ , estimated by using the lag 1 variables is shown in Table 18, for the IMR data.

	NIK <sub>-3</sub>	EU <sub>-3</sub>	ISE <sub>-3</sub>	EM <sub>-3</sub>	BVSP <sub>-3</sub>	DAX <sub>-3</sub>	FTSE <sub>-3</sub>	SP <sub>-3</sub>
NIK	-0.0297	-0.2926	0.0008	-0.0113	0.0175	0.2452	0.1064	-0.0991
EU	-0.0014	0.1035	-0.0003	-0.0318	0.0020	-0.0176	-0.0616	-0.0128
ISE	-0.0703	-0.0594	0.0117	0.2764	-0.0747	0.0695	-0.1734	0.0357
EM	-0.0103	0.0971	-0.0222	0.0407	-0.0828	-0.0333	-0.0623	0.0153
BVSP	0.1023	0.0070	-0.0255	-0.1352	0.1162	0.0985	-0.0336	-0.0054
DAX	-0.0221	-0.1016	-0.0043	0.0917	-0.0730	0.0764	-0.0694	0.1030
FTSE	0.0187	-0.2235	0.0084	-0.0416	-0.1049	0.1379	0.2804	-0.1406
SP	0.0225	-0.0770	-0.0080	-0.0572	-0.0223	0.1069	-0.0994	0.1101

Table 4:  $B_3$  for the unrestricted Financial VAR(3) model (rounded to 4 decimals).

	NIK	EU	ISE	EM	BVSP	DAX	FTSE	SP
NIK	1	0.0498	0.0184	-0.8995	0.1937	-0.0011	0.0783	-0.0307
EU	0	1	-0.0367	-0.0178	-0.0206	-0.3724	-0.5183	-0.0133
ISE	0	0	1	-0.9804	0.1591	-0.1218	-0.3428	-0.1251
EM	0	0	0	1	-0.3608	-0.0944	-0.2247	0.0933
BVSP	0	0	0	0	1	-0.0072	-0.2951	-0.6417
DAX	0	0	0	0	0	1	-0.8111	-0.2198
FTSE	0	0	0	0	0	0	1	-0.6243
SP	0	0	0	0	0	0	0	1

Table 5:  $A$  for the unrestricted Financial VAR(4) model (rounded to 4 decimals).

	NIK <sub>-1</sub>	EU <sub>-1</sub>	ISE <sub>-1</sub>	EM <sub>-1</sub>	BVSP <sub>-1</sub>	DAX <sub>-1</sub>	FTSE <sub>-1</sub>	SP <sub>-1</sub>
NIK	0.2138	-0.0974	-0.1134	0.0946	0.0661	-0.0050	-0.1810	-0.2739
EU	-0.0074	0.1709	-0.0034	0.0275	-0.0174	-0.0457	-0.1290	-0.0049
ISE	0.0391	0.3996	-0.0883	0.2706	-0.2750	-0.0841	-0.1048	-0.1194
EM	0.0449	0.0132	-0.0052	0.1859	-0.1471	-0.1107	0.0334	-0.1241
BVSP	-0.0216	0.0668	0.0353	-0.1686	0.1618	-0.1512	0.1162	-0.0740
DAX	-0.0219	0.2265	-0.0304	0.0135	-0.0389	-0.0667	-0.1164	-0.0426
FTSE	0.0670	0.0701	0.0202	0.0797	-0.1424	0.2029	0.1138	-0.3800
SP	0.0386	0.3503	-0.0503	0.0329	-0.0390	-0.1336	-0.3804	0.2247

Table 6:  $B_1$  for the unrestricted Financial VAR(4) model (rounded to 4 decimals).

	NIK <sub>-2</sub>	EU <sub>-2</sub>	ISE <sub>-2</sub>	EM <sub>-2</sub>	BVSP <sub>-2</sub>	DAX <sub>-2</sub>	FTSE <sub>-2</sub>	SP <sub>-2</sub>
NIK	-0.0311	-0.1610	-0.0411	-0.0013	0.0916	-0.0244	0.1471	-0.0267
EU	-0.0014	0.1021	-0.0054	-0.0059	0.0059	0.0151	-0.0977	-0.0307
ISE	-0.0122	0.0103	-0.0301	-0.0176	0.0178	0.0245	0.0158	0.0484
EM	0.0105	0.1257	-0.0279	0.1742	-0.1020	-0.1019	-0.0539	-0.0575
BVSP	-0.0582	-0.0530	-0.0433	0.1826	-0.0191	0.0025	0.0129	0.0310
DAX	-0.0416	0.0569	0.0094	0.0651	-0.0387	-0.0376	-0.0325	0.0237
FTSE	0.0554	0.3219	-0.0490	0.1518	-0.0199	0.0329	-0.0277	-0.4070
SP	0.0293	0.0357	0.0557	-0.1164	0.0473	-0.0208	-0.2336	0.1474

Table 7:  $B_2$  for the unrestricted Financial VAR(4) model (rounded to 4 decimals).

	NIK <sub>-3</sub>	EU <sub>-3</sub>	ISE <sub>-3</sub>	EM <sub>-3</sub>	BVSP <sub>-3</sub>	DAX <sub>-3</sub>	FTSE <sub>-3</sub>	SP <sub>-3</sub>
NIK	-0.0531	-0.2655	-0.0137	-0.0077	0.0263	0.2438	0.0806	-0.0885
EU	-0.0180	0.1201	-0.0063	-0.0397	0.0070	-0.0210	-0.0799	0.0051
ISE	-0.0829	0.0505	0.0051	0.2462	-0.0800	0.0750	-0.2471	0.0373
EM	0.0068	0.1330	-0.0108	0.0597	-0.1000	-0.0387	-0.0826	-0.0079
BVSP	0.0789	-0.0102	-0.0336	-0.1602	0.1301	0.0844	-0.0372	0.0454
DAX	-0.0289	-0.0647	-0.0024	0.0831	-0.0671	0.0737	-0.0960	0.0948
FTSE	0.0511	-0.1609	0.0236	-0.0300	-0.1242	0.1388	0.2437	-0.1786
SP	0.0415	0.0773	0.0091	-0.0292	-0.0542	0.0751	-0.2046	0.0872

Table 8:  $B_3$  for the unrestricted Financial VAR(4) model (rounded to 4 decimals).

	<b>NIK<sub>-4</sub></b>	<b>EU<sub>-4</sub></b>	<b>ISE<sub>-4</sub></b>	<b>EM<sub>-4</sub></b>	<b>BVSP<sub>-4</sub></b>	<b>DAX<sub>-4</sub></b>	<b>FTSE<sub>-4</sub></b>	<b>SP<sub>-4</sub></b>
<b>NIK</b>	-0.0317	0.1020	0.0500	-0.1574	0.0632	0.0242	-0.1180	-0.0120
<b>EU</b>	-0.0137	0.1278	-0.0024	-0.0192	0.0086	-0.0147	-0.1136	0.0337
<b>ISE</b>	-0.0165	0.6753	-0.0545	-0.1178	0.0255	-0.0042	-0.5498	-0.0255
<b>EM</b>	-0.0152	0.1687	0.0072	0.0793	-0.0464	-0.1043	-0.0692	-0.0451
<b>BVSP</b>	-0.0043	-0.0138	-0.0382	0.1124	-0.0098	-0.0311	-0.0211	0.1224
<b>DAX</b>	-0.0242	0.3387	-0.0247	0.0818	0.0135	-0.1580	-0.1484	-0.0309
<b>FTSE</b>	0.0101	0.3182	-0.0251	0.0320	-0.0407	-0.1010	-0.1596	-0.0831
<b>SP</b>	-0.0535	0.7521	-0.0019	0.1315	-0.1131	-0.2949	-0.4615	-0.0335

Table 9:  $B_4$  for the unrestricted Financial VAR(4) model (rounded to 4 decimals).

	<b>NIK</b>	<b>EU</b>	<b>ISE</b>	<b>EM</b>	<b>BVSP</b>	<b>DAX</b>	<b>FTSE</b>	<b>SP</b>
<b>NIK</b>	1	0.0944	0.0304	-0.8907	0.1867	-0.0325	0.0564	-0.0190
<b>EU</b>	0	1	-0.0357	-0.0164	-0.0234	-0.3745	-0.5173	-0.0105
<b>ISE</b>	0	0	1	-0.9673	0.1315	-0.1327	-0.3485	-0.0871
<b>EM</b>	0	0	0	1	-0.3629	-0.0991	-0.2192	0.0983
<b>BVSP</b>	0	0	0	0	1	-0.0025	-0.2825	-0.6595
<b>DAX</b>	0	0	0	0	0	1	-0.8084	-0.2217
<b>FTSE</b>	0	0	0	0	0	0	1	-0.6253
<b>SP</b>	0	0	0	0	0	0	0	1

Table 10:  $A$  for the unrestricted Financial VAR(5) model (rounded to 4 decimal places).

	<b>NIK<sub>-1</sub></b>	<b>EU<sub>-1</sub></b>	<b>ISE<sub>-1</sub></b>	<b>EM<sub>-1</sub></b>	<b>BVSP<sub>-1</sub></b>	<b>DAX<sub>-1</sub></b>	<b>FTSE<sub>-1</sub></b>	<b>SP<sub>-1</sub></b>
<b>NIK</b>	0.2005	-0.2147	-0.1216	0.1676	0.0353	0.0455	-0.1137	-0.2744
<b>EU</b>	-0.0090	0.1496	-0.0071	0.0343	-0.0184	-0.0401	-0.1172	-0.0041
<b>ISE</b>	0.0268	0.2516	-0.1023	0.3352	-0.3004	-0.0360	-0.0248	-0.1016
<b>EM</b>	0.0418	-0.0120	-0.0058	0.1948	-0.1496	-0.1000	0.0471	-0.1245
<b>BVSP</b>	-0.0156	0.1280	0.0499	-0.1873	0.1590	-0.1717	0.0972	-0.0838
<b>DAX</b>	-0.0181	0.2461	-0.0281	0.0063	-0.0396	-0.0720	-0.1261	-0.0432
<b>FTSE</b>	0.0702	0.0797	0.0255	0.0651	-0.1417	0.1977	0.1154	-0.3827
<b>SP</b>	0.0420	0.2881	-0.0549	0.0882	-0.0695	-0.0882	-0.3559	0.2366

Table 11:  $B_1$  for the unrestricted Financial VAR(5) model (rounded to 4 decimals).

	<b>NIK<sub>-2</sub></b>	<b>EU<sub>-2</sub></b>	<b>ISE<sub>-2</sub></b>	<b>EM<sub>-2</sub></b>	<b>BVSP<sub>-2</sub></b>	<b>DAX<sub>-2</sub></b>	<b>FTSE<sub>-2</sub></b>	<b>SP<sub>-2</sub></b>
<b>NIK</b>	-0.0293	-0.1957	-0.0360	0.0059	0.0797	-0.0285	0.2068	-0.0469
<b>EU</b>	-0.0021	0.0821	-0.0039	-0.0112	0.0086	0.0210	-0.0855	-0.0287
<b>ISE</b>	0.0018	-0.0631	-0.0203	-0.0399	0.0107	0.0325	0.1267	0.0215
<b>EM</b>	0.0141	0.1147	-0.0258	0.1744	-0.1067	-0.0990	-0.0430	-0.0580
<b>BVSP</b>	-0.0610	0.0210	-0.0494	0.2168	-0.0285	-0.0125	-0.0516	0.0270
<b>DAX</b>	-0.0434	0.0795	0.0041	0.0737	-0.0408	-0.0489	-0.0407	0.0217
<b>FTSE</b>	0.0555	0.3460	-0.0558	0.1614	-0.0187	0.0193	-0.0390	-0.4062
<b>SP</b>	0.0322	0.0507	0.0555	-0.0978	0.0065	-0.0539	-0.2055	0.1437

Table 12:  $B_2$  for the unrestricted Financial VAR(5) model (rounded to 4 decimals).

	<b>NIK<sub>-3</sub></b>	<b>EU<sub>-3</sub></b>	<b>ISE<sub>-3</sub></b>	<b>EM<sub>-3</sub></b>	<b>BVSP<sub>-3</sub></b>	<b>DAX<sub>-3</sub></b>	<b>FTSE<sub>-3</sub></b>	<b>SP<sub>-3</sub></b>
<b>NIK</b>	-0.0485	-0.2250	-0.0203	0.0590	0.0058	0.2258	0.1025	-0.1432
<b>EU</b>	-0.0154	0.1032	-0.0054	-0.0392	0.0067	-0.0170	-0.0733	0.0098
<b>ISE</b>	-0.0861	0.0448	0.0036	0.2904	-0.0902	0.0890	-0.2141	-0.0349
<b>EM</b>	0.0161	0.1375	-0.0109	0.0721	-0.1034	-0.0427	-0.0783	-0.0217
<b>BVSP</b>	0.0711	0.0638	-0.0403	-0.1398	0.1149	0.0484	-0.0620	0.0554
<b>DAX</b>	-0.0318	-0.0657	-0.0021	0.0777	-0.0690	0.0748	-0.0949	0.1001
<b>FTSE</b>	0.0559	-0.1443	0.0232	-0.0336	-0.1287	0.1232	0.2499	-0.1722
<b>SP</b>	0.0572	0.0886	0.0017	0.0276	-0.0751	0.0801	-0.2076	0.0568

Table 13:  $B_3$  for the unrestricted Financial VAR(5) model (rounded to 4 decimals).

	<b>NIK</b> <sub>-4</sub>	<b>EU</b> <sub>-4</sub>	<b>ISE</b> <sub>-4</sub>	<b>EM</b> <sub>-4</sub>	<b>BVSP</b> <sub>-4</sub>	<b>DAX</b> <sub>-4</sub>	<b>FTSE</b> <sub>-4</sub>	<b>SP</b> <sub>-4</sub>
<b>NIK</b>	0.0511	0.1260	0.0729	-0.1399	0.0349	0.0228	-0.1169	-0.0730
<b>EU</b>	-0.0057	0.1137	-0.0035	-0.0167	0.0100	-0.0168	-0.1068	0.0362
<b>ISE</b>	-0.0084	0.6296	-0.0222	-0.0836	0.0023	0.0138	-0.4626	-0.1160
<b>EM</b>	0.0081	0.1703	0.0083	0.0913	-0.0538	-0.1038	-0.0740	-0.0587
<b>BVSP</b>	0.0349	0.0552	-0.0389	0.0861	-0.0215	-0.0394	-0.0770	0.1401
<b>DAX</b>	-0.0371	0.3433	-0.0257	0.0825	0.0163	-0.1530	-0.1567	-0.0301
<b>FTSE</b>	0.0353	0.3214	-0.0299	0.0265	-0.0380	-0.0919	-0.1761	-0.0843
<b>SP</b>	-0.0202	0.7968	-0.0009	0.2056	-0.1360	-0.3020	-0.5138	-0.0805

Table 14:  $B_4$  for the unrestricted Financial VAR(5) model (rounded to 4 decimals).

	<b>NIK</b> <sub>-5</sub>	<b>EU</b> <sub>-5</sub>	<b>ISE</b> <sub>-5</sub>	<b>EM</b> <sub>-5</sub>	<b>BVSP</b> <sub>-5</sub>	<b>DAX</b> <sub>-5</sub>	<b>FTSE</b> <sub>-5</sub>	<b>SP</b> <sub>-5</sub>
<b>NIK</b>	0.0542	-0.0360	-0.0291	0.1412	-0.0106	-0.0629	0.0902	-0.1685
<b>EU</b>	0.0062	-0.0936	0.0054	0.0057	0.0090	0.0010	0.0648	0.0002
<b>ISE</b>	-0.0285	-0.3219	0.0111	0.1815	-0.0996	0.0977	0.3337	-0.1423
<b>EM</b>	-0.0132	-0.0529	-0.0292	0.0642	-0.0008	0.0074	0.0407	-0.0381
<b>BVSP</b>	0.0785	0.3339	-0.0123	-0.1215	0.0262	-0.0268	-0.3491	0.0031
<b>DAX</b>	0.0086	0.1067	0.0090	-0.0786	0.0084	-0.0473	-0.0232	0.0107
<b>FTSE</b>	0.0468	0.0859	-0.0150	-0.1292	0.0648	-0.0196	-0.0496	-0.0353
<b>SP</b>	-0.0990	0.2042	0.0313	0.1087	0.0108	-0.2593	0.0295	-0.1462

Table 15:  $B_5$  for the unrestricted Financial VAR(5) model (rounded to 4 decimals).

	NIK	NIK	EU	ISE	EM	BVSP	DAX	FTSE	SP	NIK <sub>-1</sub>	EU <sub>-1</sub>	ISE <sub>-1</sub>	EM <sub>-1</sub>	BVSP <sub>-1</sub>	DAX <sub>-1</sub>	FTSE <sub>-1</sub>	SP <sub>-1</sub>
NIK	10223.1	0	0	0	-8375.9	2126.5	0	0	0	1851.4	-1837.6	-874.8	860.8	755.8	-59.0	-1171.5	-2721.6
EU	0	142751.0	-6004.3	0	-3845.8	-3845.8	-53988.4	-75617.0	0	-1869.1	17320.8	-651.4	4333.7	-1861.7	-5919.4	-13839.1	30.9
ISE	0	-6004.3	5869.8	5272.0	-5272.0	1090.4	1330.0	1405.0	-829.5	458.4	851.9	-342.1	1212.4	-1574.0	-69.4	649.2	-828.0
EM	-8375.9	0	-5272.0	42193.1	-13002.6	-13002.6	-2713.5	-5818.5	3808.5	-1923.4	-1699.4	583.6	1228.9	-1826.7	-2542.6	3601.4	-292.3
BVSP	2126.5	-3845.8	1090.4	-13002.6	13563.9	2407.9	2407.9	1761.7	-7154.5	386.1	656.4	70.6	-1785.8	2173.1	-302.6	327.8	-347.4
DAX	0	-53988.4	1330.0	-2713.5	2407.9	2407.9	42713.2	12225.0	-5213.5	577.4	-2237.8	-378.9	-2343.1	525.1	1622.8	3436.5	-982.1
FTSE	0	-75617.0	1405.0	-5818.5	1761.7	1761.7	12225.0	70300.8	-2613.9	1354.0	-13200.2	1004.7	-2649.7	997.8	7922.5	8556.4	-956.2
SP	0	0	-829.5	3808.5	-7154.5	-7154.5	-5213.5	-2613.9	15368.1	22.3	-382.0	47.7	492.2	191.5	-1161.3	-2209.7	3342.1
NIK <sub>-1</sub>	1851.4	-1869.1	458.4	-1923.4	386.1	386.1	577.4	1354.0	22.3	7851.5	-923.8	-402.5	-8936.2	2553.2	465.8	1602.8	-847.5
EU <sub>-1</sub>	-1837.6	17320.8	851.9	-1699.4	656.4	656.4	-2237.8	-13200.2	-382.0	-923.8	141457.2	-6049.3	-1969.2	-3528.8	-53024.5	-73392.9	-517.3
ISE <sub>-1</sub>	-874.8	-651.4	-342.1	583.6	70.6	70.6	-378.9	1004.7	47.7	-402.5	-6049.3	5534.0	-5600.0	1473.6	1234.6	1313.6	101.7
EM <sub>-1</sub>	860.8	4333.7	1212.4	1228.9	-1785.8	-1785.8	-2343.1	-2649.7	492.2	-8936.2	-1969.2	-5600.0	42509.4	-13521.8	-2368.1	-4855.1	3611.5
BVSP <sub>-1</sub>	755.8	-1861.7	-1574.0	-1826.7	2173.1	2173.1	525.1	997.8	191.5	2553.2	-3528.8	1473.6	-13521.8	14138.3	2111.6	1213.2	-6552.7
DAX <sub>-1</sub>	-59.0	-5919.4	-69.4	-2542.6	-302.6	-302.6	1622.8	7922.5	-1161.3	465.8	-53024.5	1234.6	-2368.1	2111.6	43042.2	11232.2	-4840.1
FTSE <sub>-1</sub>	-1171.5	-13839.1	649.2	3601.4	327.8	327.8	3436.5	8556.4	-2209.7	1602.8	-73392.9	1313.6	-4855.1	1213.2	11232.2	68572.1	-2183.6
SP <sub>-1</sub>	-2721.6	30.9	-828.0	-292.3	-347.4	-347.4	-982.1	-956.2	3342.1	-847.5	-517.3	101.7	3611.5	-6552.7	-4840.1	-2183.6	16525.5

Table 16:  $\hat{K}$  for the financial restricted VAR(1) model (entries rounded to one decimal).

	NIK	NIK	EU	ISE	EM	BVSP	DAX	FTSE	SP	NIK	EU	ISE	EM	BVSP	DAX	FTSE	SP	NIK	EU	ISE	EM	BVSP	DAX	FTSE	SP
NIK	10562.1	0	146641.6	-6195.8	0	-8651.5	2192.7	0	0	2121.6	-1973.7	-1159.9	1150.0	869.8	-83.1	-15063.4	-2564.1	-480.4	-1950.7	-413.0	279.1	956.9	-513.2	2621.7	-11915.3
EU	0	146641.6	-6195.8	-6195.8	0	-8651.5	2192.7	-76130.7	0	-562.2	20342.8	-1973.7	-1159.9	1150.0	869.8	-83.1	-15063.4	-2564.1	-480.4	-1950.7	-413.0	279.1	956.9	-513.2	2621.7
ISE	0	-6195.8	5928.7	-5475.2	4438.4	1	-13532.7	1390.6	1453.3	223.6	764.0	-416.8	1243.4	-1458.4	-107.8	683.9	-889.8	301.4	-1394.0	-127.9	-41.3	692.3	473.9	320.0	939.3
EM	-8651.5	0	-5475.2	4438.4	-13532.7	1390.6	1453.3	-5885.8	-7392.1	-140.8	-649.4	1274.1	1983.2	-2872.2	-2751.5	2836.2	-889.8	301.4	-1394.0	-127.9	-41.3	692.3	473.9	320.0	939.3
BVSP	2192.7	-4303.9	1196.4	-13532.7	1390.6	1453.3	-5885.8	12475.0	-5219.3	-242.6	-3438.1	-545.6	-1962.3	635.9	1631.9	9718.3	-1732.5	-860.8	-3992.0	763.6	712.9	1523.4	279.8	715.5	354.8
DAX	0	-5585.8	1390.6	-2751.5	2641.0	43706.9	2641.0	12475.0	-5219.3	-242.6	-3438.1	-545.6	-1962.3	635.9	1631.9	9718.3	-1732.5	-860.8	-3992.0	763.6	712.9	1523.4	279.8	715.5	354.8
FTSE	0	-76130.7	1453.3	-5885.8	2048.3	12475.0	-5219.3	-3705.9	16740.9	-256.7	-759.2	-504.3	-2942.2	1340.0	8004.8	9718.3	-1732.5	-860.8	-3992.0	763.6	712.9	1523.4	279.8	715.5	354.8
SP	0	0	-832.8	3478.1	-7392.1	-5219.3	-3705.9	-3705.9	16740.9	-256.7	-759.2	-504.3	-2942.2	1340.0	8004.8	9718.3	-1732.5	-860.8	-3992.0	763.6	712.9	1523.4	279.8	715.5	354.8
NIK	2121.6	-562.2	223.6	-348.8	-140.8	692.5	-242.6	1261.0	-759.2	-523.7	147922.9	-5907.5	-5907.5	-3995.0	-55037.5	-7776.2	-1042.2	-1902.3	19169.9	-578.4	4473.7	-1957.8	830.6	-5135.3	-562.4
EU	-1973.7	20342.8	764.0	-649.4	692.5	-242.6	1261.0	-759.2	-759.2	-523.7	147922.9	-5907.5	-5907.5	-3995.0	-55037.5	-7776.2	-1042.2	-1902.3	19169.9	-578.4	4473.7	-1957.8	830.6	-5135.3	-562.4
ISE	-1159.9	-197.6	-416.8	1274.1	-19.7	-545.6	1163.7	-2942.2	551.7	-8799.7	-596.7	-5501.6	44967.1	-14040.6	14802.8	1671.4	-608.4	540.9	1273.3	-360.9	1292.6	-1853.4	-2978.4	3835.9	-206.0
EM	1150.0	3815.4	1243.4	1983.2	1983.2	1983.2	1983.2	1983.2	1983.2	1983.2	-596.7	-5501.6	44967.1	-14040.6	14802.8	1671.4	-608.4	540.9	1273.3	-360.9	1292.6	-1853.4	-2978.4	3835.9	-206.0
BVSP	-869.8	-2246.0	-1458.4	-2872.2	2462.0	635.9	1340.0	313.0	313.0	1853.6	-3995.0	1111.2	-14040.6	14802.8	1671.4	-608.4	540.9	1273.3	-360.9	1292.6	-1853.4	-2978.4	3835.9	-206.0	-206.0
DAX	-83.1	4013.1	-107.8	-2751.5	-434.7	1631.9	8004.8	-1510.7	459.8	-55037.5	1401.6	-3940.4	2179.5	44184.9	2179.5	44184.9	2179.5	44184.9	2179.5	44184.9	2179.5	44184.9	2179.5	44184.9	2179.5
FTSE	-1576.9	-15063.4	683.9	2836.2	527.4	4063.1	9718.3	-7392.1	4869.1	-1321.4	-1042.2	-608.4	3000.7	-4232.7	-5356.0	12870.1	-2567.0	18631.9	30.0	-1879.6	835.6	-974.2	235.6	794.7	949.1
SP	-5641.1	-1267.0	-750.1	-889.8	-353.8	-411.5	-1732.5	4869.1	-1321.4	-1042.2	-608.4	3000.7	-4232.7	-5356.0	12870.1	-2567.0	18631.9	30.0	-1879.6	835.6	-974.2	235.6	794.7	949.1	949.1
NIK	-480.4	249.2	-101.7	301.4	-471.9	-860.8	1396.9	250.0	1878.8	-1902.3	19169.9	1273.3	-1546.5	-3.1	890.6	1573.5	30.0	7970.7	-631.7	-413.1	-9114.3	2599.6	583.2	1413.8	-1070.1
EU	-1950.7	11073.0	-1394.0	-1394.0	4003.1	-1209.7	-3952.0	-1831.2	-3206.9	-1790.4	19169.9	1273.3	-1546.5	-3.1	890.6	1573.5	30.0	7970.7	-631.7	-413.1	-9114.3	2599.6	583.2	1413.8	-1070.1
ISE	-413.0	-857.8	-127.9	-557.8	-169.9	763.6	-553.7	1326.2	-1108.9	-578.4	19169.9	1273.3	-1546.5	-3.1	890.6	1573.5	30.0	7970.7	-631.7	-413.1	-9114.3	2599.6	583.2	1413.8	-1070.1
EM	-279.1	692.3	-41.3	3387.5	1523.4	712.9	-2096.5	-3463.9	1098.0	4473.7	1292.6	1384.3	-1853.4	2305.3	920.5	633.1	235.6	2599.6	-3755.5	1525.4	-14041.8	14474.2	2359.6	43405.5	1299.8
BVSP	956.9	478.9	179.3	-3219.5	279.8	-730.4	1447.0	570.7	830.6	-1957.8	-1692.7	-1853.4	-225.7	1821.0	7504.7	-764.7	-764.7	583.2	-52942.1	1288.9	-2771.9	2359.6	43405.5	1299.8	1299.8
DAX	-513.2	2621.7	520.0	-3258.4	515.5	3816.6	504.0	-404.4	-180.3	26.5	-5135.3	-67.4	-2978.4	2305.3	920.5	633.1	235.6	2599.6	-3755.5	1525.4	-14041.8	14474.2	2359.6	43405.5	1299.8
FTSE	1507.4	-1215.3	939.3	-2218.9	535.1	3816.6	504.0	-404.4	-180.3	26.5	-5135.3	-67.4	-2978.4	2305.3	920.5	633.1	235.6	2599.6	-3755.5	1525.4	-14041.8	14474.2	2359.6	43405.5	1299.8
SP	94.4	-5430.0	407.0	-1153.4	354.8	2282.9	-1485.6	3418.3	76.8	-1080.8	-15895.9	460.9	3835.9	573.9	3712.9	9449.1	-2029.0	1413.8	-74839.6	1368.6	-4975.8	1299.8	10976.2	69873.1	-1414.7

Table 17: The  $\hat{K}$  matrix for Financial VAR(2) (rounded to 1 decimal).

IMR	78193.8990	IMR	78193.8990	MMR	5758.0389	HepB	405.7913	GDP	868.5659	OPExp	0.0000	HExp	314.3372	IMR-1	-71926.1876	MMR-1	-4632.3622	HepB-1	-160.4118	GDP-1	417.9827	OPExp-1	-104.6326	HExp-1	-382.7312
MMR	5758.0389	MMR	5758.0389	MMR	5599.4176	HepB	152.4034	GDP	674.7314	OPExp	0.0000	HExp	-36.7332	IMR-1	-10562.6880	MMR-1	958.3424	HepB-1	-13.1047	GDP-1	345.0612	OPExp-1	-32.0986	HExp-1	-7.8669
HepB	405.7913	HepB	152.4034	MMR	152.4034	HepB	18.3428	GDP	14.4085	OPExp	0.0000	HExp	0.5283	IMR-1	-448.7913	MMR-1	-52.7652	HepB-1	-12.9436	GDP-1	3.9675	OPExp-1	-2.2020	HExp-1	-2.7720
GDP	868.5659	GDP	674.7314	MMR	674.7314	HepB	14.4085	GDP	238.9225	OPExp	0.0000	HExp	-4.2284	IMR-1	-1346.2032	MMR-1	52.9283	HepB-1	12.1550	GDP-1	-89.7692	OPExp-1	10.2742	HExp-1	15.4743
OPExp	0.0000	OPExp	0.0000	MMR	0.0000	HepB	0.0000	GDP	0.0000	OPExp	1.9570	HExp	-1.5371	IMR-1	7.1297	MMR-1	-7.3361	HepB-1	-0.2766	GDP-1	-0.8572	OPExp-1	0.0535	HExp-1	-0.1811
HExp	314.3372	HExp	-36.7332	MMR	-36.7332	HepB	0.5283	GDP	-4.2284	OPExp	-1.5371	HExp	7.9863	IMR-1	-223.5551	MMR-1	-45.7508	HepB-1	-3.2456	GDP-1	-3.9811	OPExp-1	-1.3610	HExp-1	-2.2841
IMR-1	-71926.1876	IMR-1	-10562.6880	MMR-1	-10562.6880	HepB-1	-448.7913	GDP-1	-1346.2032	OPExp-1	7.1297	HExp-1	-223.5551	IMR-1	75702.8848	MMR-1	-1917.2812	HepB-1	8.6454	GDP-1	-1443.7150	OPExp-1	88.7339	HExp-1	429.3489
MMR-1	-4632.3622	MMR-1	958.3424	MMR-1	958.3424	HepB-1	-52.7652	GDP-1	52.9283	OPExp-1	-7.3361	HExp-1	-45.7508	IMR-1	-1917.2812	MMR-1	6271.0399	HepB-1	186.9895	GDP-1	895.9179	OPExp-1	44.0174	HExp-1	-86.1008
HepB-1	-160.4118	HepB-1	-13.1047	HepB-1	-13.1047	HepB-1	-12.9436	GDP-1	12.1550	OPExp-1	-0.2766	HExp-1	-3.2456	IMR-1	8.6454	MMR-1	186.9895	HepB-1	20.2812	GDP-1	16.5578	OPExp-1	3.4141	HExp-1	-0.6124
GDP-1	417.9827	GDP-1	345.0612	GDP-1	345.0612	HepB-1	3.9675	GDP-1	-89.7692	OPExp-1	-0.8572	HExp-1	-3.9811	IMR-1	-1443.7150	MMR-1	895.9179	HepB-1	16.5578	GDP-1	251.3136	OPExp-1	-6.2351	HExp-1	-29.9574
OPExp-1	-104.6326	OPExp-1	-32.0986	OPExp-1	-32.0986	HepB-1	-2.2020	GDP-1	10.2742	OPExp-1	0.0535	HExp-1	-1.3610	IMR-1	88.7339	MMR-1	44.0174	HepB-1	3.4141	GDP-1	-6.2351	OPExp-1	4.3498	HExp-1	-0.5391
HExp-1	-382.7312	HExp-1	-7.8669	HExp-1	-7.8669	HepB-1	-2.7720	GDP-1	15.4743	OPExp-1	-0.1811	HExp-1	-2.2841	IMR-1	429.3489	MMR-1	-86.1008	HepB-1	-0.6124	GDP-1	-29.9574	OPExp-1	-0.5391	HExp-1	11.6633

Table 18:  $\hat{K}$  for the IMR restricted VAR(1) model of Case 2 (rounded to 4 decimals).