Simple multivariate analysis 02.sas
Estimate beta, var(v)

The ARIMA Procedure

Name of Variable = q	
Mean of Working Series	-0.0034
Standard Deviation	0.999994
Number of Observations	20000

Autocorrelations				
Lag	Covariance	Correlation	-1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1	Std Error
0	0.999988	1.00000	||********************|	0
1	0.328838	0.32884	||******* |	0.0070711
2	-0.0011116	-.00111	|| |	0.0077983
3	-0.0061619	-.00616	|| |	0.0077983
4	-0.0010122	-.00101	|| |	0.0077986
5	0.0082378	0.00824	|| |	0.0077986

"." marks two standard errors

Inverse Autocorrelations		
Lag	Correlation	-1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1
1	-0.37375	| *******| |
2	0.13767	| |*** |
3	-0.04749	| *| |
4	0.02055	| | |
5	-0.01200	| | |

Partial Autocorrelations		
Lag	Correlation	-1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1
1	0.32884	| |******* |
2	-0.12250	| **| |
3	0.03931	| |* |
4	-0.01344	| | |
5	0.01395	| | |

Simple multivariate analysis 02.sas
Estimate beta, var(v)

The ARIMA Procedure

Conditional Least Squares Estimation					
Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag
MA1,1	-0.37391	0.0065612	-56.99	<.0001	1

Variance Estimate	0.87692
Std Error Estimate	0.93644
AIC	54131.74
SBC	54139.65
Number of Residuals	20000

** AIC and SBC do not include log determinant.*

Autocorrelation Check of Residuals										
To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations						
6	2.15	5	0.8286	0.001	0.001	-0.006	-0.002	0.008	0.003
12	12.98	11	0.2944	-0.009	0.001	-0.006	0.012	-0.008	-0.015
18	20.71	17	0.2398	0.005	0.005	0.005	-0.011	0.012	0.007
24	26.02	23	0.3001	0.002	-0.001	-0.012	-0.008	0.004	0.007
30	31.65	29	0.3352	0.007	-0.000	0.011	-0.001	-0.009	-0.005
36	37.08	35	0.3734	-0.003	-0.001	-0.013	0.008	0.001	0.006
42	38.22	41	0.5950	-0.002	-0.005	0.004	0.001	-0.000	0.004
48	42.93	47	0.6417	-0.000	-0.006	-0.002	-0.013	-0.003	0.005

Model for variable q

No mean term in this model.

Moving Average Factors	
Factor 1:	1 + 0.37391 B**(1)

Simple multivariate analysis 02.sas
Estimate beta, var(v)

The ARIMA Procedure

Forecasts for variable q				
Obs	Forecast	Std Error	95% Confidence Limits	
20001	-0.1961	0.9364	-2.0315	1.6393
20002	0.0000	0.9998	-1.9595	1.9595
20003	0.0000	0.9998	-1.9595	1.9595
20004	0.0000	0.9998	-1.9595	1.9595
20005	0.0000	0.9998	-1.9595	1.9595
20006	0.0000	0.9998	-1.9595	1.9595
20007	0.0000	0.9998	-1.9595	1.9595
20008	0.0000	0.9998	-1.9595	1.9595
20009	0.0000	0.9998	-1.9595	1.9595
20010	0.0000	0.9998	-1.9595	1.9595
20011	0.0000	0.9998	-1.9595	1.9595
20012	0.0000	0.9998	-1.9595	1.9595
20013	0.0000	0.9998	-1.9595	1.9595
20014	0.0000	0.9998	-1.9595	1.9595
20015	0.0000	0.9998	-1.9595	1.9595
20016	0.0000	0.9998	-1.9595	1.9595
20017	0.0000	0.9998	-1.9595	1.9595
20018	0.0000	0.9998	-1.9595	1.9595
20019	0.0000	0.9998	-1.9595	1.9595
20020	0.0000	0.9998	-1.9595	1.9595
20021	0.0000	0.9998	-1.9595	1.9595
20022	0.0000	0.9998	-1.9595	1.9595
20023	0.0000	0.9998	-1.9595	1.9595
20024	0.0000	0.9998	-1.9595	1.9595

Simple multivariate analysis 02.sas

The VARMAX Procedure

Number of Observations	19999
Number of Pairwise Missing	24
Observation(s) eliminated by differencing	1

Simple Summary Statistics							
Variable	Type	N	Mean	Standard Deviation	Min	Max	Difference
p	Dependent	19999	-0.00152	3.06814	-8.59261	8.03701	1
q	Dependent	19999	-0.00345	1.00002	-1.00000	1.00000	

Simple multivariate analysis 02.sas

The VARMAX Procedure

Type of Model	VAR(4)
Estimation Method	Least Squares Estimation

AR Coefficient Estimates			
Lag	Variable	p	q
1	p	-0.02255	-0.55074
	q	-0.00813	0.39899
2	p	-0.01762	-0.13625
	q	-0.00012	-0.15299
3	p	-0.01301	0.04180
	q	-0.00227	0.05408
4	p	-0.00543	-0.00937
	q	-0.00459	-0.00701

Schematic Representation of Parameter Estimates				
Variable/Lag	AR1	AR2	AR3	AR4
p	.-	..	..	..
q	.+	.-	.+	..
+ is > 2*std error, -is < -2*stderror, . is between, * is N/A				

Model Parameter Estimates						
Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
p	AR1_1_1	-0.02255	0.02118	-1.06	0.2870	p(t-1)
	AR1_1_2	-0.55074	0.06765	-8.14	0.0001	q(t-1)
	AR2_1_1	-0.01762	0.02113	-0.83	0.4043	p(t-2)
	AR2_1_2	-0.13625	0.07748	-1.76	0.0787	q(t-2)
	AR3_1_1	-0.01301	0.02098	-0.62	0.5351	p(t-3)
	AR3_1_2	0.04180	0.07691	0.54	0.5868	q(t-3)
	AR4_1_1	-0.00543	0.01165	-0.47	0.6416	p(t-4)
	AR4_1_2	-0.00937	0.04601	-0.20	0.8386	q(t-4)
q	AR1_2_1	-0.00813	0.00663	-1.23	0.2202	p(t-1)
	AR1_2_2	0.39899	0.02117	18.84	0.0001	q(t-1)
	AR2_2_1	-0.00012	0.00661	-0.02	0.9854	p(t-2)

Simple multivariate analysis 02.sas

The VARMAX Procedure

Model Parameter Estimates						
Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
	AR2_2_2	-0.15299	0.02425	-6.31	0.0001	q(t-2)
	AR3_2_1	-0.00227	0.00657	-0.35	0.7295	p(t-3)
	AR3_2_2	0.05408	0.02407	2.25	0.0247	q(t-3)
	AR4_2_1	-0.00459	0.00365	-1.26	0.2087	p(t-4)
	AR4_2_2	-0.00701	0.01440	-0.49	0.6265	q(t-4)

Covariances of Innovations		
Variable	p	q
p	8.95290	2.64155
q	2.64155	0.87719

Information Criteria	
AICC	-0.132
HQC	-0.12993
AIC	-0.132
SBC	-0.12568
FPEC	0.876341

Cross Covariances of Residuals			
Lag	Variable	p	q
0	p	8.94930	2.64048
	q	2.64048	0.87683

Simple multivariate analysis 02.sas

The VARMAX Procedure

Cross Correlations of Residuals			
Lag	Variable	p	q
0	p	1.00000	0.94260
	q	0.94260	1.00000

Schematic Representation of Cross Correlations of Residuals	
Variable/Lag	0
p	++
q	++
+ is > 2*std error, -is < -2*stderror, . is between	

Univariate Model ANOVA Diagnostics				
Variable	R-Square	Standard Deviation	F Value	Pr > F
p	0.0494	2.99214	148.34	<.0001
q	0.1232	0.93659	401.03	<.0001

Univariate Model White Noise Diagnostics					
		Normality		ARCH	
Variable	Durbin Watson	Chi-Square	Pr > ChiSq	F Value	Pr > F
p	1.99986	1128.70	<.0001	99.88	<.0001
q	1.99964	1801.20	<.0001	437.03	<.0001

Univariate Model AR Diagnostics								
	AR1		AR2		AR3		AR4	
Variable	F Value	Pr > F	F Value	Pr > F	F Value	Pr > F	F Value	Pr > F
p	0.00	0.9961	0.00	0.9998	0.00	1.0000	0.01	0.9999
q	0.00	0.9816	0.00	0.9992	0.01	0.9993	0.04	0.9972

Simple multivariate analysis 02.sas

The VARMAX Procedure

Accumulated Impulse Response			
Lag	Variable	p	q
1	p	0.97745	-0.55074
	q	-0.00813	1.39899
2	p	0.96481	-0.89432
	q	-0.01131	1.40968
3	p	0.95534	-0.89531
	q	-0.01350	1.40984
4	p	0.95195	-0.87631
	q	-0.01878	1.42414
5	p	0.95563	-0.88045
	q	-0.02051	1.43076

Orthogonalized Impulse Response			
Lag	Variable	p	q
0	p	2.99214	0.00000
	q	0.88283	0.31274
1	p	-0.55367	-0.17224
	q	0.32793	0.12478
2	p	-0.34114	-0.10745
	q	-0.00008	0.00334
3	p	-0.02922	-0.00031
	q	-0.00641	0.00005
4	p	0.00662	0.00594
	q	-0.00318	0.00447
5	p	0.00736	-0.00130
	q	0.00067	0.00207

Variance Decomposition

Coefficient matrix		
	p	q
p	0.9556281	-0.88045

Covariance matrix		
	p	q
p	8.9529008	2.6415477
q	2.6415477	0.8771922

Correlation matrix		
	p	q
p	1.000	0.943
q	0.943	1.000

Purmutation used in decomposition / ordering of variables:	
p	q

Permuted coefficients		
	p	q
p	0.9556281	-0.88045

Permuted covariance matrix		
	p	q
p	8.9529008	2.6415477
q	2.6415477	0.8771922

Cholesky factor of permuted covariance matrix		
	p	q
p	2.9921398	0
	0.882829	0.3127383

Variance Decomposition

Variance contributions (ordered)		
	p	q
p	4.335083	0.0758178

Total variance	
p	4.4109008

Proportional contributions		
	p	q
p	0.983	0.017

Variance Decomposition

Coefficient matrix		
	p	q
p	0.9556281	-0.88045

Covariance matrix		
	p	q
p	8.9529008	2.6415477
q	2.6415477	0.8771922

Correlation matrix		
	p	q
p	1.000	0.943
q	0.943	1.000

Purmutation used in decomposition / ordering of variables:	
q	p

Permuted coefficients		
	q	p
p	-0.88045	0.9556281

Permuted covariance matrix		
	q	p
q	0.8771922	2.6415477
p	2.6415477	8.9529008

Cholesky factor of permuted covariance matrix		
	q	p
p	0.9365854	0
	2.8204024	0.9991151

Variance Decomposition

Variance contributions (ordered)		
	q	p
p	3.4992913	0.9116095

Total variance	
p	4.4109008

Proportional contributions		
	q	p
p	0.793	0.207

Variance Decomposition
Analyze the impact of an initial buy order.
Note: varmax can only construct orthogonalized impulse response functions in the
given order of the variables. So we need to re-estimate, placing q first.

The VARMAX Procedure

Number of Observations	19999
Number of Pairwise Missing	24
Observation(s) eliminated by differencing	1

Simple Summary Statistics							
Variable	Type	N	Mean	Standard Deviation	Min	Max	Difference
q	Dependent	19999	-0.00345	1.00002	-1.00000	1.00000	
p	Dependent	19999	-0.00152	3.06814	-8.59261	8.03701	1

Variance Decomposition
Analyze the impact of an initial buy order.
Note: varmax can only construct orthogonalized impulse response functions in the
given order of the variables. So we need to re-estimate, placing q first.

The VARMAX Procedure

Type of Model	VAR(4)
Estimation Method	Least Squares Estimation

AR Coefficient Estimates			
Lag	Variable	q	p
1	q	0.39899	-0.00813
	p	-0.55074	-0.02255
2	q	-0.15299	-0.00012
	p	-0.13625	-0.01762
3	q	0.05408	-0.00227
	p	0.04180	-0.01301
4	q	-0.00701	-0.00459
	p	-0.00937	-0.00543

Schematic Representation of Parameter Estimates				
Variable/Lag	AR1	AR2	AR3	AR4
q	+.	-.	+.	..
p	-.	..	..	..
+ is > 2*std error, -is < -2*stderror, . is between, * is N/A				

Model Parameter Estimates						
Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
q	AR1_1_1	0.39899	0.02117	18.84	0.0001	q(t-1)
	AR1_1_2	-0.00813	0.00663	-1.23	0.2202	p(t-1)
	AR2_1_1	-0.15299	0.02425	-6.31	0.0001	q(t-2)
	AR2_1_2	-0.00012	0.00661	-0.02	0.9854	p(t-2)
	AR3_1_1	0.05408	0.02407	2.25	0.0247	q(t-3)
	AR3_1_2	-0.00227	0.00657	-0.35	0.7295	p(t-3)
	AR4_1_1	-0.00701	0.01440	-0.49	0.6265	q(t-4)
	AR4_1_2	-0.00459	0.00365	-1.26	0.2087	p(t-4)

Variance Decomposition
Analyze the impact of an initial buy order.
Note: varmax can only construct orthogonalized impulse response functions in the
given order of the variables. So we need to re-estimate, placing q first.

The VARMAX Procedure

Model Parameter Estimates						
Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
p	AR1_2_1	-0.55074	0.06765	-8.14	0.0001	q(t-1)
	AR1_2_2	-0.02255	0.02118	-1.06	0.2870	p(t-1)
	AR2_2_1	-0.13625	0.07748	-1.76	0.0787	q(t-2)
	AR2_2_2	-0.01762	0.02113	-0.83	0.4043	p(t-2)
	AR3_2_1	0.04180	0.07691	0.54	0.5868	q(t-3)
	AR3_2_2	-0.01301	0.02098	-0.62	0.5351	p(t-3)
	AR4_2_1	-0.00937	0.04601	-0.20	0.8386	q(t-4)
	AR4_2_2	-0.00543	0.01165	-0.47	0.6416	p(t-4)

Covariances of Innovations		
Variable	q	p
q	0.87719	2.64155
p	2.64155	8.95290

Information Criteria	
AICC	-0.132
HQC	-0.12993
AIC	-0.132
SBC	-0.12568
FPEC	0.876341

Variance Decomposition
Analyze the impact of an initial buy order.
Note: varmax can only construct orthogonalized impulse response functions in the
given order of the variables. So we need to re-estimate, placing q first.

The VARMAX Procedure

Cross Covariances of Residuals			
Lag	Variable	q	p
0	q	0.87683	2.64048
	p	2.64048	8.94930

Cross Correlations of Residuals			
Lag	Variable	q	p
0	q	1.00000	0.94260
	p	0.94260	1.00000

Schematic Representation of Cross Correlations of Residuals	
Variable/Lag	0
q	++
p	++
+ is > 2*std error, -is < -2*stderror, . is between	

Univariate Model ANOVA Diagnostics				
Variable	R-Square	Standard Deviation	F Value	Pr > F
q	0.1232	0.93659	401.03	<.0001
p	0.0494	2.99214	148.34	<.0001

Variance Decomposition
Analyze the impact of an initial buy order.
Note: varmax can only construct orthogonalized impulse response functions in the
given order of the variables. So we need to re-estimate, placing q first.

The VARMAX Procedure

Univariate Model White Noise Diagnostics					
		Normality		ARCH	
Variable	Durbin Watson	Chi-Square	Pr > ChiSq	F Value	Pr > F
q	1.99964	1801.20	<.0001	437.03	<.0001
p	1.99986	1128.70	<.0001	99.88	<.0001

Univariate Model AR Diagnostics								
	AR1		AR2		AR3		AR4	
Variable	F Value	Pr > F	F Value	Pr > F	F Value	Pr > F	F Value	Pr > F
q	0.00	0.9816	0.00	0.9992	0.01	0.9993	0.04	0.9972
p	0.00	0.9961	0.00	0.9998	0.00	1.0000	0.01	0.9999

Accumulated Impulse Response			
Lag	Variable	q	p
1	q	1.39899	-0.00813
	p	-0.55074	0.97745
2	q	1.40968	-0.01131
	p	-0.89432	0.96481
3	q	1.40984	-0.01350
	p	-0.89531	0.95534
4	q	1.42414	-0.01878
	p	-0.87631	0.95195
5	q	1.43076	-0.02051
	p	-0.88045	0.95563

Variance Decomposition
Analyze the impact of an initial buy order.
Note: varmax can only construct orthogonalized impulse response functions in the
given order of the variables. So we need to re-estimate, placing q first.

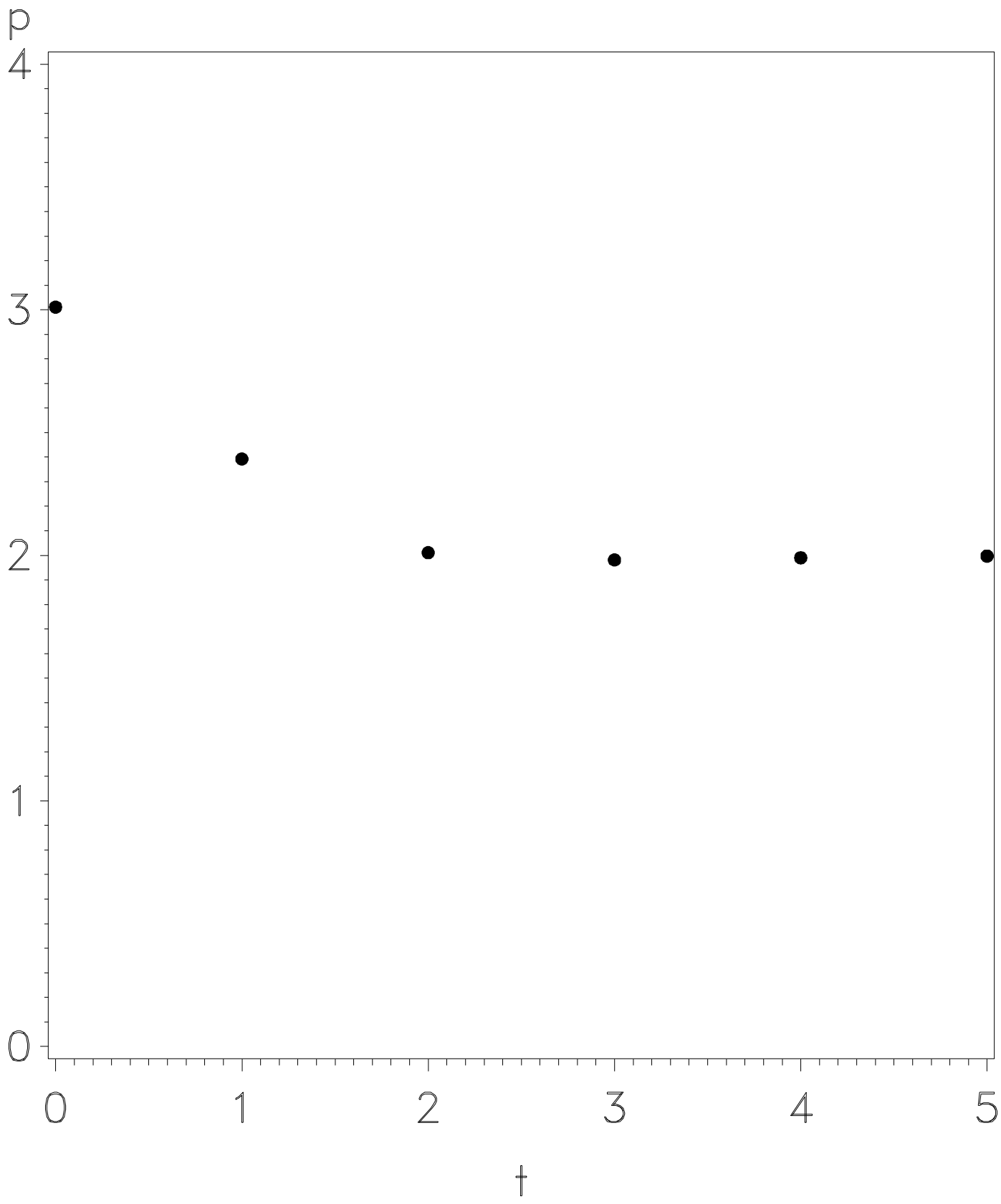
The VARMAX Procedure

Orthogonalized Impulse Response			
Lag	Variable	q	p
0	q	0.93659	0.00000
	p	2.82040	0.99912
1	q	0.35077	-0.00812
	p	-0.57941	-0.02253
2	q	0.00104	-0.00318
	p	-0.35744	-0.01263
3	q	-0.00603	-0.00219
	p	-0.02765	-0.00946
4	q	-0.00151	-0.00528
	p	0.00822	-0.00339
5	q	0.00132	-0.00173
	p	0.00650	0.00368

Simple multivariate analysis 02.sas
Impact of a buy order (q=+1 at time 0)

Obs	q	p	t	qCurrent	pCurrent
1	1.00000	3.01137	0	1.00000	3.01137
2	1.37452	2.39273	1	0.37452	-0.61864
3	1.37563	2.01109	2	0.00111	-0.38164
4	1.36919	1.98157	3	-0.00644	-0.02952
5	1.36758	1.99035	4	-0.00161	0.00878
6	1.36899	1.99730	5	0.00141	0.00694

Simple multivariate analysis 02.sas
Impact of a buy order (q=+1 at time 0)



Simple multivariate analysis 02.sas
Impact of a buy order (q=+1 at time 0)