

Untitled

Study

some datas

datas: ## Risk return

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##                               Dharma      Q.Cap      Quest
## StdDev Sharpe (Rf=0.1%, p=95%): 0.020146913 -0.019172705 -0.1468964
## VaR Sharpe (Rf=0.1%, p=95%):   0.012669543 -0.010874403 -0.0934317
## ES Sharpe (Rf=0.1%, p=95%):   0.008286357 -0.004838421 -0.0614477
##                               Trium      BlackLong Stoxx      SP
## StdDev Sharpe (Rf=0.1%, p=95%): -0.4219127 -0.24760026      0 0.013587214
## VaR Sharpe (Rf=0.1%, p=95%):   -0.2354116 -0.13091873      0 0.008398073
## ES Sharpe (Rf=0.1%, p=95%):   -0.1112093 -0.04878968      0 0.004801412
##                               SPEur      SPhEur
## StdDev Sharpe (Rf=0.1%, p=95%): 0.03653848 -0.0010270741
## VaR Sharpe (Rf=0.1%, p=95%):   0.02226496 -0.0006297822
## ES Sharpe (Rf=0.1%, p=95%):   0.01234817 -0.0003626463

##                               Dharma Q.Cap Quest      Trium BlackLong Stoxx
## Annualized Return              0.2995 0.2051 0.0321 -0.0961      -0.0123 0.2488
## Annualized Std Dev              0.1326 0.1154 0.0830  0.0490      0.0608 0.1114
## Annualized Sharpe (Rf=-0.4%) 2.2983 1.8192 0.4370 -1.8860      -0.1373 2.2794
##                               SP      SPEur SPhEur
## Annualized Return              0.2816 0.3480 0.2430
## Annualized Std Dev              0.1318 0.1376 0.1321
## Annualized Sharpe (Rf=-0.4%) 2.1755 2.5688 1.8776

##                               Dharma      Q.Cap      Quest      Trium
## Average Return      0.001074890 0.000767196 0.0001389279 -0.0003960349
## Standard Deviation 0.008352684 0.007271443 0.0052260047  0.0030874734
##                               BlackLong      Stoxx      SP      SPEur
## Average Return      -0.0000419184 0.0009066092 0.001019435 0.001223330
## Standard Deviation 0.0038308830 0.0070154369 0.008303854 0.008668142
##                               SPhEur
## Average Return      0.0008980636
## Standard Deviation 0.0083203607
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##          Dharma   Q.Cap   Quest   Trium BlackLong   Stoxx      SP
## rho1      0.0229  0.1964  0.0422 -0.0042    0.0641  0.0069 -0.0895
## rho2     -0.0092  0.0142  0.0581  0.0217    0.0749 -0.0193 -0.0328
## rho3      0.0807  0.0248  0.0853  0.0945   -0.1081  0.0149 -0.0037
## rho4     -0.0102 -0.0407  0.0181 -0.0135   -0.0382 -0.0127 -0.0256
## rho5     -0.0404  0.0463  0.0855 -0.1139    0.0528 -0.0894 -0.0646
## rho6     -0.0653  0.0558 -0.0729  0.0409   -0.0080 -0.0428 -0.1393
## Q(6) p-value 0.8567  0.1701  0.5399  0.5683    0.5359  0.9087  0.3571
##          SPhEur  SPhEur
## rho1     -0.1290 -0.0889
## rho2      0.0058 -0.0349
## rho3     -0.0090 -0.0004
## rho4      0.0009 -0.0245
## rho5     -0.0350 -0.0668
## rho6     -0.1629 -0.1413
## Q(6) p-value 0.1835  0.3411

##          Dharma   Q.Cap   Quest   Trium BlackLong   Stoxx      SP   SPhEur
## Up Capture  1.0719  0.6064 -0.0212 -0.2448    0.1857    1 0.8818 0.9366
## Down Capture 1.0229  0.5032 -0.0963 -0.1622    0.2856    1 0.7774 0.7590
##          SPhEur
## Up Capture  0.8615
## Down Capture 0.8059

##          Dharma to Stoxx Q.Cap to Stoxx Quest to Stoxx Trium to Stoxx
## Up Capture          1.0719          0.6064          -0.0212          -0.2448
## Down Capture          1.0229          0.5032          -0.0963          -0.1622
## Up Number           0.8261          0.7217          0.4174          0.2174
## Down Number          0.7838          0.5000          0.4730          0.3243
## Up Percent           0.5304          0.3652          0.2087          0.0783
## Down Percent          0.4730          0.7162          0.7568          0.8784
##          BlackLong to Stoxx Stoxx to Stoxx SP to Stoxx SPhEur to Stoxx
## Up Capture          0.1857          1          0.8818          0.9366
## Down Capture          0.2856          1          0.7774          0.7590
## Up Number           0.5478          1          0.7565          0.7304
## Down Number          0.6216          1          0.7162          0.6757
## Up Percent           0.1304          0          0.4261          0.4609
## Down Percent          0.7838          0          0.6622          0.5946
##          SPhEur to Stoxx
## Up Capture          0.8615

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## Down Capture          0.8059
## Up Number             0.7304
## Down Number           0.7162
## Up Percent            0.4261
## Down Percent          0.6486

##          Dharma to Stoxx Q.Cap to Stoxx Quest to Stoxx Trium to Stoxx
## Correlation    8.705172e-01  6.532324e-01  -0.18304898  -4.643465e-01
## p-value        2.079673e-60  9.756942e-25   0.01104260   1.167933e-11
## Lower CI       8.313973e-01  5.637751e-01  -0.31645438  -5.685684e-01
## Upper CI       9.010508e-01  7.275409e-01  -0.04254347  -3.454536e-01
##          BlackLong to Stoxx Stoxx to Stoxx  SP to Stoxx  SPEur to Stoxx
## Correlation    3.850231e-01                1 7.298407e-01  7.248612e-01
## p-value        3.502309e-08                0 3.245489e-33  1.408597e-32
## Lower CI       2.574518e-01                1 6.560345e-01  6.499699e-01
## Upper CI       4.994028e-01                1 7.898199e-01  7.858091e-01
##          SPhEur to Stoxx
## Correlation    7.310921e-01
## p-value        2.232687e-33
## Lower CI       6.575601e-01
## Upper CI       7.908271e-01

##          Dharma  Q.Cap  Quest  Trium BlackLong  Stoxx
## daily Std Dev    0.0084  0.0073  0.0052  0.0031   0.0038  0.0070
## Skewness         -0.4038 -1.4799 -0.0611 -0.7423   -2.0375 -0.3022
## Kurtosis         4.6451 10.4775  5.9308 11.7809   15.9246  5.1706
## Excess kurtosis   1.6451  7.4775  2.9308  8.7809   12.9246  2.1706
## Sample skewness   -0.4102 -1.5033 -0.0620 -0.7541   -2.0697 -0.3069
## Sample excess kurtosis 1.7207  7.7078  3.0405  9.0458   13.2996  2.2601
##          SP  SPEur  SPhEur
## daily Std Dev    0.0083  0.0087  0.0083
## Skewness         -0.6046 -0.7893 -0.5946
## Kurtosis         6.2035  6.5014  6.1667
## Excess kurtosis   3.2035  3.5014  3.1667
## Sample skewness   -0.6142 -0.8018 -0.6040
## Sample excess kurtosis 3.3204  3.6262  3.2827

##          Dharma  Q.Cap  Quest  Trium BlackLong
## Semi Deviation    0.0062  0.0058  0.0036  0.0022   0.0030
## Gain Deviation     0.0051  0.0041  0.0040  0.0022   0.0021

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## Loss Deviation	0.0062	0.0072	0.0037	0.0024	0.0039
## Downside Deviation (MAR=5%)	0.0058	0.0055	0.0036	0.0025	0.0031
## Downside Deviation (Rf=-0.4%)	0.0057	0.0054	0.0035	0.0024	0.0031
## Downside Deviation (0%)	0.0057	0.0055	0.0035	0.0024	0.0031
## Maximum Drawdown	0.0868	0.1050	0.1032	0.0750	0.0626
## Historical VaR (99%)	-0.0222	-0.0225	-0.0138	-0.0075	-0.0106
## Historical ES (99%)	-0.0270	-0.0373	-0.0209	-0.0141	-0.0208
## Modified VaR (99%)	-0.0235	-0.0307	-0.0158	-0.0149	-0.0202
## Modified ES (99%)	-0.0282	-0.0307	-0.0185	-0.0149	-0.0202
##	Stoxx	SP	SPEur	SPhEur	
## Semi Deviation	0.0052	0.0062	0.0065	0.0062	
## Gain Deviation	0.0045	0.0052	0.0053	0.0052	
## Loss Deviation	0.0054	0.0069	0.0073	0.0069	
## Downside Deviation (MAR=5%)	0.0048	0.0059	0.0061	0.0059	
## Downside Deviation (Rf=-0.4%)	0.0047	0.0058	0.0060	0.0058	
## Downside Deviation (0%)	0.0047	0.0058	0.0060	0.0058	
## Maximum Drawdown	0.0694	0.0677	0.0698	0.0710	
## Historical VaR (99%)	-0.0175	-0.0266	-0.0282	-0.0267	
## Historical ES (99%)	-0.0241	-0.0299	-0.0332	-0.0299	
## Modified VaR (99%)	-0.0202	-0.0270	-0.0290	-0.0271	
## Modified ES (99%)	-0.0232	-0.0270	-0.0290	-0.0271	
##	Dharma	Q.Cap	Quest	Trium	BlackLong
## Semi Deviation	0.0062	0.0058	0.0036	0.0022	0.0030
## Gain Deviation	0.0051	0.0041	0.0040	0.0022	0.0021
## Loss Deviation	0.0062	0.0072	0.0037	0.0024	0.0039
## Downside Deviation (MAR=5%)	0.0058	0.0055	0.0036	0.0025	0.0031
## Downside Deviation (Rf=-0.4%)	0.0057	0.0054	0.0035	0.0024	0.0031
## Downside Deviation (0%)	0.0057	0.0055	0.0035	0.0024	0.0031
## Maximum Drawdown	0.0868	0.1050	0.1032	0.0750	0.0626
## Historical VaR (95%)	-0.0141	-0.0104	-0.0071	-0.0042	-0.0049
## Historical ES (95%)	-0.0197	-0.0189	-0.0115	-0.0070	-0.0102
## Modified VaR (95%)	-0.0133	-0.0128	-0.0082	-0.0055	-0.0072
## Modified ES (95%)	-0.0203	-0.0288	-0.0125	-0.0117	-0.0194
##	Stoxx	SP	SPEur	SPhEur	
## Semi Deviation	0.0052	0.0062	0.0065	0.0062	
## Gain Deviation	0.0045	0.0052	0.0053	0.0052	
## Loss Deviation	0.0054	0.0069	0.0073	0.0069	
## Downside Deviation (MAR=5%)	0.0048	0.0059	0.0061	0.0059	

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## Downside Deviation (Rf=-0.4%) 0.0047 0.0058 0.0060 0.0058
## Downside Deviation (0%)      0.0047 0.0058 0.0060 0.0058
## Maximum Drawdown             0.0694 0.0677 0.0698 0.0710
## Historical VaR (95%)         -0.0121 -0.0119 -0.0119 -0.0120
## Historical ES (95%)          -0.0164 -0.0210 -0.0215 -0.0212
## Modified VaR (95%)           -0.0109 -0.0134 -0.0142 -0.0136
## Modified ES (95%)            -0.0172 -0.0235 -0.0256 -0.0236

##      From      Trough      To  Depth Length To Trough Recovery
## 1 2019-04-24 2019-05-31 2019-07-24 -0.0868      66      28      38
## 2 2019-07-25 2019-08-15 2019-09-10 -0.0827      34      16      18
## 3 2019-03-20 2019-03-25 2019-04-01 -0.0217       9       4       5
## 4 2019-02-07 2019-02-08 2019-02-15 -0.0202       7       2       5
## 5 2019-01-03 2019-01-03 2019-01-04 -0.0184       2       1       1

##      Dharma  Q.Cap  Quest  Trium BlackLong  Stoxx      SP
## Sterling ratio 1.6037 1.0006 0.1579 -0.5490  -0.0759  1.4690  1.6794
## Calmar ratio   3.4520 1.9533 0.3110 -1.2810  -0.1972  3.5866  4.1610
## Burke ratio    2.7024 1.7838 0.4531 -2.0479  -0.2089  2.8812  2.7481
## Pain index     0.0233 0.0222 0.0560 0.0342   0.0115  0.0148  0.0138
## Ulcer index    0.0347 0.0372 0.0656 0.0384   0.0191  0.0231  0.0221
## Pain ratio     12.8491 9.2609 0.5736 -2.8060  -1.0711  16.8006  20.4318
## Martin ratio   8.6259 5.5077 0.4896 -2.5018  -0.6434  10.7624  12.7697
##      SPEur  SPhEur
## Sterling ratio 2.0497 1.4210
## Calmar ratio   4.9859 3.4226
## Burke ratio    3.2555 2.3300
## Pain index     0.0139 0.0151
## Ulcer index    0.0226 0.0235
## Pain ratio     25.0233 16.1059
## Martin ratio   15.3793 10.3278

##      Dharma to Stoxx Q.Cap to Stoxx Quest to Stoxx
## CoSkewness      0.0000      0.0000      0.0000
## CoKurtosis       0.0000      0.0000      0.0000
## Beta CoVariance  1.0365      0.6771     -0.1364
## Beta CoSkewness  1.1237      2.4264      0.1113
## Beta CoKurtosis  1.0475      0.8185     -0.2798
##      Trium to Stoxx BlackLong to Stoxx Stoxx to Stoxx
## CoSkewness      0.0000      0.0000      0

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## CoKurtosis          0.0000          0.0000          0
## Beta CoVariance     -0.2044          0.2102          1
## Beta CoSkewness     -0.5016          0.1138          1
## Beta CoKurtosis     -0.1965          0.1295          1
##           SP to Stoxx SPEur to Stoxx SPhEur to Stoxx
## CoSkewness          0.0000          0.0000          0.0000
## CoKurtosis          0.0000          0.0000          0.0000
## Beta CoVariance     0.8639          0.8956          0.8671
## Beta CoSkewness     0.7227          0.9179          0.7032
## Beta CoKurtosis     0.9036          0.9684          0.9043

##           Dharma   Q.Cap   Quest   Trium BlackLong Stoxx
## Tracking Error      0.0041  0.0060  0.0095  0.0089   0.0066   0
## Annualised Tracking Error 0.0654  0.0945  0.1506  0.1410   0.1043   0
## Information Ratio    0.7752 -0.4622 -1.4395 -2.4465  -2.5030  NaN
##           SP   SPEur   SPhEur
## Tracking Error      0.0058  0.0060  0.0058
## Annualised Tracking Error 0.0914  0.0955  0.0913
## Information Ratio    0.3588  1.0390 -0.0638

##   period_lengths Dharma Stoxx total periods prob_Dharma_outperformance
## 1           1      96   96           192           0.5000000
## 2           30      90   73           163           0.5521472
## 3          200       0    0            0           NaN
##   prob_Stoxx_outperformance
## 1           0.5000000
## 2           0.4478528
## 3           NaN

##           Dharma   Q.Cap   Quest   Trium BlackLong Stoxx
## Last 20 day Average 0.0041  0.0031 -0.0015 -0.0016  -0.0002  0.0022
## Last 50 day Average 0.0010 -0.0005  0.0004 -0.0006  -0.0004  0.0001
## Last 200 day Average 0.0011  0.0008  0.0001 -0.0004   0.0000  0.0009
## Last 20 day Std Dev 0.0060  0.0040  0.0037  0.0027   0.0033  0.0050
## Last 50 day Std Dev 0.0104  0.0107  0.0056  0.0044   0.0057  0.0084
## Last 200 day Std Dev 0.0084  0.0073  0.0052  0.0031   0.0038  0.0070
##           SP   SPEur   SPhEur
## Last 20 day Average 0.0021  0.0026  0.0020
## Last 50 day Average 0.0000  0.0004 -0.0001
## Last 200 day Average 0.0010  0.0012  0.0009

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## Last 20 day Std Dev  0.0054 0.0052  0.0054
## Last 50 day Std Dev  0.0103 0.0111  0.0103
## Last 200 day Std Dev 0.0083 0.0087  0.0083

## Warning in summary.lm(model.lm): essentially perfect fit: summary may be
## unreliable

## Warning in summary.lm(model.lm): essentially perfect fit: summary may be
## unreliable

##           Dharma to Stoxx Dharma to SPEur Q.Cap to Stoxx
## Alpha           0.0001           0.0000           0.0002
## Beta            1.0365           0.8465           0.6771
## Beta+           0.9949           0.8259           0.5436
## Beta-           1.0751           0.8563           1.1226
## R-squared       0.7578           0.7717           0.4267
## Annualized Alpha 0.0345           0.0106           0.0408
## Correlation      0.8705           0.8785           0.6532
## Correlation p-value 0.0000           0.0000           0.0000
## Tracking Error   0.0654           0.0668           0.0945
## Active Premium   0.0507           -0.0485          -0.0437
## Information Ratio 0.7752           -0.7268          -0.4622
## Treynor Ratio    0.2940           0.3600           0.3102
##           Q.Cap to SPEur Quest to Stoxx Quest to SPEur
## Alpha           0.0002           0.0003           0.0003
## Beta            0.4948           -0.1364          -0.0988
## Beta+           0.3546           -0.1653          -0.0173
## Beta-           0.7611           -0.2792          -0.2390
## R-squared       0.3480           0.0335           0.0269
## Annualized Alpha 0.0437           0.0733           0.0724
## Correlation      0.5899           -0.1831          -0.1639
## Correlation p-value 0.0000           0.0110           0.0231
## Tracking Error   0.1163           0.1506           0.1719
## Active Premium   -0.1429          -0.2167          -0.3160
## Information Ratio -1.2290          -1.4395          -1.8377
## Treynor Ratio    0.4244           -0.2658          -0.3668
##           Trium to Stoxx Trium to SPEur BlackLong to Stoxx
## Alpha           -0.0002          -0.0002          -0.0002
## Beta            -0.2044          -0.1381           0.2102
## Beta+           -0.1665          -0.1745           0.1874

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## Beta-	-0.2553	-0.1016	0.1710
## R-squared	0.2156	0.1503	0.1482
## Annualized Alpha	-0.0471	-0.0513	-0.0539
## Correlation	-0.4643	-0.3877	0.3850
## Correlation p-value	0.0000	0.0000	0.0000
## Tracking Error	0.1410	0.1630	0.1043
## Active Premium	-0.3449	-0.4441	-0.2612
## Information Ratio	-2.4465	-2.7249	-2.5030
## Treynor Ratio	0.4523	0.6694	-0.0397
##	BlackLong to SPEur	Stoxx to Stoxx	Stoxx to SPEur
## Alpha	-0.0001	0.0000	0.0002
## Beta	0.0572	1.0000	0.5867
## Beta+	0.0265	1.0000	0.6421
## Beta-	0.1110	1.0000	0.5846
## R-squared	0.0168	1.0000	0.5254
## Annualized Alpha	-0.0241	0.0000	0.0505
## Correlation	0.1295	1.0000	0.7249
## Correlation p-value	0.0735	0.0000	0.0000
## Tracking Error	0.1431	0.0000	0.0955
## Active Premium	-0.3604	0.0000	-0.0992
## Information Ratio	-2.5191	NaN	-1.0390
## Treynor Ratio	-0.1460	0.2538	0.4327
##	SP to Stoxx	SP to SPEur	SPEur to Stoxx
## Alpha	0.0002	-0.0001	0.0004
## Beta	0.8639	0.9038	0.8956
## Beta+	0.8501	0.9252	0.9017
## Beta-	0.9612	0.9348	1.0113
## R-squared	0.5327	0.8901	0.5254
## Annualized Alpha	0.0619	-0.0211	0.1097
## Correlation	0.7298	0.9434	0.7249
## Correlation p-value	0.0000	0.0000	0.0000
## Tracking Error	0.0914	0.0457	0.0955
## Active Premium	0.0328	-0.0664	0.0992
## Information Ratio	0.3588	-1.4549	1.0390
## Treynor Ratio	0.3320	0.3173	0.3947
##	SPEur to Stoxx	SPEur to SPEur	
## Alpha	0.0001	-0.0002	
## Beta	0.8671	0.9074	
## Beta+	0.8561	0.9293	

## Beta-	0.9578	0.9324
## R-squared	0.5345	0.8936
## Annualized Alpha	0.0292	-0.0517
## Correlation	0.7311	0.9453
## Correlation p-value	0.0000	0.0000
## Tracking Error	0.0913	0.0449
## Active Premium	-0.0058	-0.1051
## Information Ratio	-0.0638	-2.3382
## Treynor Ratio	0.2860	0.2733

##	Dharma	Q.Cap	Quest	Trium	BlackLong	Stoxx	SP
## Specific Risk	0.0651	0.0872	0.0813	0.0433	0.0560	0.0000	0.0899
## Systematic Risk	0.1154	0.0754	-0.0152	-0.0228	0.0234	0.1114	0.0962
## Total Risk	0.1325	0.1153	0.0828	0.0489	0.0607	0.1114	0.1317
##	SPEur	SPhEur					
## Specific Risk	0.0945	0.0899					
## Systematic Risk	0.0997	0.0966					
## Total Risk	0.1374	0.1319					

##	Dharma	Q.Cap	Quest	Trium	BlackLong	Stoxx
## Observations	192.0000	192.0000	192.0000	192.0000	192.0000	192.0000
## NAs	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
## Minimum	-0.0293	-0.0387	-0.0220	-0.0199	-0.0270	-0.0249
## Quartile 1	-0.0033	-0.0020	-0.0026	-0.0021	-0.0012	-0.0022
## Median	0.0015	0.0013	0.0000	0.0000	0.0000	0.0012
## Arithmetic Mean	0.0011	0.0008	0.0001	-0.0004	0.0000	0.0009
## Geometric Mean	0.0010	0.0007	0.0001	-0.0004	0.0000	0.0009
## Quartile 3	0.0060	0.0045	0.0022	0.0010	0.0020	0.0045
## Maximum	0.0301	0.0227	0.0194	0.0116	0.0097	0.0279
## SE Mean	0.0006	0.0005	0.0004	0.0002	0.0003	0.0005
## LCL Mean (0.95)	-0.0001	-0.0003	-0.0006	-0.0008	-0.0006	-0.0001
## UCL Mean (0.95)	0.0023	0.0018	0.0009	0.0000	0.0005	0.0019
## Variance	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000
## Stdev	0.0084	0.0073	0.0052	0.0031	0.0038	0.0070
## Skewness	-0.4038	-1.4799	-0.0611	-0.7423	-2.0375	-0.3022
## Kurtosis	1.6451	7.4775	2.9308	8.7809	12.9246	2.1706
##	SP	SPEur	SPhEur			
## Observations	192.0000	192.0000	192.0000			
## NAs	0.0000	0.0000	0.0000			
## Minimum	-0.0302	-0.0376	-0.0300			

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## Quartile 1      -0.0023  -0.0024  -0.0024
## Median          0.0009   0.0007   0.0007
## Arithmetic Mean  0.0010   0.0012   0.0009
## Geometric Mean   0.0010   0.0012   0.0009
## Quartile 3      0.0063   0.0056   0.0061
## Maximum          0.0338   0.0322   0.0338
## SE Mean          0.0006   0.0006   0.0006
## LCL Mean (0.95) -0.0002   0.0000  -0.0003
## UCL Mean (0.95)  0.0022   0.0025   0.0021
## Variance         0.0001   0.0001   0.0001
## Stdev            0.0083   0.0087   0.0083
## Skewness         -0.6046  -0.7893  -0.5946
## Kurtosis         3.2035   3.5014   3.1667

##              Dharma  Q.Cap  Quest  Trium BlackLong  Stoxx
## Mean Absolute deviation 0.0062 0.0048 0.0036 0.0021   0.0024 0.0050
## daily Std Dev           0.0084 0.0073 0.0052 0.0031   0.0038 0.0070
## Annualized Std Dev      0.1326 0.1154 0.0830 0.0490   0.0608 0.1114
##              SP  SPEur  SPhEur
## Mean Absolute deviation 0.0058 0.0061 0.0058
## daily Std Dev           0.0083 0.0087 0.0083
## Annualized Std Dev      0.1318 0.1376 0.1321

##              Dharma      Q.Cap      Quest      Trium BlackLong
## Total Risk =  0.1326916 0.1155326 0.08281393 0.04897193 0.06070681
##              Stoxx      SP      SPEur      SPhEur
## Total Risk =  0.1115937 0.1316676 0.1374474 0.1319383

##              Dharma      Q.Cap      Quest      Trium BlackLong
## Tracking Error: Stoxx 0.06538105 0.09450919 0.1505567 0.1409745 0.104334
##              Stoxx      SP      SPEur      SPhEur
## Tracking Error: Stoxx 0 0.09138033 0.09550368 0.09132418

AdjustedSharpeRatio(mainIdx,
                    riskFree)

##              Dharma
## Annualized Sharpe Ratio (Rf=-0.4%) 1.110708

AppraisalRatio(mainIdx,
               oneBench,
               mean(riskFree),

```

```

method="modified") # "appraisal", "alternative"

## [1] 0.04015194
AverageDrawdown(allIdx)

##           Dharma      Q.Cap      Quest      Trium  BlackLong
## Average Drawdown 0.01705456 0.01242273 0.07183559 0.07500623 0.01382728
##           Stoxx      SP      SPEur      SPhEur
## Average Drawdown 0.01474423 0.0144306 0.01271994 0.01496421

library(xtable)
print(xtable(AverageDrawdown(allIdx)))

## % latex table generated in R 3.6.1 by xtable 1.8-4 package
## % Tue Sep 24 15:06:55 2019
## \begin{table}[ht]
## \centering
## \begin{tabular}{rrrrrrrrrr}
## \hline
## & Dharma & Q.Cap & Quest & Trium & BlackLong & Stoxx & SP & SPEur & SPhEur \\
## \hline
## Average Drawdown & 0.02 & 0.01 & 0.07 & 0.08 & 0.01 & 0.01 & 0.01 & 0.01 & 0.01 \\
## \hline
## \end{tabular}
## \end{table}

AverageLength(allIdx)

##           Dharma Q.Cap Quest Trium BlackLong  Stoxx  SP  SPEur
## Average Length 9.333333  7.9  93.5   190    21.875 10.0625 7.95 7.363636
##           SPhEur
## Average Length 8.473684

AverageRecovery(allIdx)

##           Dharma Q.Cap Quest Trium BlackLong  Stoxx  SP  SPEur
## Average Recovery 5.111111  4.5  51.5    4    7.75 5.0625 4.2 4.227273
##           SPhEur
## Average Recovery 4.684211

```

```
BernardoLedoitRatio(allIdx)
```

```
##                               Dharma    Q.Cap    Quest    Trium BlackLong
## Bernardo and Ledoit ratio 1.413282 1.370106 1.081458 0.6763377 0.9655389
##                               Stoxx      SP      SPEur    SPhEur
## Bernardo and Ledoit ratio 1.430524 1.423408 1.495266 1.364268
```

```
BetaCoVariance(allIdx, allIdx)
```

```
##                               Dharma    Q.Cap    Quest    Trium
## Beta Covariance: Dharma    1.0000000 0.5794155 -0.12328746 -0.1906713
## Beta Covariance: Q.Cap    0.7645414 1.0000000 -0.05797807 -0.1982284
## Beta Covariance: Quest    -0.3149426 -0.1122446 1.00000000 0.1229146
## Beta Covariance: Trium    -1.3955037 -1.0995136 0.35215735 1.0000000
## Beta Covariance: BlackLong 0.5211858 0.2677144 0.18616758 0.3021840
## Beta Covariance: Stoxx    1.0364508 0.6770701 -0.13635856 -0.2043575
## Beta Covariance: SP      0.8652886 0.4395154 -0.14386195 -0.1425826
## Beta Covariance: SPEur    0.8465014 0.4948366 -0.09884024 -0.1380759
## Beta Covariance: SPhEur    0.8654921 0.4398652 -0.14393338 -0.1425920
##                               BlackLong    Stoxx      SP      SPEur
## Beta Covariance: Dharma    0.10963223 0.7311492 0.8552011 0.9116488
## Beta Covariance: Q.Cap    0.07430674 0.6302340 0.5731817 0.7031899
## Beta Covariance: Quest    0.10003736 -0.2457266 -0.3632166 -0.2719231
## Beta Covariance: Trium    0.46522473 -1.0551000 -1.0313817 -1.0883371
## Beta Covariance: BlackLong 1.00000000 0.7050869 0.3682146 0.2929623
## Beta Covariance: Stoxx    0.21024758 1.0000000 0.8638792 0.8956248
## Beta Covariance: SP      0.07836812 0.6165994 1.0000000 0.9848329
## Beta Covariance: SPEur    0.05722127 0.5866561 0.9037950 1.0000000
## Beta Covariance: SPhEur    0.07887645 0.6164313 0.9978737 0.9848223
##                               SPhEur
## Beta Covariance: Dharma    0.8588065
## Beta Covariance: Q.Cap    0.5759207
## Beta Covariance: Quest    -0.3648432
## Beta Covariance: Trium    -1.0355547
## Beta Covariance: BlackLong 0.3720779
## Beta Covariance: Stoxx    0.8670807
## Beta Covariance: SP      1.0018450
## Beta Covariance: SPEur    0.9073821
## Beta Covariance: SPhEur    1.0000000
```

BetaCoSkewness(allIdx, allIdx)

```
##
## Beta Coskewness: Dharma      Dharma      Q.Cap      Quest      Trium
## Beta Coskewness: Q.Cap      0.7347435  1.0000000  -0.2435378  -0.20361091
## Beta Coskewness: Quest      -4.6716877  3.7930193  1.0000000  1.78795668
## Beta Coskewness: Trium      -0.1483136  0.9672165  0.7375503  1.00000000
## Beta Coskewness: BlackLong  -0.2443146  -0.1336793  0.3106806  0.57394542
## Beta Coskewness: Stoxx      1.1236521  2.4265300  0.1112723  -0.50169754
## Beta Coskewness: SP         0.9058070  1.0452044  -0.2001686  -0.03475610
## Beta Coskewness: SPEur      0.7754577  0.8769556  -0.1432288  -0.02805112
## Beta Coskewness: SPhEur     0.9046055  1.0445797  -0.2026449  -0.03434958
##
## Beta Coskewness: Dharma      BlackLong    Stoxx      SP      SPEur
## Beta Coskewness: Dharma      0.12379156  0.69325940  1.1653739  1.3106835
## Beta Coskewness: Q.Cap      -0.03654013  0.66722807  0.6281343  0.7493461
## Beta Coskewness: Quest      1.81546053  -4.00328184  -6.6249637  -4.7405499
## Beta Coskewness: Trium      2.29218488  0.97796933  -0.8601512  -0.8497505
## Beta Coskewness: BlackLong  1.00000000  0.05729023  -0.1866582  -0.3669512
## Beta Coskewness: Stoxx      0.11377028  1.00000000  0.7226670  0.9178063
## Beta Coskewness: SP         0.21425314  0.44649970  1.0000000  1.1246277
## Beta Coskewness: SPEur      0.11021221  0.42240945  0.8670522  1.0000000
## Beta Coskewness: SPhEur     0.21495242  0.44070080  1.0036460  1.1242211
##
## Beta Coskewness: Dharma      SPhEur
## Beta Coskewness: Dharma      1.1539788
## Beta Coskewness: Q.Cap      0.6228357
## Beta Coskewness: Quest      -6.5684954
## Beta Coskewness: Trium      -0.8492477
## Beta Coskewness: BlackLong  -0.1802600
## Beta Coskewness: Stoxx      0.7031073
## Beta Coskewness: SP         0.9964291
## Beta Coskewness: SPEur      0.8614609
## Beta Coskewness: SPhEur     1.0000000
```

BetaCoKurtosis(allIdx, allIdx)

```
##
## Beta Cokurtosis: Dharma      Dharma      Q.Cap      Quest      Trium
## Beta Cokurtosis: Dharma      1.0000000  0.6926732  -0.2373918  -0.15677052
## Beta Cokurtosis: Q.Cap      0.6974759  1.0000000  -0.0841158  -0.16756915
## Beta Cokurtosis: Quest      -0.6102050  -0.1430737  1.0000000  0.13522006
```

```

## Beta Cokurtosis: Trium      -0.9376393 -0.8694799  0.5599438  1.00000000
## Beta Cokurtosis: BlackLong -0.2120956 -0.1738865  0.4183539  0.61351209
## Beta Cokurtosis: Stoxx      1.0474772  0.8185000 -0.2797926 -0.19646076
## Beta Cokurtosis: SP         0.8730387  0.5172892 -0.2633800 -0.11166616
## Beta Cokurtosis: SPEur      0.8240878  0.5770335 -0.1954115 -0.09591944
## Beta Cokurtosis: SPhEur     0.8722923  0.5122548 -0.2658492 -0.11184161
##                               BlackLong      Stoxx      SP      SPEur
## Beta Cokurtosis: Dharma      0.08855985  0.77034790  0.9705221  1.0340650
## Beta Cokurtosis: Q.Cap        0.02217758  0.64069786  0.5251272  0.6538496
## Beta Cokurtosis: Quest        0.05905166 -0.48161044 -0.6856091 -0.6020511
## Beta Cokurtosis: Trium        1.05155194 -0.60559123 -0.8160042 -0.9350557
## Beta Cokurtosis: BlackLong    1.00000000  0.03719401 -0.2509824 -0.3392481
## Beta Cokurtosis: Stoxx        0.12946320  1.00000000  0.9035647  0.9683694
## Beta Cokurtosis: SP           0.07132254  0.62022796  1.0000000  1.0195003
## Beta Cokurtosis: SPEur        0.03861134  0.58416833  0.9153940  1.0000000
## Beta Cokurtosis: SPhEur       0.07244234  0.61968330  0.9994197  1.0176549
##                               SPhEur
## Beta Cokurtosis: Dharma        0.9711504
## Beta Cokurtosis: Q.Cap          0.5224163
## Beta Cokurtosis: Quest         -0.6864732
## Beta Cokurtosis: Trium         -0.8098670
## Beta Cokurtosis: BlackLong     -0.2447314
## Beta Cokurtosis: Stoxx          0.9042975
## Beta Cokurtosis: SP             1.0004209
## Beta Cokurtosis: SPEur          0.9146417
## Beta Cokurtosis: SPhEur         1.0000000

```

```

BurkeRatio(allIdx,
            mean(riskFree),
            modified=FALSE) # TRUE

```

```

##                               Dharma      Q.Cap
## Burke ratio (Risk free = -1.59763558201058e-05) 2.702374 1.783825
##                               Quest      Trium
## Burke ratio (Risk free = -1.59763558201058e-05) 0.4530947 -2.047932
##                               BlackLong      Stoxx
## Burke ratio (Risk free = -1.59763558201058e-05) -0.2089294 2.881179
##                               SP      SPEur      SPhEur
## Burke ratio (Risk free = -1.59763558201058e-05) 2.748075 3.255524 2.33002

```

```
CalmarRatio(allIdx, scale=252)
```

```
##           Dharma    Q.Cap    Quest    Trium BlackLong    Stoxx
## Calmar Ratio 3.452011 1.953285 0.3109702 -1.281006 -0.1972024 3.586632
##           SP    SPEur    SPhEur
## Calmar Ratio 4.160962 4.98595 3.422559
```

```
SterlingRatio(allIdx, scale=252, excess=0.1)
```

```
##           Dharma    Q.Cap    Quest    Trium
## Sterling Ratio (Excess = 10%) 1.603654 1.000562 0.157924 -0.5490287
##           BlackLong    Stoxx    SP    SPEur
## Sterling Ratio (Excess = 10%) -0.07588951 1.469035 1.67943 2.049651
##           SPhEur
## Sterling Ratio (Excess = 10%) 1.421017
```

CAPM functions a bit disregarder now

```
CAPM.alpha(allIdx,
            oneBench,
            riskFree)
```

```
##           Dharma    Q.Cap    Quest    Trium
## Alpha: Stoxx 0.0001346521 0.0001585175 0.0002807103 -0.0001915197
##           BlackLong    Stoxx    SP    SPEur
## Alpha: Stoxx -0.0002199094 -2.503858e-19 0.0002384123 0.0004130172
##           SPhEur
## Alpha: Stoxx 0.0001140867
```

```
CAPM.beta(allIdx,
            oneBench,
            riskFree)
```

```
##           Dharma    Q.Cap    Quest    Trium BlackLong Stoxx
## Beta: Stoxx 1.036451 0.6770699 -0.1363625 -0.2043592 0.2102432    1
##           SP    SPEur    SPhEur
## Beta: Stoxx 0.863876 0.8956233 0.8670775
```

```
CAPM.CML.slope(oneBench,
                riskFree)
```

```
##           Stoxx
## Capital Market Line Slope: Stoxx 0.1315079
```

```
CAPM.SML.slope(oneBench,
               riskFree)
```

```
##                               Stoxx
## Security Market Line: Stoxx 1083.91
```

```
CAPM.CML(allIdx,
         oneBench,
         riskFree)
```

```
##                               Dharma      Q.Cap      Quest
## Capital Market Line: Stoxx 0.0001253802 8.4916e-05 2.29376e-06
##                               Trium      BlackLong      Stoxx
## Capital Market Line: Stoxx -6.805808e-05 -2.148896e-05 0.0001032499
##                               SP          SPEur          SPhEur
## Capital Market Line: Stoxx 0.0001180875 0.0001449012 0.0001021261
```

```
CAPM.RiskPremium(allIdx,
                 riskFree)
```

```
##                               Dharma      Q.Cap      Quest      Trium
## Risk Premium (Rf=0%) 0.001090866 0.0007831723 0.0001549042 -0.0003800585
##                               BlackLong      Stoxx      SP          SPEur
## Risk Premium (Rf=0%) -2.594205e-05 0.0009225856 0.001035412 0.001239306
##                               SPhEur
## Risk Premium (Rf=0%) 0.0009140399
```

```
CAPM.dynamic(allIdx,
             oneBench,
             riskFree,
             returns[paste( periods[1],"/"), 4:5]) # fake Z facrot (public info not directly linked, ie US10y CPI etc...)
```

```
##                               Average alpha Trium alpha at t - 1
## Dharma to Stoxx      -1.007508e-04      -3.584982e-01
## Q.Cap to Stoxx       5.308383e-04      -4.526193e-01
## Quest to Stoxx       1.053741e-04      -9.773190e-02
## Trium to Stoxx      -2.030086e-04      1.000020e+00
## BlackLong to Stoxx -2.030086e-04      1.955129e-05
## Stoxx to Stoxx       1.420333e-19      -7.509805e-16
## SP to Stoxx          4.323791e-05      1.594576e-01
## SPEur to Stoxx      1.737493e-04      2.712859e-01
```



```

## SPhEur to Stoxx      -9.133191e-05      1.525813e-01
##                      BlackLong alpha at t - 1 Average beta
## Dharma to Stoxx      -5.300576e-02      9.851300e-01
## Q.Cap to Stoxx       -3.024714e-02      5.648350e-01
## Quest to Stoxx       3.688879e-01      -2.384976e-01
## Trium to Stoxx       -2.454139e-05      7.654796e-06
## BlackLong to Stoxx   9.999755e-01      7.654796e-06
## Stoxx to Stoxx       5.655027e-16      1.000000e+00
## SP to Stoxx          -3.416317e-01      9.917198e-01
## SPEur to Stoxx       -5.250847e-01      1.078649e+00
## SPhEur to Stoxx     -3.360125e-01      9.927271e-01
##                      Trium beta at t - 1 BlackLong beta at t - 1
## Dharma to Stoxx      -1.663493e+01      5.793737e+00
## Q.Cap to Stoxx       3.686836e+01      3.320853e+00
## Quest to Stoxx       2.759111e+00      2.058356e+01
## Trium to Stoxx       8.564527e-04      -2.293454e-04
## BlackLong to Stoxx   8.564527e-04      -2.293454e-04
## Stoxx to Stoxx       -7.886368e-16      1.523534e-15
## SP to Stoxx          -3.107942e+01      -1.415323e+01
## SPEur to Stoxx       -2.420017e+01      -3.039288e+00
## SPhEur to Stoxx     -3.169007e+01      -1.385234e+01

```

```

CAPM.epsilon(allIdx,
              oneBench,
              mean(riskFree))

```

```

##                      Dharma
## Regression epsilon (Risk free = -1.59763558201058e-05) 0.04144891
##                      Q.Cap
## Regression epsilon (Risk free = -1.59763558201058e-05) 0.03648627
##                      Quest
## Regression epsilon (Risk free = -1.59763558201058e-05) 0.06572162
##                      Trium
## Regression epsilon (Risk free = -1.59763558201058e-05) -0.0450575
##                      BlackLong
## Regression epsilon (Risk free = -1.59763558201058e-05) -0.06444844
##                      Stoxx
## Regression epsilon (Risk free = -1.59763558201058e-05) -3.195271e-05
##                      SP      SPEur
## Regression epsilon (Risk free = -1.59763558201058e-05) 0.06638813 0.124751

```

```

##                                     SPhEur
## Regression epsilon (Risk free = -1.59763558201058e-05) 0.02710201
CAPM.jensenAlpha(allIdx,
                  oneBench,
                  mean(riskFree))

##                                     Dharma      Q.Cap
## Jensen's Alpha (Risk free = -1.59763558201058e-05) 0.04161551 0.03667674
##                                     Quest      Trium
## Jensen's Alpha (Risk free = -1.59763558201058e-05) 0.06603428 -0.04521707
##                                     BlackLong
## Jensen's Alpha (Risk free = -1.59763558201058e-05) -0.06463641
##                                     Stoxx
## Jensen's Alpha (Risk free = -1.59763558201058e-05) -1.665335e-16
##                                     SP      SPEur
## Jensen's Alpha (Risk free = -1.59763558201058e-05) 0.06665849 0.125196
##                                     SPhEur
## Jensen's Alpha (Risk free = -1.59763558201058e-05) 0.02724805
CDD(returns, weight= NULL, p= 0.95)

##                                     Dharma      Q.Cap      Quest      Trium
## Conditional Drawdown 5% 0.08218555 0.05871846 0.1273809 0.06391121
##                                     BlackLong      Stoxx      SP      SPEur
## Conditional Drawdown 5% 0.02957565 0.0618313 0.02544341 0.06599971
##                                     SPhEur UsOnIdx      EuOnIdx
## Conditional Drawdown 5% 0.02529022      0 0.0170734
length(mainIdx)

## [1] 192
cb <- clean.boudt(mainIdx, alpha=0.01, trim=0.001)
length(cb[[1]])

## [1] 192
CoSkewnessMatrix(allIdx)

##          [,1]      [,2]      [,3]      [,4]      [,5]
## [1,] -2.334580e-07 -3.362194e-07 6.139358e-08 3.307582e-08 -2.890013e-08
## [2,] -3.362194e-07 -4.148010e-07 1.065683e-07 6.068630e-08 -1.316739e-08

```

```

## [3,] 6.139358e-08 1.065683e-07 4.040403e-08 4.576218e-10 3.546991e-08
## [4,] 3.307582e-08 6.068630e-08 4.576218e-10 3.215054e-09 3.396656e-08
## [5,] -2.890013e-08 -1.316739e-08 3.546991e-08 3.396656e-08 2.776791e-08
## [6,] -1.618470e-07 -2.787283e-07 1.225639e-08 4.390182e-08 -1.251107e-08
## [7,] -2.720659e-07 -3.352322e-07 5.862566e-08 1.246309e-08 -5.550424e-08
## [8,] -3.059896e-07 -3.767808e-07 6.753580e-08 1.911418e-08 -4.232338e-08
## [9,] -2.694056e-07 -3.327072e-07 5.869495e-08 1.228384e-08 -5.513820e-08
##      [,6]      [,7]      [,8]      [,9]
## [1,] -1.618470e-07 -2.720659e-07 -3.059896e-07 -2.694056e-07
## [2,] -2.787283e-07 -3.352322e-07 -3.767808e-07 -3.327072e-07
## [3,] 1.225639e-08 5.862566e-08 6.753580e-08 5.869495e-08
## [4,] 4.390182e-08 1.246309e-08 1.911418e-08 1.228384e-08
## [5,] -1.251107e-08 -5.550424e-08 -4.232338e-08 -5.513820e-08
## [6,] -1.163169e-07 -1.481807e-07 -1.751320e-07 -1.457756e-07
## [7,] -1.481807e-07 -3.111549e-07 -3.479520e-07 -3.092755e-07
## [8,] -1.751320e-07 -3.479520e-07 -3.955430e-07 -3.453511e-07
## [9,] -1.457756e-07 -3.092755e-07 -3.453511e-07 -3.073961e-07
##      [,10]      [,11]      [,12]      [,13]
## [1,] -3.362194e-07 -4.148010e-07 1.065683e-07 6.068630e-08
## [2,] -4.148010e-07 -5.645521e-07 1.374898e-07 1.149490e-07
## [3,] 1.065683e-07 1.374898e-07 -3.280469e-08 -1.535476e-08
## [4,] 6.068630e-08 1.149490e-07 -1.535476e-08 -2.096675e-08
## [5,] -1.316739e-08 2.062881e-08 3.068298e-08 1.734344e-08
## [6,] -2.787283e-07 -3.766850e-07 7.940673e-08 7.287696e-08
## [7,] -3.352322e-07 -3.546145e-07 7.634898e-08 2.699151e-08
## [8,] -3.767808e-07 -4.230449e-07 8.891469e-08 3.551913e-08
## [9,] -3.327072e-07 -3.516232e-07 7.657288e-08 2.690561e-08
##      [,14]      [,15]      [,16]      [,17]
## [1,] -1.316739e-08 -2.787283e-07 -3.352322e-07 -3.767808e-07
## [2,] 2.062881e-08 -3.766850e-07 -3.546145e-07 -4.230449e-07
## [3,] 3.068298e-08 7.940673e-08 7.634898e-08 8.891469e-08
## [4,] 1.734344e-08 7.287696e-08 2.699151e-08 3.551913e-08
## [5,] 1.519350e-08 -2.381976e-09 -3.648467e-08 -2.689384e-08
## [6,] -2.381976e-09 -2.511866e-07 -2.391213e-07 -2.808070e-07
## [7,] -3.648467e-08 -2.391213e-07 -3.590395e-07 -3.989735e-07
## [8,] -2.689384e-08 -2.808070e-07 -3.989735e-07 -4.473147e-07
## [9,] -3.636144e-08 -2.371418e-07 -3.569946e-07 -3.963770e-07
##      [,18]      [,19]      [,20]      [,21]      [,22]
## [1,] -3.327072e-07 6.139358e-08 1.065683e-07 4.040403e-08 4.576218e-10

```

```

## [2,] -3.516232e-07 1.065683e-07 1.374898e-07 -3.280469e-08 -1.535476e-08
## [3,] 7.657288e-08 4.040403e-08 -3.280469e-08 -8.648702e-09 -1.546350e-08
## [4,] 2.690561e-08 4.576218e-10 -1.535476e-08 -1.546350e-08 -1.598818e-08
## [5,] -3.636144e-08 3.546991e-08 3.068298e-08 -1.570138e-08 -3.035817e-08
## [6,] -2.371418e-07 1.225639e-08 7.940673e-08 3.462319e-08 -7.273464e-11
## [7,] -3.569946e-07 5.862566e-08 7.634898e-08 5.729733e-08 1.473376e-09
## [8,] -3.963770e-07 6.753580e-08 8.891469e-08 4.099960e-08 3.651704e-09
## [9,] -3.549611e-07 5.869495e-08 7.657288e-08 5.680896e-08 1.276838e-09
##      [,23]      [,24]      [,25]      [,26]      [,27]
## [1,] 3.546991e-08 1.225639e-08 5.862566e-08 6.753580e-08 5.869495e-08
## [2,] 3.068298e-08 7.940673e-08 7.634898e-08 8.891469e-08 7.657288e-08
## [3,] -1.570138e-08 3.462319e-08 5.729733e-08 4.099960e-08 5.680896e-08
## [4,] -3.035817e-08 -7.273464e-11 1.473376e-09 3.651704e-09 1.276838e-09
## [5,] -3.531082e-08 1.943566e-08 3.732804e-08 4.124718e-08 3.696544e-08
## [6,] 1.943566e-08 -1.151855e-08 3.924418e-09 1.057803e-08 3.410274e-09
## [7,] 3.732804e-08 3.924418e-09 6.876018e-08 6.675398e-08 6.880095e-08
## [8,] 4.124718e-08 1.057803e-08 6.675398e-08 7.305767e-08 6.682778e-08
## [9,] 3.696544e-08 3.410274e-09 6.880095e-08 6.682778e-08 6.886124e-08
##      [,28]      [,29]      [,30]      [,31]      [,32]
## [1,] 3.307582e-08 6.068630e-08 4.576218e-10 3.215054e-09 3.396656e-08
## [2,] 6.068630e-08 1.149490e-07 -1.535476e-08 -2.096675e-08 1.734344e-08
## [3,] 4.576218e-10 -1.535476e-08 -1.546350e-08 -1.598818e-08 -3.035817e-08
## [4,] 3.215054e-09 -2.096675e-08 -1.598818e-08 -2.167741e-08 -4.968864e-08
## [5,] 3.396656e-08 1.734344e-08 -3.035817e-08 -4.968864e-08 -6.523254e-08
## [6,] 4.390182e-08 7.287696e-08 -7.273464e-11 -2.119984e-08 1.140835e-08
## [7,] 1.246309e-08 2.699151e-08 1.473376e-09 1.864585e-08 3.424797e-08
## [8,] 1.911418e-08 3.551913e-08 3.651704e-09 1.842039e-08 4.154587e-08
## [9,] 1.228384e-08 2.690561e-08 1.276838e-09 1.840949e-08 3.383962e-08
##      [,33]      [,34]      [,35]      [,36]      [,37]
## [1,] 4.390182e-08 1.246309e-08 1.911418e-08 1.228384e-08 -2.890013e-08
## [2,] 7.287696e-08 2.699151e-08 3.551913e-08 2.690561e-08 -1.316739e-08
## [3,] -7.273464e-11 1.473376e-09 3.651704e-09 1.276838e-09 3.546991e-08
## [4,] -2.119984e-08 1.864585e-08 1.842039e-08 1.840949e-08 3.396656e-08
## [5,] 1.140835e-08 3.424797e-08 4.154587e-08 3.383962e-08 2.776791e-08
## [6,] 5.193412e-08 1.333285e-08 2.157045e-08 1.309406e-08 -1.251107e-08
## [7,] 1.333285e-08 1.193911e-08 1.364693e-08 1.180949e-08 -5.550424e-08
## [8,] 2.157045e-08 1.364693e-08 1.430823e-08 1.344269e-08 -4.232338e-08
## [9,] 1.309406e-08 1.180949e-08 1.344269e-08 1.167241e-08 -5.513820e-08
##      [,38]      [,39]      [,40]      [,41]

```

```

## [1,] -1.316739e-08  3.546991e-08  3.396656e-08  2.776791e-08
## [2,]  2.062881e-08  3.068298e-08  1.734344e-08  1.519350e-08
## [3,]  3.068298e-08 -1.570138e-08 -3.035817e-08 -3.531082e-08
## [4,]  1.734344e-08 -3.035817e-08 -4.968864e-08 -6.523254e-08
## [5,]  1.519350e-08 -3.531082e-08 -6.523254e-08 -1.136564e-07
## [6,] -2.381976e-09  1.943566e-08  1.140835e-08 -6.511399e-09
## [7,] -3.648467e-08  3.732804e-08  3.424797e-08  2.121489e-08
## [8,] -2.689384e-08  4.124718e-08  4.154587e-08  4.170634e-08
## [9,] -3.636144e-08  3.696544e-08  3.383962e-08  2.048770e-08
##      [,42]      [,43]      [,44]      [,45]
## [1,] -1.251107e-08 -5.550424e-08 -4.232338e-08 -5.513820e-08
## [2,] -2.381976e-09 -3.648467e-08 -2.689384e-08 -3.636144e-08
## [3,]  1.943566e-08  3.732804e-08  4.124718e-08  3.696544e-08
## [4,]  1.140835e-08  3.424797e-08  4.154587e-08  3.383962e-08
## [5,] -6.511399e-09  2.121489e-08  4.170634e-08  2.048770e-08
## [6,] -1.177713e-08 -2.623191e-08 -1.302113e-08 -2.617798e-08
## [7,] -2.623191e-08 -7.359837e-08 -6.418012e-08 -7.332240e-08
## [8,] -1.302113e-08 -6.418012e-08 -5.621670e-08 -6.373037e-08
## [9,] -2.617798e-08 -7.332240e-08 -6.373037e-08 -7.304350e-08
##      [,46]      [,47]      [,48]      [,49]
## [1,] -1.618470e-07 -2.787283e-07  1.225639e-08  4.390182e-08
## [2,] -2.787283e-07 -3.766850e-07  7.940673e-08  7.287696e-08
## [3,]  1.225639e-08  7.940673e-08  3.462319e-08 -7.273464e-11
## [4,]  4.390182e-08  7.287696e-08 -7.273464e-11 -2.119984e-08
## [5,] -1.251107e-08 -2.381976e-09  1.943566e-08  1.140835e-08
## [6,] -1.163169e-07 -2.511866e-07 -1.151855e-08  5.193412e-08
## [7,] -1.481807e-07 -2.391213e-07  3.924418e-09  1.333285e-08
## [8,] -1.751320e-07 -2.808070e-07  1.057803e-08  2.157045e-08
## [9,] -1.457756e-07 -2.371418e-07  3.410274e-09  1.309406e-08
##      [,50]      [,51]      [,52]      [,53]
## [1,] -1.251107e-08 -1.163169e-07 -1.481807e-07 -1.751320e-07
## [2,] -2.381976e-09 -2.511866e-07 -2.391213e-07 -2.808070e-07
## [3,]  1.943566e-08 -1.151855e-08  3.924418e-09  1.057803e-08
## [4,]  1.140835e-08  5.193412e-08  1.333285e-08  2.157045e-08
## [5,] -6.511399e-09 -1.177713e-08 -2.623191e-08 -1.302113e-08
## [6,] -1.177713e-08 -1.035168e-07 -7.480817e-08 -9.500836e-08
## [7,] -2.623191e-08 -7.480817e-08 -1.533777e-07 -1.801259e-07
## [8,] -1.302113e-08 -9.500836e-08 -1.801259e-07 -2.154613e-07
## [9,] -2.617798e-08 -7.278341e-08 -1.515706e-07 -1.777593e-07

```

```

##          [,54]          [,55]          [,56]          [,57]          [,58]
## [1,] -1.457756e-07 -2.720659e-07 -3.352322e-07 5.862566e-08 1.246309e-08
## [2,] -2.371418e-07 -3.352322e-07 -3.546145e-07 7.634898e-08 2.699151e-08
## [3,] 3.410274e-09 5.862566e-08 7.634898e-08 5.729733e-08 1.473376e-09
## [4,] 1.309406e-08 1.246309e-08 2.699151e-08 1.473376e-09 1.864585e-08
## [5,] -2.617798e-08 -5.550424e-08 -3.648467e-08 3.732804e-08 3.424797e-08
## [6,] -7.278341e-08 -1.481807e-07 -2.391213e-07 3.924418e-09 1.333285e-08
## [7,] -1.515706e-07 -3.111549e-07 -3.590395e-07 6.876018e-08 1.193911e-08
## [8,] -1.777593e-07 -3.479520e-07 -3.989735e-07 6.675398e-08 1.364693e-08
## [9,] -1.497556e-07 -3.092755e-07 -3.569946e-07 6.880095e-08 1.180949e-08
##          [,59]          [,60]          [,61]          [,62]
## [1,] -5.550424e-08 -1.481807e-07 -3.111549e-07 -3.479520e-07
## [2,] -3.648467e-08 -2.391213e-07 -3.590395e-07 -3.989735e-07
## [3,] 3.732804e-08 3.924418e-09 6.876018e-08 6.675398e-08
## [4,] 3.424797e-08 1.333285e-08 1.193911e-08 1.364693e-08
## [5,] 2.121489e-08 -2.623191e-08 -7.359837e-08 -6.418012e-08
## [6,] -2.623191e-08 -7.480817e-08 -1.533777e-07 -1.801259e-07
## [7,] -7.359837e-08 -1.533777e-07 -3.435113e-07 -3.863223e-07
## [8,] -6.418012e-08 -1.801259e-07 -3.863223e-07 -4.422632e-07
## [9,] -7.332240e-08 -1.515706e-07 -3.422846e-07 -3.841687e-07
##          [,63]          [,64]          [,65]          [,66]          [,67]
## [1,] -3.092755e-07 -3.059896e-07 -3.767808e-07 6.753580e-08 1.911418e-08
## [2,] -3.569946e-07 -3.767808e-07 -4.230449e-07 8.891469e-08 3.551913e-08
## [3,] 6.880095e-08 6.753580e-08 8.891469e-08 4.099960e-08 3.651704e-09
## [4,] 1.180949e-08 1.911418e-08 3.551913e-08 3.651704e-09 1.842039e-08
## [5,] -7.332240e-08 -4.232338e-08 -2.689384e-08 4.124718e-08 4.154587e-08
## [6,] -1.515706e-07 -1.751320e-07 -2.808070e-07 1.057803e-08 2.157045e-08
## [7,] -3.422846e-07 -3.479520e-07 -3.989735e-07 6.675398e-08 1.364693e-08
## [8,] -3.841687e-07 -3.955430e-07 -4.473147e-07 7.305767e-08 1.430823e-08
## [9,] -3.410513e-07 -3.453511e-07 -3.963770e-07 6.682778e-08 1.344269e-08
##          [,68]          [,69]          [,70]          [,71]
## [1,] -4.232338e-08 -1.751320e-07 -3.479520e-07 -3.955430e-07
## [2,] -2.689384e-08 -2.808070e-07 -3.989735e-07 -4.473147e-07
## [3,] 4.124718e-08 1.057803e-08 6.675398e-08 7.305767e-08
## [4,] 4.154587e-08 2.157045e-08 1.364693e-08 1.430823e-08
## [5,] 4.170634e-08 -1.302113e-08 -6.418012e-08 -5.621670e-08
## [6,] -1.302113e-08 -9.500836e-08 -1.801259e-07 -2.154613e-07
## [7,] -6.418012e-08 -1.801259e-07 -3.863223e-07 -4.422632e-07
## [8,] -5.621670e-08 -2.154613e-07 -4.422632e-07 -5.100768e-07

```

```

## [9,] -6.373037e-08 -1.777593e-07 -3.841687e-07 -4.394113e-07
##      [,72]      [,73]      [,74]      [,75]      [,76]
## [1,] -3.453511e-07 -2.694056e-07 -3.327072e-07 5.869495e-08 1.228384e-08
## [2,] -3.963770e-07 -3.327072e-07 -3.516232e-07 7.657288e-08 2.690561e-08
## [3,] 6.682778e-08 5.869495e-08 7.657288e-08 5.680896e-08 1.276838e-09
## [4,] 1.344269e-08 1.228384e-08 2.690561e-08 1.276838e-09 1.840949e-08
## [5,] -6.373037e-08 -5.513820e-08 -3.636144e-08 3.696544e-08 3.383962e-08
## [6,] -1.777593e-07 -1.457756e-07 -2.371418e-07 3.410274e-09 1.309406e-08
## [7,] -3.841687e-07 -3.092755e-07 -3.569946e-07 6.880095e-08 1.180949e-08
## [8,] -4.394113e-07 -3.453511e-07 -3.963770e-07 6.682778e-08 1.344269e-08
## [9,] -3.820243e-07 -3.073961e-07 -3.549611e-07 6.886124e-08 1.167241e-08
##      [,77]      [,78]      [,79]      [,80]
## [1,] -5.513820e-08 -1.457756e-07 -3.092755e-07 -3.453511e-07
## [2,] -3.636144e-08 -2.371418e-07 -3.569946e-07 -3.963770e-07
## [3,] 3.696544e-08 3.410274e-09 6.880095e-08 6.682778e-08
## [4,] 3.383962e-08 1.309406e-08 1.180949e-08 1.344269e-08
## [5,] 2.048770e-08 -2.617798e-08 -7.332240e-08 -6.373037e-08
## [6,] -2.617798e-08 -7.278341e-08 -1.515706e-07 -1.777593e-07
## [7,] -7.332240e-08 -1.515706e-07 -3.422846e-07 -3.841687e-07
## [8,] -6.373037e-08 -1.777593e-07 -3.841687e-07 -4.394113e-07
## [9,] -7.304350e-08 -1.497556e-07 -3.410513e-07 -3.820243e-07
##      [,81]
## [1,] -3.073961e-07
## [2,] -3.549611e-07
## [3,] 6.886124e-08
## [4,] 1.167241e-08
## [5,] -7.304350e-08
## [6,] -1.497556e-07
## [7,] -3.410513e-07
## [8,] -3.820243e-07
## [9,] -3.398124e-07

```

`CoKurtosisMatrix(allIdx)`

```

##      [,1]      [,2]      [,3]      [,4]      [,5]
## [1,] 2.237498e-08 1.549855e-08 -5.311637e-09 -3.507738e-09 1.981525e-09
## [2,] 1.549855e-08 1.641814e-08 -2.418169e-09 -2.804045e-09 1.121582e-09
## [3,] -5.311637e-09 -2.418169e-09 4.816485e-09 1.049248e-09 1.934774e-11
## [4,] -3.507738e-09 -2.804045e-09 1.049248e-09 1.528106e-09 5.036019e-10
## [5,] 1.981525e-09 1.121582e-09 1.934774e-11 5.036019e-10 1.954425e-09

```

```

## [6,] 1.723652e-08 1.252268e-08 -4.456084e-09 -2.704595e-09 1.856867e-09
## [7,] 2.171542e-08 1.415399e-08 -5.898991e-09 -3.082632e-09 1.810521e-09
## [8,] 2.313719e-08 1.607788e-08 -5.636372e-09 -3.221755e-09 1.724716e-09
## [9,] 2.172948e-08 1.411764e-08 -5.913487e-09 -3.083121e-09 1.827566e-09
##      [,6]      [,7]      [,8]      [,9]
## [1,] 1.723652e-08 2.171542e-08 2.313719e-08 2.172948e-08
## [2,] 1.252268e-08 1.415399e-08 1.607788e-08 1.411764e-08
## [3,] -4.456084e-09 -5.898991e-09 -5.636372e-09 -5.913487e-09
## [4,] -2.704595e-09 -3.082632e-09 -3.221755e-09 -3.083121e-09
## [5,] 1.856867e-09 1.810521e-09 1.724716e-09 1.827566e-09
## [6,] 1.451994e-08 1.619709e-08 1.728755e-08 1.620570e-08
## [7,] 1.619709e-08 2.305107e-08 2.400101e-08 2.305772e-08
## [8,] 1.728755e-08 2.400101e-08 2.573748e-08 2.400057e-08
## [9,] 1.620570e-08 2.305772e-08 2.400057e-08 2.306602e-08
##      [,10]      [,11]      [,12]      [,13]      [,14]
## [1,] 1.549855e-08 1.641814e-08 -2.418169e-09 -2.804045e-09 1.121582e-09
## [2,] 1.641814e-08 2.021777e-08 -2.175934e-09 -3.339185e-09 8.629182e-10
## [3,] -2.418169e-09 -2.175934e-09 1.912516e-09 8.159049e-10 1.456575e-10
## [4,] -2.804045e-09 -3.339185e-09 8.159049e-10 1.330170e-09 3.818851e-10
## [5,] 1.121582e-09 8.629182e-10 1.456575e-10 3.818851e-10 1.286082e-09
## [6,] 1.252268e-08 1.417810e-08 -2.011008e-09 -2.468440e-09 9.650738e-10
## [7,] 1.415399e-08 1.386047e-08 -2.214801e-09 -2.018933e-09 1.206512e-09
## [8,] 1.607788e-08 1.639068e-08 -2.215152e-09 -2.320561e-09 1.106954e-09
## [9,] 1.411764e-08 1.379921e-08 -2.214465e-09 -2.015371e-09 1.218418e-09
##      [,15]      [,16]      [,17]      [,18]
## [1,] 1.252268e-08 1.415399e-08 1.607788e-08 1.411764e-08
## [2,] 1.417810e-08 1.386047e-08 1.639068e-08 1.379921e-08
## [3,] -2.011008e-09 -2.214801e-09 -2.215152e-09 -2.214465e-09
## [4,] -2.468440e-09 -2.018933e-09 -2.320561e-09 -2.015371e-09
## [5,] 9.650738e-10 1.206512e-09 1.106954e-09 1.218418e-09
## [6,] 1.090779e-08 1.085177e-08 1.246712e-08 1.081921e-08
## [7,] 1.085177e-08 1.432497e-08 1.581107e-08 1.428442e-08
## [8,] 1.246712e-08 1.581107e-08 1.794787e-08 1.575877e-08
## [9,] 1.081921e-08 1.428442e-08 1.575877e-08 1.424504e-08
##      [,19]      [,20]      [,21]      [,22]
## [1,] -5.311637e-09 -2.418169e-09 4.816485e-09 1.049248e-09
## [2,] -2.418169e-09 -2.175934e-09 1.912516e-09 8.159049e-10
## [3,] 4.816485e-09 1.912516e-09 -2.671382e-09 -9.408777e-10
## [4,] 1.049248e-09 8.159049e-10 -9.408777e-10 -5.197837e-10

```



```

## [5,] 1.934774e-11 1.456575e-10 5.740245e-11 -4.253663e-10
## [6,] -4.456084e-09 -2.011008e-09 3.680578e-09 8.890382e-10
## [7,] -5.898991e-09 -2.214801e-09 4.980431e-09 9.173012e-10
## [8,] -5.636372e-09 -2.215152e-09 4.867790e-09 9.784441e-10
## [9,] -5.913487e-09 -2.214465e-09 4.994422e-09 9.144318e-10
##      [,23]      [,24]      [,25]      [,26]
## [1,] 1.934774e-11 -4.456084e-09 -5.898991e-09 -5.636372e-09
## [2,] 1.456575e-10 -2.011008e-09 -2.214801e-09 -2.215152e-09
## [3,] 5.740245e-11 3.680578e-09 4.980431e-09 4.867790e-09
## [4,] -4.253663e-10 8.890382e-10 9.173012e-10 9.784441e-10
## [5,] -6.694618e-10 -1.482441e-11 -1.501517e-10 3.886151e-11
## [6,] -1.482441e-11 -3.875257e-09 -4.731295e-09 -4.535577e-09
## [7,] -1.501517e-10 -4.731295e-09 -6.687891e-09 -6.429716e-09
## [8,] 3.886151e-11 -4.535577e-09 -6.429716e-09 -6.247708e-09
## [9,] -1.545818e-10 -4.744471e-09 -6.709534e-09 -6.448943e-09
##      [,27]      [,28]      [,29]      [,30]
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## [2,] -2.214465e-09 -2.804045e-09 -3.339185e-09 8.159049e-10
## [3,] 4.994422e-09 1.049248e-09 8.159049e-10 -9.408777e-10
## [4,] 9.144318e-10 1.528106e-09 1.330170e-09 -5.197837e-10
## [5,] -1.545818e-10 5.036019e-10 3.818851e-10 -4.253663e-10
## [6,] -4.744471e-09 -2.704595e-09 -2.468440e-09 8.890382e-10
## [7,] -6.709534e-09 -3.082632e-09 -2.018933e-09 9.173012e-10
## [8,] -6.448943e-09 -3.221755e-09 -2.320561e-09 9.784441e-10
## [9,] -6.731346e-09 -3.083121e-09 -2.015371e-09 9.144318e-10
##      [,31]      [,32]      [,33]      [,34]
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## [2,] 1.330170e-09 3.818851e-10 -2.468440e-09 -2.018933e-09
## [3,] -5.197837e-10 -4.253663e-10 8.890382e-10 9.173012e-10
## [4,] -9.933237e-10 -7.176715e-10 1.117451e-09 1.263261e-09
## [5,] -7.176715e-10 -1.037273e-09 1.597169e-10 5.190321e-10
## [6,] 1.117451e-09 1.597169e-10 -2.437634e-09 -2.142662e-09
## [7,] 1.263261e-09 5.190321e-10 -2.142662e-09 -3.097647e-09
## [8,] 1.390069e-09 6.277585e-10 -2.273278e-09 -3.126034e-09
## [9,] 1.259713e-09 5.128480e-10 -2.143200e-09 -3.099577e-09
##      [,35]      [,36]      [,37]      [,38]      [,39]
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## [2,] -2.320561e-09 -2.015371e-09 1.121582e-09 8.629182e-10 1.456575e-10
## [3,] 9.784441e-10 9.144318e-10 1.934774e-11 1.456575e-10 5.740245e-11

```

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## [4,] 1.390069e-09 1.259713e-09 5.036019e-10 3.818851e-10 -4.253663e-10
## [5,] 6.277585e-10 5.128480e-10 1.954425e-09 1.286082e-09 -6.694618e-10
## [6,] -2.273278e-09 -2.143200e-09 1.856867e-09 9.650738e-10 -1.482441e-11
## [7,] -3.126034e-09 -3.099577e-09 1.810521e-09 1.206512e-09 -1.501517e-10
## [8,] -3.266733e-09 -3.126727e-09 1.724716e-09 1.106954e-09 3.886151e-11
## [9,] -3.126727e-09 -3.101661e-09 1.827566e-09 1.218418e-09 -1.545818e-10
##      [,40]      [,41]      [,42]      [,43]      [,44]
## [1,] 5.036019e-10 1.954425e-09 1.856867e-09 1.810521e-09 1.724716e-09
## [2,] 3.818851e-10 1.286082e-09 9.650738e-10 1.206512e-09 1.106954e-09
## [3,] -4.253663e-10 -6.694618e-10 -1.482441e-11 -1.501517e-10 3.886151e-11
## [4,] -7.176715e-10 -1.037273e-09 1.597169e-10 5.190321e-10 6.277585e-10
## [5,] -1.037273e-09 -7.198821e-10 1.273899e-09 1.934523e-09 2.066860e-09
## [6,] 1.597169e-10 1.273899e-09 1.669040e-09 1.739783e-09 1.694221e-09
## [7,] 5.190321e-10 1.934523e-09 1.739783e-09 1.886692e-09 1.697616e-09
## [8,] 6.277585e-10 2.066860e-09 1.694221e-09 1.697616e-09 1.574343e-09
## [9,] 5.128480e-10 1.932806e-09 1.751952e-09 1.900437e-09 1.714679e-09
##      [,45]      [,46]      [,47]      [,48]
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## [2,] 1.218418e-09 1.252268e-08 1.417810e-08 -2.011008e-09
## [3,] -1.545818e-10 -4.456084e-09 -2.011008e-09 3.680578e-09
## [4,] 5.128480e-10 -2.704595e-09 -2.468440e-09 8.890382e-10
## [5,] 1.932806e-09 1.856867e-09 9.650738e-10 -1.482441e-11
## [6,] 1.751952e-09 1.451994e-08 1.090779e-08 -3.875257e-09
## [7,] 1.900437e-09 1.619709e-08 1.085177e-08 -4.731295e-09
## [8,] 1.714679e-09 1.728755e-08 1.246712e-08 -4.535577e-09
## [9,] 1.914366e-09 1.620570e-08 1.081921e-08 -4.744471e-09
##      [,49]      [,50]      [,51]      [,52]
## [1,] -2.704595e-09 1.856867e-09 1.451994e-08 1.619709e-08
## [2,] -2.468440e-09 9.650738e-10 1.090779e-08 1.085177e-08
## [3,] 8.890382e-10 -1.482441e-11 -3.875257e-09 -4.731295e-09
## [4,] 1.117451e-09 1.597169e-10 -2.437634e-09 -2.142662e-09
## [5,] 1.597169e-10 1.273899e-09 1.669040e-09 1.739783e-09
## [6,] -2.437634e-09 1.669040e-09 1.298272e-08 1.309496e-08
## [7,] -2.142662e-09 1.739783e-09 1.309496e-08 1.673751e-08
## [8,] -2.273278e-09 1.694221e-09 1.401251e-08 1.743743e-08
## [9,] -2.143200e-09 1.751952e-09 1.310298e-08 1.674294e-08
##      [,53]      [,54]      [,55]      [,56]
## [1,] 1.728755e-08 1.620570e-08 2.171542e-08 1.415399e-08
## [2,] 1.246712e-08 1.081921e-08 1.415399e-08 1.386047e-08

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## [3,] -4.535577e-09 -4.744471e-09 -5.898991e-09 -2.214801e-09
## [4,] -2.273278e-09 -2.143200e-09 -3.082632e-09 -2.018933e-09
## [5,] 1.694221e-09 1.751952e-09 1.810521e-09 1.206512e-09
## [6,] 1.401251e-08 1.310298e-08 1.619709e-08 1.085177e-08
## [7,] 1.743743e-08 1.674294e-08 2.305107e-08 1.432497e-08
## [8,] 1.871301e-08 1.743632e-08 2.400101e-08 1.581107e-08
## [9,] 1.743632e-08 1.674957e-08 2.305772e-08 1.428442e-08
##      [,57]      [,58]      [,59]      [,60]
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## [2,] -2.214801e-09 -2.018933e-09 1.206512e-09 1.085177e-08
## [3,] 4.980431e-09 9.173012e-10 -1.501517e-10 -4.731295e-09
## [4,] 9.173012e-10 1.263261e-09 5.190321e-10 -2.142662e-09
## [5,] -1.501517e-10 5.190321e-10 1.934523e-09 1.739783e-09
## [6,] -4.731295e-09 -2.142662e-09 1.739783e-09 1.309496e-08
## [7,] -6.687891e-09 -3.097647e-09 1.886692e-09 1.673751e-08
## [8,] -6.429716e-09 -3.126034e-09 1.697616e-09 1.743743e-08
## [9,] -6.709534e-09 -3.099577e-09 1.900437e-09 1.674294e-08
##      [,61]      [,62]      [,63]      [,64]
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## [2,] 1.432497e-08 1.581107e-08 1.428442e-08 1.607788e-08
## [3,] -6.687891e-09 -6.429716e-09 -6.709534e-09 -5.636372e-09
## [4,] -3.097647e-09 -3.126034e-09 -3.099577e-09 -3.221755e-09
## [5,] 1.886692e-09 1.697616e-09 1.900437e-09 1.724716e-09
## [6,] 1.673751e-08 1.743743e-08 1.674294e-08 1.728755e-08
## [7,] 2.548310e-08 2.624676e-08 2.549147e-08 2.400101e-08
## [8,] 2.624676e-08 2.770029e-08 2.624335e-08 2.573748e-08
## [9,] 2.549147e-08 2.624335e-08 2.550122e-08 2.400057e-08
##      [,65]      [,66]      [,67]      [,68]      [,69]
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## [2,] 1.639068e-08 -2.215152e-09 -2.320561e-09 1.106954e-09 1.246712e-08
## [3,] -2.215152e-09 4.867790e-09 9.784441e-10 3.886151e-11 -4.535577e-09
## [4,] -2.320561e-09 9.784441e-10 1.390069e-09 6.277585e-10 -2.273278e-09
## [5,] 1.106954e-09 3.886151e-11 6.277585e-10 2.066860e-09 1.694221e-09
## [6,] 1.246712e-08 -4.535577e-09 -2.273278e-09 1.694221e-09 1.401251e-08
## [7,] 1.581107e-08 -6.429716e-09 -3.126034e-09 1.697616e-09 1.743743e-08
## [8,] 1.794787e-08 -6.247708e-09 -3.266733e-09 1.574343e-09 1.871301e-08
## [9,] 1.575877e-08 -6.448943e-09 -3.126727e-09 1.714679e-09 1.743632e-08
##      [,70]      [,71]      [,72]      [,73]
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```

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## [2,] 1.581107e-08 1.794787e-08 1.575877e-08 1.411764e-08
## [3,] -6.429716e-09 -6.247708e-09 -6.448943e-09 -5.913487e-09
## [4,] -3.126034e-09 -3.266733e-09 -3.126727e-09 -3.083121e-09
## [5,] 1.697616e-09 1.574343e-09 1.714679e-09 1.827566e-09
## [6,] 1.743743e-08 1.871301e-08 1.743632e-08 1.620570e-08
## [7,] 2.624676e-08 2.770029e-08 2.624335e-08 2.305772e-08
## [8,] 2.770029e-08 2.993269e-08 2.768545e-08 2.400057e-08
## [9,] 2.624335e-08 2.768545e-08 2.624161e-08 2.306602e-08
##      [,74]      [,75]      [,76]      [,77]
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## [2,] 1.379921e-08 -2.214465e-09 -2.015371e-09 1.218418e-09
## [3,] -2.214465e-09 4.994422e-09 9.144318e-10 -1.545818e-10
## [4,] -2.015371e-09 9.144318e-10 1.259713e-09 5.128480e-10
## [5,] 1.218418e-09 -1.545818e-10 5.128480e-10 1.932806e-09
## [6,] 1.081921e-08 -4.744471e-09 -2.143200e-09 1.751952e-09
## [7,] 1.428442e-08 -6.709534e-09 -3.099577e-09 1.900437e-09
## [8,] 1.575877e-08 -6.448943e-09 -3.126727e-09 1.714679e-09
## [9,] 1.424504e-08 -6.731346e-09 -3.101661e-09 1.914366e-09
##      [,78]      [,79]      [,80]      [,81]
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## [2,] 1.081921e-08 1.428442e-08 1.575877e-08 1.424504e-08
## [3,] -4.744471e-09 -6.709534e-09 -6.448943e-09 -6.731346e-09
## [4,] -2.143200e-09 -3.099577e-09 -3.126727e-09 -3.101661e-09
## [5,] 1.751952e-09 1.900437e-09 1.714679e-09 1.914366e-09
## [6,] 1.310298e-08 1.674294e-08 1.743632e-08 1.674957e-08
## [7,] 1.674294e-08 2.549147e-08 2.624335e-08 2.550122e-08
## [8,] 1.743632e-08 2.624335e-08 2.768545e-08 2.624161e-08
## [9,] 1.674957e-08 2.550122e-08 2.624161e-08 2.551235e-08
##      [,82]      [,83]      [,84]      [,85]      [,86]
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## [2,] 1.641814e-08 2.021777e-08 -2.175934e-09 -3.339185e-09 8.629182e-10
## [3,] -2.418169e-09 -2.175934e-09 1.912516e-09 8.159049e-10 1.456575e-10
## [4,] -2.804045e-09 -3.339185e-09 8.159049e-10 1.330170e-09 3.818851e-10
## [5,] 1.121582e-09 8.629182e-10 1.456575e-10 3.818851e-10 1.286082e-09
## [6,] 1.252268e-08 1.417810e-08 -2.011008e-09 -2.468440e-09 9.650738e-10
## [7,] 1.415399e-08 1.386047e-08 -2.214801e-09 -2.018933e-09 1.206512e-09
## [8,] 1.607788e-08 1.639068e-08 -2.215152e-09 -2.320561e-09 1.106954e-09
## [9,] 1.411764e-08 1.379921e-08 -2.214465e-09 -2.015371e-09 1.218418e-09
##      [,87]      [,88]      [,89]      [,90]

```

```

## [1,] 1.252268e-08 1.415399e-08 1.607788e-08 1.411764e-08
## [2,] 1.417810e-08 1.386047e-08 1.639068e-08 1.379921e-08
## [3,] -2.011008e-09 -2.214801e-09 -2.215152e-09 -2.214465e-09
## [4,] -2.468440e-09 -2.018933e-09 -2.320561e-09 -2.015371e-09
## [5,] 9.650738e-10 1.206512e-09 1.106954e-09 1.218418e-09
## [6,] 1.090779e-08 1.085177e-08 1.246712e-08 1.081921e-08
## [7,] 1.085177e-08 1.432497e-08 1.581107e-08 1.428442e-08
## [8,] 1.246712e-08 1.581107e-08 1.794787e-08 1.575877e-08
## [9,] 1.081921e-08 1.428442e-08 1.575877e-08 1.424504e-08
##      [,91]      [,92]      [,93]      [,94]      [,95]
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## [2,] 2.021777e-08 2.898706e-08 -2.438270e-09 -4.857336e-09 6.428628e-10
## [3,] -2.175934e-09 -2.438270e-09 2.143573e-09 1.054314e-09 3.223399e-10
## [4,] -3.339185e-09 -4.857336e-09 1.054314e-09 1.747494e-09 4.250714e-10
## [5,] 8.629182e-10 6.428628e-10 3.223399e-10 4.250714e-10 1.186450e-09
## [6,] 1.417810e-08 1.857195e-08 -1.987969e-09 -3.350842e-09 7.343381e-10
## [7,] 1.386047e-08 1.522189e-08 -1.612894e-09 -1.934090e-09 1.000986e-09
## [8,] 1.639068e-08 1.895318e-08 -1.700153e-09 -2.439176e-09 8.678136e-10
## [9,] 1.379921e-08 1.514331e-08 -1.610353e-09 -1.928504e-09 1.010410e-09
##      [,96]      [,97]      [,98]      [,99]
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## [3,] -1.987969e-09 -1.612894e-09 -1.700153e-09 -1.610353e-09
## [4,] -3.350842e-09 -1.934090e-09 -2.439176e-09 -1.928504e-09
## [5,] 7.343381e-10 1.000986e-09 8.678136e-10 1.010410e-09
## [6,] 1.319942e-08 1.113462e-08 1.333500e-08 1.107913e-08
## [7,] 1.113462e-08 1.360031e-08 1.546134e-08 1.353572e-08
## [8,] 1.333500e-08 1.546134e-08 1.821360e-08 1.538534e-08
## [9,] 1.107913e-08 1.353572e-08 1.538534e-08 1.347273e-08
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## [2,] -2.175934e-09 -2.438270e-09 2.143573e-09 1.054314e-09
## [3,] 1.912516e-09 2.143573e-09 -6.263545e-10 -6.139298e-10
## [4,] 8.159049e-10 1.054314e-09 -6.139298e-10 -5.136606e-10
## [5,] 1.456575e-10 3.223399e-10 9.439133e-12 -3.733106e-10
## [6,] -2.011008e-09 -1.987969e-09 1.547532e-09 7.087711e-10
## [7,] -2.214801e-09 -1.612894e-09 1.598039e-09 5.426849e-10
## [8,] -2.215152e-09 -1.700153e-09 1.796609e-09 6.496899e-10
## [9,] -2.214465e-09 -1.610353e-09 1.600777e-09 5.394565e-10

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## [2,]  3.223399e-10 -1.987969e-09 -1.612894e-09 -1.700153e-09
## [3,]  9.439133e-12  1.547532e-09  1.598039e-09  1.796609e-09
## [4,] -3.733106e-10  7.087711e-10  5.426849e-10  6.496899e-10
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## [7,]  6.360003e-12 -1.613743e-09 -2.277017e-09 -2.209910e-09
## [8,]  1.454549e-10 -1.670713e-09 -2.209910e-09 -2.172568e-09
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##          [,108]          [,109]          [,110]          [,111]
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## [2,] -1.610353e-09 -3.339185e-09 -4.857336e-09  1.054314e-09
## [3,]  1.600777e-09  8.159049e-10  1.054314e-09 -6.139298e-10
## [4,]  5.394565e-10  1.330170e-09  1.747494e-09 -5.136606e-10
## [5,]  2.885030e-12  3.818851e-10  4.250714e-10 -3.733106e-10
## [6,] -1.612618e-09 -2.468440e-09 -3.350842e-09  7.087711e-10
## [7,] -2.279814e-09 -2.018933e-09 -1.934090e-09  5.426849e-10
## [8,] -2.213073e-09 -2.320561e-09 -2.439176e-09  6.496899e-10
## [9,] -2.282702e-09 -2.015371e-09 -1.928504e-09  5.394565e-10
##          [,112]          [,113]          [,114]          [,115]
## [1,]  1.330170e-09  3.818851e-10 -2.468440e-09 -2.018933e-09
## [2,]  1.747494e-09  4.250714e-10 -3.350842e-09 -1.934090e-09
## [3,] -5.136606e-10 -3.733106e-10  7.087711e-10  5.426849e-10
## [4,] -9.211164e-10 -5.710026e-10  1.189335e-09  8.822765e-10
## [5,] -5.710026e-10 -8.054338e-10  1.745048e-10  3.508261e-10
## [6,]  1.189335e-09  1.745048e-10 -2.478217e-09 -1.520530e-09
## [7,]  8.822765e-10  3.508261e-10 -1.520530e-09 -1.812401e-09
## [8,]  1.062636e-09  4.427807e-10 -1.810573e-09 -1.939688e-09
## [9,]  8.787225e-10  3.454463e-10 -1.517281e-09 -1.809696e-09
##          [,116]          [,117]          [,118]          [,119]          [,120]
## [1,] -2.320561e-09 -2.015371e-09  1.121582e-09  8.629182e-10  1.456575e-10
## [2,] -2.439176e-09 -1.928504e-09  8.629182e-10  6.428628e-10  3.223399e-10
## [3,]  6.496899e-10  5.394565e-10  1.456575e-10  3.223399e-10  9.439133e-12
## [4,]  1.062636e-09  8.787225e-10  3.818851e-10  4.250714e-10 -3.733106e-10
## [5,]  4.427807e-10  3.454463e-10  1.286082e-09  1.186450e-09 -5.196254e-10
## [6,] -1.810573e-09 -1.517281e-09  9.650738e-10  7.343381e-10  1.056101e-10
## [7,] -1.939688e-09 -1.809696e-09  1.206512e-09  1.000986e-09  6.360003e-12
## [8,] -2.180273e-09 -1.937106e-09  1.106954e-09  8.678136e-10  1.454549e-10

```

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## [9,] -1.937106e-09 -1.807172e-09 1.218418e-09 1.010410e-09 2.885030e-12
##      [,121]      [,122]      [,123]      [,124]      [,125]
## [1,] 3.818851e-10 1.286082e-09 9.650738e-10 1.206512e-09 1.106954e-09
## [2,] 4.250714e-10 1.186450e-09 7.343381e-10 1.000986e-09 8.678136e-10
## [3,] -3.733106e-10 -5.196254e-10 1.056101e-10 6.360003e-12 1.454549e-10
## [4,] -5.710026e-10 -8.054338e-10 1.745048e-10 3.508261e-10 4.427807e-10
## [5,] -8.054338e-10 -5.901952e-10 8.696907e-10 1.271775e-09 1.376227e-09
## [6,] 1.745048e-10 8.696907e-10 8.283762e-10 1.058391e-09 9.917494e-10
## [7,] 3.508261e-10 1.271775e-09 1.058391e-09 1.381142e-09 1.235000e-09
## [8,] 4.427807e-10 1.376227e-09 9.917494e-10 1.235000e-09 1.108439e-09
## [9,] 3.454463e-10 1.269915e-09 1.066735e-09 1.390451e-09 1.245184e-09
##      [,126]      [,127]      [,128]      [,129]      [,130]
## [1,] 1.218418e-09 1.252268e-08 1.417810e-08 -2.011008e-09 -2.468440e-09
## [2,] 1.010410e-09 1.417810e-08 1.857195e-08 -1.987969e-09 -3.350842e-09
## [3,] 2.885030e-12 -2.011008e-09 -1.987969e-09 1.547532e-09 7.087711e-10
## [4,] 3.454463e-10 -2.468440e-09 -3.350842e-09 7.087711e-10 1.189335e-09
## [5,] 1.269915e-09 9.650738e-10 7.343381e-10 1.056101e-10 1.745048e-10
## [6,] 1.066735e-09 1.090779e-08 1.319942e-08 -1.761926e-09 -2.478217e-09
## [7,] 1.390451e-09 1.085177e-08 1.113462e-08 -1.613743e-09 -1.520530e-09
## [8,] 1.245184e-09 1.246712e-08 1.333500e-08 -1.670713e-09 -1.810573e-09
## [9,] 1.399838e-09 1.081921e-08 1.107913e-08 -1.612618e-09 -1.517281e-09
##      [,131]      [,132]      [,133]      [,134]      [,135]
## [1,] 9.650738e-10 1.090779e-08 1.085177e-08 1.246712e-08 1.081921e-08
## [2,] 7.343381e-10 1.319942e-08 1.113462e-08 1.333500e-08 1.107913e-08
## [3,] 1.056101e-10 -1.761926e-09 -1.613743e-09 -1.670713e-09 -1.612618e-09
## [4,] 1.745048e-10 -2.478217e-09 -1.520530e-09 -1.810573e-09 -1.517281e-09
## [5,] 8.696907e-10 8.283762e-10 1.058391e-09 9.917494e-10 1.066735e-09
## [6,] 8.283762e-10 1.014471e-08 8.845625e-09 1.030510e-08 8.818083e-09
## [7,] 1.058391e-09 8.845625e-09 1.066325e-08 1.185665e-08 1.062973e-08
## [8,] 9.917494e-10 1.030510e-08 1.185665e-08 1.355176e-08 1.181224e-08
## [9,] 1.066735e-09 8.818083e-09 1.062973e-08 1.181224e-08 1.059710e-08
##      [,136]      [,137]      [,138]      [,139]      [,140]
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## [2,] 1.386047e-08 1.522189e-08 -1.612894e-09 -1.934090e-09 1.000986e-09
## [3,] -2.214801e-09 -1.612894e-09 1.598039e-09 5.426849e-10 6.360003e-12
## [4,] -2.018933e-09 -1.934090e-09 5.426849e-10 8.822765e-10 3.508261e-10
## [5,] 1.206512e-09 1.000986e-09 6.360003e-12 3.508261e-10 1.271775e-09
## [6,] 1.085177e-08 1.113462e-08 -1.613743e-09 -1.520530e-09 1.058391e-09
## [7,] 1.432497e-08 1.360031e-08 -2.277017e-09 -1.812401e-09 1.381142e-09

```

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## [8,] 1.581107e-08 1.546134e-08 -2.209910e-09 -1.939688e-09 1.235000e-09
## [9,] 1.428442e-08 1.353572e-08 -2.279814e-09 -1.809696e-09 1.390451e-09
##      [,141]      [,142]      [,143]      [,144]
## [1,] 1.085177e-08 1.432497e-08 1.581107e-08 1.428442e-08
## [2,] 1.113462e-08 1.360031e-08 1.546134e-08 1.353572e-08
## [3,] -1.613743e-09 -2.277017e-09 -2.209910e-09 -2.279814e-09
## [4,] -1.520530e-09 -1.812401e-09 -1.939688e-09 -1.809696e-09
## [5,] 1.058391e-09 1.381142e-09 1.235000e-09 1.390451e-09
## [6,] 8.845625e-09 1.066325e-08 1.185665e-08 1.062973e-08
## [7,] 1.066325e-08 1.509914e-08 1.646442e-08 1.505927e-08
## [8,] 1.185665e-08 1.646442e-08 1.834951e-08 1.640910e-08
## [9,] 1.062973e-08 1.505927e-08 1.640910e-08 1.502027e-08
##      [,145]      [,146]      [,147]      [,148]      [,149]
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## [2,] 1.639068e-08 1.895318e-08 -1.700153e-09 -2.439176e-09 8.678136e-10
## [3,] -2.215152e-09 -1.700153e-09 1.796609e-09 6.496899e-10 1.454549e-10
## [4,] -2.320561e-09 -2.439176e-09 6.496899e-10 1.062636e-09 4.427807e-10
## [5,] 1.106954e-09 8.678136e-10 1.454549e-10 4.427807e-10 1.376227e-09
## [6,] 1.246712e-08 1.333500e-08 -1.670713e-09 -1.810573e-09 9.917494e-10
## [7,] 1.581107e-08 1.546134e-08 -2.209910e-09 -1.939688e-09 1.235000e-09
## [8,] 1.794787e-08 1.821360e-08 -2.172568e-09 -2.180273e-09 1.108439e-09
## [9,] 1.575877e-08 1.538534e-08 -2.213073e-09 -1.937106e-09 1.245184e-09
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## [1,] 1.246712e-08 1.581107e-08 1.794787e-08 1.575877e-08
## [2,] 1.333500e-08 1.546134e-08 1.821360e-08 1.538534e-08
## [3,] -1.670713e-09 -2.209910e-09 -2.172568e-09 -2.213073e-09
## [4,] -1.810573e-09 -1.939688e-09 -2.180273e-09 -1.937106e-09
## [5,] 9.917494e-10 1.235000e-09 1.108439e-09 1.245184e-09
## [6,] 1.030510e-08 1.185665e-08 1.355176e-08 1.181224e-08
## [7,] 1.185665e-08 1.646442e-08 1.834951e-08 1.640910e-08
## [8,] 1.355176e-08 1.834951e-08 2.095913e-08 1.827999e-08
## [9,] 1.181224e-08 1.640910e-08 1.827999e-08 1.635510e-08
##      [,154]      [,155]      [,156]      [,157]      [,158]
## [1,] 1.411764e-08 1.379921e-08 -2.214465e-09 -2.015371e-09 1.218418e-09
## [2,] 1.379921e-08 1.514331e-08 -1.610353e-09 -1.928504e-09 1.010410e-09
## [3,] -2.214465e-09 -1.610353e-09 1.600777e-09 5.394565e-10 2.885030e-12
## [4,] -2.015371e-09 -1.928504e-09 5.394565e-10 8.787225e-10 3.454463e-10
## [5,] 1.218418e-09 1.010410e-09 2.885030e-12 3.454463e-10 1.269915e-09
## [6,] 1.081921e-08 1.107913e-08 -1.612618e-09 -1.517281e-09 1.066735e-09

```



```

## [7,] 1.428442e-08 1.353572e-08 -2.279814e-09 -1.809696e-09 1.390451e-09
## [8,] 1.575877e-08 1.538534e-08 -2.213073e-09 -1.937106e-09 1.245184e-09
## [9,] 1.424504e-08 1.347273e-08 -2.282702e-09 -1.807172e-09 1.399838e-09
##      [,159]      [,160]      [,161]      [,162]
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## [2,] 1.107913e-08 1.353572e-08 1.538534e-08 1.347273e-08
## [3,] -1.612618e-09 -2.279814e-09 -2.213073e-09 -2.282702e-09
## [4,] -1.517281e-09 -1.809696e-09 -1.937106e-09 -1.807172e-09
## [5,] 1.066735e-09 1.390451e-09 1.245184e-09 1.399838e-09
## [6,] 8.818083e-09 1.062973e-08 1.181224e-08 1.059710e-08
## [7,] 1.062973e-08 1.505927e-08 1.640910e-08 1.502027e-08
## [8,] 1.181224e-08 1.640910e-08 1.827999e-08 1.635510e-08
## [9,] 1.059710e-08 1.502027e-08 1.635510e-08 1.498216e-08
##      [,163]      [,164]      [,165]      [,166]
## [1,] -5.311637e-09 -2.418169e-09 4.816485e-09 1.049248e-09
## [2,] -2.418169e-09 -2.175934e-09 1.912516e-09 8.159049e-10
## [3,] 4.816485e-09 1.912516e-09 -2.671382e-09 -9.408777e-10
## [4,] 1.049248e-09 8.159049e-10 -9.408777e-10 -5.197837e-10
## [5,] 1.934774e-11 1.456575e-10 5.740245e-11 -4.253663e-10
## [6,] -4.456084e-09 -2.011008e-09 3.680578e-09 8.890382e-10
## [7,] -5.898991e-09 -2.214801e-09 4.980431e-09 9.173012e-10
## [8,] -5.636372e-09 -2.215152e-09 4.867790e-09 9.784441e-10
## [9,] -5.913487e-09 -2.214465e-09 4.994422e-09 9.144318e-10
##      [,167]      [,168]      [,169]      [,170]
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## [2,] 1.456575e-10 -2.011008e-09 -2.214801e-09 -2.215152e-09
## [3,] 5.740245e-11 3.680578e-09 4.980431e-09 4.867790e-09
## [4,] -4.253663e-10 8.890382e-10 9.173012e-10 9.784441e-10
## [5,] -6.694618e-10 -1.482441e-11 -1.501517e-10 3.886151e-11
## [6,] -1.482441e-11 -3.875257e-09 -4.731295e-09 -4.535577e-09
## [7,] -1.501517e-10 -4.731295e-09 -6.687891e-09 -6.429716e-09
## [8,] 3.886151e-11 -4.535577e-09 -6.429716e-09 -6.247708e-09
## [9,] -1.545818e-10 -4.744471e-09 -6.709534e-09 -6.448943e-09
##      [,171]      [,172]      [,173]      [,174]
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## [2,] -2.214465e-09 -2.175934e-09 -2.438270e-09 2.143573e-09
## [3,] 4.994422e-09 1.912516e-09 2.143573e-09 -6.263545e-10
## [4,] 9.144318e-10 8.159049e-10 1.054314e-09 -6.139298e-10
## [5,] -1.545818e-10 1.456575e-10 3.223399e-10 9.439133e-12

```

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## [6,] -4.744471e-09 -2.011008e-09 -1.987969e-09 1.547532e-09
## [7,] -6.709534e-09 -2.214801e-09 -1.612894e-09 1.598039e-09
## [8,] -6.448943e-09 -2.215152e-09 -1.700153e-09 1.796609e-09
## [9,] -6.731346e-09 -2.214465e-09 -1.610353e-09 1.600777e-09
##      [,175]      [,176]      [,177]      [,178]
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## [3,] -6.139298e-10  9.439133e-12  1.547532e-09  1.598039e-09
## [4,] -5.136606e-10 -3.733106e-10  7.087711e-10  5.426849e-10
## [5,] -3.733106e-10 -5.196254e-10  1.056101e-10  6.360003e-12
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## [8,]  6.496899e-10  1.454549e-10 -1.670713e-09 -2.209910e-09
## [9,]  5.394565e-10  2.885030e-12 -1.612618e-09 -2.279814e-09
##      [,179]      [,180]      [,181]      [,182]
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## [3,]  1.796609e-09  1.600777e-09 -2.671382e-09 -6.263545e-10
## [4,]  6.496899e-10  5.394565e-10 -9.408777e-10 -6.139298e-10
## [5,]  1.454549e-10  2.885030e-12  5.740245e-11  9.439133e-12
## [6,] -1.670713e-09 -1.612618e-09  3.680578e-09  1.547532e-09
## [7,] -2.209910e-09 -2.279814e-09  4.980431e-09  1.598039e-09
## [8,] -2.172568e-09 -2.213073e-09  4.867790e-09  1.796609e-09
## [9,] -2.213073e-09 -2.282702e-09  4.994422e-09  1.600777e-09
##      [,183]      [,184]      [,185]      [,186]
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## [2,] -6.263545e-10 -6.139298e-10  9.439133e-12  1.547532e-09
## [3,]  4.377844e-09  5.919724e-10  2.585190e-10 -2.108416e-09
## [4,]  5.919724e-10  6.046577e-10  5.171897e-10 -6.540196e-10
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## [6,] -2.108416e-09 -6.540196e-10  2.593621e-10  3.249929e-09
## [7,] -3.001490e-09 -9.081328e-10  4.605966e-11  3.825881e-09
## [8,] -2.635686e-09 -9.284537e-10 -6.395172e-11  3.691557e-09
## [9,] -3.005273e-09 -9.068524e-10  5.047031e-11  3.838213e-09
##      [,187]      [,188]      [,189]      [,190]
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## [3,] -3.001490e-09 -2.635686e-09 -3.005273e-09 -9.408777e-10
## [4,] -9.081328e-10 -9.284537e-10 -9.068524e-10 -5.197837e-10

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## [5,] 4.605966e-11 -6.395172e-11 5.047031e-11 -4.253663e-10
## [6,] 3.825881e-09 3.691557e-09 3.838213e-09 8.890382e-10
## [7,] 5.690862e-09 5.367740e-09 5.704958e-09 9.173012e-10
## [8,] 5.367740e-09 5.332673e-09 5.384030e-09 9.784441e-10
## [9,] 5.704958e-09 5.384030e-09 5.719645e-09 9.144318e-10
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## [2,] 1.054314e-09 -6.139298e-10 -5.136606e-10 -3.733106e-10
## [3,] -6.139298e-10 5.919724e-10 6.046577e-10 5.171897e-10
## [4,] -5.136606e-10 6.046577e-10 5.931977e-10 7.211912e-10
## [5,] -3.733106e-10 5.171897e-10 7.211912e-10 1.012245e-09
## [6,] 7.087711e-10 -6.540196e-10 -3.330313e-10 -1.431769e-10
## [7,] 5.426849e-10 -9.081328e-10 -4.545071e-10 -4.469245e-10
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## [9,] 5.394565e-10 -9.068524e-10 -4.491882e-10 -4.402994e-10
##      [,195]      [,196]      [,197]      [,198]
## [1,] 8.890382e-10 9.173012e-10 9.784441e-10 9.144318e-10
## [2,] 7.087711e-10 5.426849e-10 6.496899e-10 5.394565e-10
## [3,] -6.540196e-10 -9.081328e-10 -9.284537e-10 -9.068524e-10
## [4,] -3.330313e-10 -4.545071e-10 -5.420689e-10 -4.491882e-10
## [5,] -1.431769e-10 -4.469245e-10 -5.633818e-10 -4.402994e-10
## [6,] 8.285542e-10 7.355717e-10 7.565425e-10 7.347473e-10
## [7,] 7.355717e-10 9.191863e-10 9.508372e-10 9.164812e-10
## [8,] 7.565425e-10 9.508372e-10 1.032133e-09 9.478396e-10
## [9,] 7.347473e-10 9.164812e-10 9.478396e-10 9.138794e-10
##      [,199]      [,200]      [,201]      [,202]
## [1,] 1.934774e-11 1.456575e-10 5.740245e-11 -4.253663e-10
## [2,] 1.456575e-10 3.223399e-10 9.439133e-12 -3.733106e-10
## [3,] 5.740245e-11 9.439133e-12 2.585190e-10 5.171897e-10
## [4,] -4.253663e-10 -3.733106e-10 5.171897e-10 7.211912e-10
## [5,] -6.694618e-10 -5.196254e-10 9.451014e-10 1.012245e-09
## [6,] -1.482441e-11 1.056101e-10 2.593621e-10 -1.431769e-10
## [7,] -1.501517e-10 6.360003e-12 4.605966e-11 -4.469245e-10
## [8,] 3.886151e-11 1.454549e-10 -6.395172e-11 -5.633818e-10
## [9,] -1.545818e-10 2.885030e-12 5.047031e-11 -4.402994e-10
##      [,203]      [,204]      [,205]      [,206]
## [1,] -6.694618e-10 -1.482441e-11 -1.501517e-10 3.886151e-11
## [2,] -5.196254e-10 1.056101e-10 6.360003e-12 1.454549e-10
## [3,] 9.451014e-10 2.593621e-10 4.605966e-11 -6.395172e-11

```

```

## [4,] 1.012245e-09 -1.431769e-10 -4.469245e-10 -5.633818e-10
## [5,] 1.419952e-09 -2.053268e-10 -7.518850e-10 -8.622936e-10
## [6,] -2.053268e-10 1.637523e-11 -1.338977e-10 -3.795984e-11
## [7,] -7.518850e-10 -1.338977e-10 -2.729938e-10 -1.066296e-10
## [8,] -8.622936e-10 -3.795984e-11 -1.066296e-10 9.260506e-11
## [9,] -7.428015e-10 -1.358318e-10 -2.799990e-10 -1.132382e-10
##      [,207]      [,208]      [,209]      [,210]
## [1,] -1.545818e-10 -4.456084e-09 -2.011008e-09 3.680578e-09
## [2,] 2.885030e-12 -2.011008e-09 -1.987969e-09 1.547532e-09
## [3,] 5.047031e-11 3.680578e-09 1.547532e-09 -2.108416e-09
## [4,] -4.402994e-10 8.890382e-10 7.087711e-10 -6.540196e-10
## [5,] -7.428015e-10 -1.482441e-11 1.056101e-10 2.593621e-10
## [6,] -1.358318e-10 -3.875257e-09 -1.761926e-09 3.249929e-09
## [7,] -2.799990e-10 -4.731295e-09 -1.613743e-09 3.825881e-09
## [8,] -1.132382e-10 -4.535577e-09 -1.670713e-09 3.691557e-09
## [9,] -2.868643e-10 -4.744471e-09 -1.612618e-09 3.838213e-09
##      [,211]      [,212]      [,213]      [,214]
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## [2,] 7.087711e-10 1.056101e-10 -1.761926e-09 -1.613743e-09
## [3,] -6.540196e-10 2.593621e-10 3.249929e-09 3.825881e-09
## [4,] -3.330313e-10 -1.431769e-10 8.285542e-10 7.355717e-10
## [5,] -1.431769e-10 -2.053268e-10 1.637523e-11 -1.338977e-10
## [6,] 8.285542e-10 1.637523e-11 -3.467826e-09 -3.930710e-09
## [7,] 7.355717e-10 -1.338977e-10 -3.930710e-09 -5.254544e-09
## [8,] 7.565425e-10 -3.795984e-11 -3.770452e-09 -5.019093e-09
## [9,] 7.347473e-10 -1.358318e-10 -3.942928e-09 -5.273816e-09
##      [,215]      [,216]      [,217]      [,218]
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## [2,] -1.670713e-09 -1.612618e-09 -2.214801e-09 -1.612894e-09
## [3,] 3.691557e-09 3.838213e-09 4.980431e-09 1.598039e-09
## [4,] 7.565425e-10 7.347473e-10 9.173012e-10 5.426849e-10
## [5,] -3.795984e-11 -1.358318e-10 -1.501517e-10 6.360003e-12
## [6,] -3.770452e-09 -3.942928e-09 -4.731295e-09 -1.613743e-09
## [7,] -5.019093e-09 -5.273816e-09 -6.687891e-09 -2.277017e-09
## [8,] -4.840329e-09 -5.035906e-09 -6.429716e-09 -2.209910e-09
## [9,] -5.035906e-09 -5.293168e-09 -6.709534e-09 -2.279814e-09
##      [,219]      [,220]      [,221]      [,222]
## [1,] 4.980431e-09 9.173012e-10 -1.501517e-10 -4.731295e-09
## [2,] 1.598039e-09 5.426849e-10 6.360003e-12 -1.613743e-09

```

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## [3,] -3.001490e-09 -9.081328e-10 4.605966e-11 3.825881e-09
## [4,] -9.081328e-10 -4.545071e-10 -4.469245e-10 7.355717e-10
## [5,] 4.605966e-11 -4.469245e-10 -7.518850e-10 -1.338977e-10
## [6,] 3.825881e-09 7.355717e-10 -1.338977e-10 -3.930710e-09
## [7,] 5.690862e-09 9.191863e-10 -2.729938e-10 -5.254544e-09
## [8,] 5.367740e-09 9.508372e-10 -1.066296e-10 -5.019093e-09
## [9,] 5.704958e-09 9.164812e-10 -2.799990e-10 -5.273816e-09
##      [,223]      [,224]      [,225]      [,226]
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## [2,] -2.277017e-09 -2.209910e-09 -2.279814e-09 -2.215152e-09
## [3,] 5.690862e-09 5.367740e-09 5.704958e-09 4.867790e-09
## [4,] 9.191863e-10 9.508372e-10 9.164812e-10 9.784441e-10
## [5,] -2.729938e-10 -1.066296e-10 -2.799990e-10 3.886151e-11
## [6,] -5.254544e-09 -5.019093e-09 -5.273816e-09 -4.535577e-09
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## [8,] -7.394628e-09 -7.219300e-09 -7.419732e-09 -6.247708e-09
## [9,] -7.716874e-09 -7.419732e-09 -7.746080e-09 -6.448943e-09
##      [,227]      [,228]      [,229]      [,230]
## [1,] -2.215152e-09 4.867790e-09 9.784441e-10 3.886151e-11
## [2,] -1.700153e-09 1.796609e-09 6.496899e-10 1.454549e-10
## [3,] 1.796609e-09 -2.635686e-09 -9.284537e-10 -6.395172e-11
## [4,] 6.496899e-10 -9.284537e-10 -5.420689e-10 -5.633818e-10
## [5,] 1.454549e-10 -6.395172e-11 -5.633818e-10 -8.622936e-10
## [6,] -1.670713e-09 3.691557e-09 7.565425e-10 -3.795984e-11
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## [8,] -2.172568e-09 5.332673e-09 1.032133e-09 9.260506e-11
## [9,] -2.213073e-09 5.384030e-09 9.478396e-10 -1.132382e-10
##      [,231]      [,232]      [,233]      [,234]
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## [2,] -1.670713e-09 -2.209910e-09 -2.172568e-09 -2.213073e-09
## [3,] 3.691557e-09 5.367740e-09 5.332673e-09 5.384030e-09
## [4,] 7.565425e-10 9.508372e-10 1.032133e-09 9.478396e-10
## [5,] -3.795984e-11 -1.066296e-10 9.260506e-11 -1.132382e-10
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## [8,] -4.840329e-09 -7.219300e-09 -7.097777e-09 -7.241743e-09
## [9,] -5.035906e-09 -7.419732e-09 -7.241743e-09 -7.444971e-09
##      [,235]      [,236]      [,237]      [,238]
## [1,] -5.913487e-09 -2.214465e-09 4.994422e-09 9.144318e-10

```

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## [2,] -2.214465e-09 -1.610353e-09 1.600777e-09 5.394565e-10
## [3,] 4.994422e-09 1.600777e-09 -3.005273e-09 -9.068524e-10
## [4,] 9.144318e-10 5.394565e-10 -9.068524e-10 -4.491882e-10
## [5,] -1.545818e-10 2.885030e-12 5.047031e-11 -4.402994e-10
## [6,] -4.744471e-09 -1.612618e-09 3.838213e-09 7.347473e-10
## [7,] -6.709534e-09 -2.279814e-09 5.704958e-09 9.164812e-10
## [8,] -6.448943e-09 -2.213073e-09 5.384030e-09 9.478396e-10
## [9,] -6.731346e-09 -2.282702e-09 5.719645e-09 9.138794e-10
##      [,239]      [,240]      [,241]      [,242]
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## [2,] 2.885030e-12 -1.612618e-09 -2.279814e-09 -2.213073e-09
## [3,] 5.047031e-11 3.838213e-09 5.704958e-09 5.384030e-09
## [4,] -4.402994e-10 7.347473e-10 9.164812e-10 9.478396e-10
## [5,] -7.428015e-10 -1.358318e-10 -2.799990e-10 -1.132382e-10
## [6,] -1.358318e-10 -3.942928e-09 -5.273816e-09 -5.035906e-09
## [7,] -2.799990e-10 -5.273816e-09 -7.716874e-09 -7.419732e-09
## [8,] -1.132382e-10 -5.035906e-09 -7.419732e-09 -7.241743e-09
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##      [,243]      [,244]      [,245]      [,246]
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## [2,] -2.282702e-09 -2.804045e-09 -3.339185e-09 8.159049e-10
## [3,] 5.719645e-09 1.049248e-09 8.159049e-10 -9.408777e-10
## [4,] 9.138794e-10 1.528106e-09 1.330170e-09 -5.197837e-10
## [5,] -2.868643e-10 5.036019e-10 3.818851e-10 -4.253663e-10
## [6,] -5.293168e-09 -2.704595e-09 -2.468440e-09 8.890382e-10
## [7,] -7.746080e-09 -3.082632e-09 -2.018933e-09 9.173012e-10
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## [9,] -7.775419e-09 -3.083121e-09 -2.015371e-09 9.144318e-10
##      [,247]      [,248]      [,249]      [,250]
## [1,] 1.528106e-09 5.036019e-10 -2.704595e-09 -3.082632e-09
## [2,] 1.330170e-09 3.818851e-10 -2.468440e-09 -2.018933e-09
## [3,] -5.197837e-10 -4.253663e-10 8.890382e-10 9.173012e-10
## [4,] -9.933237e-10 -7.176715e-10 1.117451e-09 1.263261e-09
## [5,] -7.176715e-10 -1.037273e-09 1.597169e-10 5.190321e-10
## [6,] 1.117451e-09 1.597169e-10 -2.437634e-09 -2.142662e-09
## [7,] 1.263261e-09 5.190321e-10 -2.142662e-09 -3.097647e-09
## [8,] 1.390069e-09 6.277585e-10 -2.273278e-09 -3.126034e-09
## [9,] 1.259713e-09 5.128480e-10 -2.143200e-09 -3.099577e-09
##      [,251]      [,252]      [,253]      [,254]

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## [1,] -3.221755e-09 -3.083121e-09 -2.804045e-09 -3.339185e-09
## [2,] -2.320561e-09 -2.015371e-09 -3.339185e-09 -4.857336e-09
## [3,] 9.784441e-10 9.144318e-10 8.159049e-10 1.054314e-09
## [4,] 1.390069e-09 1.259713e-09 1.330170e-09 1.747494e-09
## [5,] 6.277585e-10 5.128480e-10 3.818851e-10 4.250714e-10
## [6,] -2.273278e-09 -2.143200e-09 -2.468440e-09 -3.350842e-09
## [7,] -3.126034e-09 -3.099577e-09 -2.018933e-09 -1.934090e-09
## [8,] -3.266733e-09 -3.126727e-09 -2.320561e-09 -2.439176e-09
## [9,] -3.126727e-09 -3.101661e-09 -2.015371e-09 -1.928504e-09
##      [,255]      [,256]      [,257]      [,258]
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## [2,] 1.054314e-09 1.747494e-09 4.250714e-10 -3.350842e-09
## [3,] -6.139298e-10 -5.136606e-10 -3.733106e-10 7.087711e-10
## [4,] -5.136606e-10 -9.211164e-10 -5.710026e-10 1.189335e-09
## [5,] -3.733106e-10 -5.710026e-10 -8.054338e-10 1.745048e-10
## [6,] 7.087711e-10 1.189335e-09 1.745048e-10 -2.478217e-09
## [7,] 5.426849e-10 8.822765e-10 3.508261e-10 -1.520530e-09
## [8,] 6.496899e-10 1.062636e-09 4.427807e-10 -1.810573e-09
## [9,] 5.394565e-10 8.787225e-10 3.454463e-10 -1.517281e-09
##      [,259]      [,260]      [,261]      [,262]
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## [2,] -1.934090e-09 -2.439176e-09 -1.928504e-09 8.159049e-10
## [3,] 5.426849e-10 6.496899e-10 5.394565e-10 -9.408777e-10
## [4,] 8.822765e-10 1.062636e-09 8.787225e-10 -5.197837e-10
## [5,] 3.508261e-10 4.427807e-10 3.454463e-10 -4.253663e-10
## [6,] -1.520530e-09 -1.810573e-09 -1.517281e-09 8.890382e-10
## [7,] -1.812401e-09 -1.939688e-09 -1.809696e-09 9.173012e-10
## [8,] -1.939688e-09 -2.180273e-09 -1.937106e-09 9.784441e-10
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## [2,] 1.054314e-09 -6.139298e-10 -5.136606e-10 -3.733106e-10
## [3,] -6.139298e-10 5.919724e-10 6.046577e-10 5.171897e-10
## [4,] -5.136606e-10 6.046577e-10 5.931977e-10 7.211912e-10
## [5,] -3.733106e-10 5.171897e-10 7.211912e-10 1.012245e-09
## [6,] 7.087711e-10 -6.540196e-10 -3.330313e-10 -1.431769e-10
## [7,] 5.426849e-10 -9.081328e-10 -4.545071e-10 -4.469245e-10
## [8,] 6.496899e-10 -9.284537e-10 -5.420689e-10 -5.633818e-10
## [9,] 5.394565e-10 -9.068524e-10 -4.491882e-10 -4.402994e-10

```

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## [2,]  7.087711e-10  5.426849e-10  6.496899e-10  5.394565e-10
## [3,] -6.540196e-10 -9.081328e-10 -9.284537e-10 -9.068524e-10
## [4,] -3.330313e-10 -4.545071e-10 -5.420689e-10 -4.491882e-10
## [5,] -1.431769e-10 -4.469245e-10 -5.633818e-10 -4.402994e-10
## [6,]  8.285542e-10  7.355717e-10  7.565425e-10  7.347473e-10
## [7,]  7.355717e-10  9.191863e-10  9.508372e-10  9.164812e-10
## [8,]  7.565425e-10  9.508372e-10  1.032133e-09  9.478396e-10
## [9,]  7.347473e-10  9.164812e-10  9.478396e-10  9.138794e-10
##          [,271]          [,272]          [,273]          [,274]
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##          [,275]          [,276]          [,277]          [,278]
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## [5,]  1.563116e-09 -2.459865e-10 -7.883515e-10 -9.296028e-10
## [6,] -2.459865e-10  1.044544e-09  7.640617e-10  8.563252e-10
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## [8,] -9.296028e-10  8.563252e-10  1.329953e-09  1.471438e-09
## [9,] -7.787609e-10  7.626605e-10  1.268190e-09  1.325798e-09
##          [,279]          [,280]          [,281]          [,282]
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## [2,]  8.787225e-10  3.818851e-10  4.250714e-10 -3.733106e-10
## [3,] -4.491882e-10 -4.253663e-10 -3.733106e-10  5.171897e-10
## [4,] -8.579633e-10 -7.176715e-10 -5.710026e-10  7.211912e-10
## [5,] -7.787609e-10 -1.037273e-09 -8.054338e-10  1.012245e-09
## [6,]  7.626605e-10  1.597169e-10  1.745048e-10 -1.431769e-10
## [7,]  1.268190e-09  5.190321e-10  3.508261e-10 -4.469245e-10
## [8,]  1.325798e-09  6.277585e-10  4.427807e-10 -5.633818e-10

```



```

## [9,] 1.264502e-09 5.128480e-10 3.454463e-10 -4.402994e-10
##      [,283]      [,284]      [,285]      [,286]
## [1,] -7.176715e-10 -1.037273e-09 1.597169e-10 5.190321e-10
## [2,] -5.710026e-10 -8.054338e-10 1.745048e-10 3.508261e-10
## [3,] 7.211912e-10 1.012245e-09 -1.431769e-10 -4.469245e-10
## [4,] 1.114001e-09 1.563116e-09 -2.459865e-10 -7.883515e-10
## [5,] 1.563116e-09 2.082346e-09 -4.082806e-10 -1.094167e-09
## [6,] -2.459865e-10 -4.082806e-10 4.781147e-11 1.513204e-10
## [7,] -7.883515e-10 -1.094167e-09 1.513204e-10 5.692262e-10
## [8,] -9.296028e-10 -1.291112e-09 1.947491e-10 6.701857e-10
## [9,] -7.787609e-10 -1.081848e-09 1.485097e-10 5.625668e-10
##      [,287]      [,288]      [,289]      [,290]
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## [2,] 4.427807e-10 3.454463e-10 -2.468440e-09 -3.350842e-09
## [3,] -5.633818e-10 -4.402994e-10 8.890382e-10 7.087711e-10
## [4,] -9.296028e-10 -7.787609e-10 1.117451e-09 1.189335e-09
## [5,] -1.291112e-09 -1.081848e-09 1.597169e-10 1.745048e-10
## [6,] 1.947491e-10 1.485097e-10 -2.437634e-09 -2.478217e-09
## [7,] 6.701857e-10 5.625668e-10 -2.142662e-09 -1.520530e-09
## [8,] 8.118743e-10 6.627740e-10 -2.273278e-09 -1.810573e-09
## [9,] 6.627740e-10 5.560152e-10 -2.143200e-09 -1.517281e-09
##      [,291]      [,292]      [,293]      [,294]
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## [2,] 7.087711e-10 1.189335e-09 1.745048e-10 -2.478217e-09
## [3,] -6.540196e-10 -3.330313e-10 -1.431769e-10 8.285542e-10
## [4,] -3.330313e-10 -6.415560e-10 -2.459865e-10 1.044544e-09
## [5,] -1.431769e-10 -2.459865e-10 -4.082806e-10 4.781147e-11
## [6,] 8.285542e-10 1.044544e-09 4.781147e-11 -2.434988e-09
## [7,] 7.355717e-10 7.640617e-10 1.513204e-10 -1.721031e-09
## [8,] 7.565425e-10 8.563252e-10 1.947491e-10 -1.869240e-09
## [9,] 7.347473e-10 7.626605e-10 1.485097e-10 -1.721507e-09
##      [,295]      [,296]      [,297]      [,298]
## [1,] -2.142662e-09 -2.273278e-09 -2.143200e-09 -3.082632e-09
## [2,] -1.520530e-09 -1.810573e-09 -1.517281e-09 -2.018933e-09
## [3,] 7.355717e-10 7.565425e-10 7.347473e-10 9.173012e-10
## [4,] 7.640617e-10 8.563252e-10 7.626605e-10 1.263261e-09
## [5,] 1.513204e-10 1.947491e-10 1.485097e-10 5.190321e-10
## [6,] -1.721031e-09 -1.869240e-09 -1.721507e-09 -2.142662e-09
## [7,] -2.030405e-09 -2.042355e-09 -2.033122e-09 -3.097647e-09

```

```

## [8,] -2.042355e-09 -2.136066e-09 -2.043789e-09 -3.126034e-09
## [9,] -2.033122e-09 -2.043789e-09 -2.035942e-09 -3.099577e-09
##      [,299]      [,300]      [,301]      [,302]
## [1,] -2.018933e-09  9.173012e-10  1.263261e-09  5.190321e-10
## [2,] -1.934090e-09  5.426849e-10  8.822765e-10  3.508261e-10
## [3,]  5.426849e-10 -9.081328e-10 -4.545071e-10 -4.469245e-10
## [4,]  8.822765e-10 -4.545071e-10 -8.644649e-10 -7.883515e-10
## [5,]  3.508261e-10 -4.469245e-10 -7.883515e-10 -1.094167e-09
## [6,] -1.520530e-09  7.355717e-10  7.640617e-10  1.513204e-10
## [7,] -1.812401e-09  9.191863e-10  1.272036e-09  5.692262e-10
## [8,] -1.939688e-09  9.508372e-10  1.329953e-09  6.701857e-10
## [9,] -1.809696e-09  9.164812e-10  1.268190e-09  5.625668e-10
##      [,303]      [,304]      [,305]      [,306]
## [1,] -2.142662e-09 -3.097647e-09 -3.126034e-09 -3.099577e-09
## [2,] -1.520530e-09 -1.812401e-09 -1.939688e-09 -1.809696e-09
## [3,]  7.355717e-10  9.191863e-10  9.508372e-10  9.164812e-10
## [4,]  7.640617e-10  1.272036e-09  1.329953e-09  1.268190e-09
## [5,]  1.513204e-10  5.692262e-10  6.701857e-10  5.625668e-10
## [6,] -1.721031e-09 -2.030405e-09 -2.042355e-09 -2.033122e-09
## [7,] -2.030405e-09 -3.259420e-09 -3.251962e-09 -3.263220e-09
## [8,] -2.042355e-09 -3.251962e-09 -3.326181e-09 -3.253732e-09
## [9,] -2.033122e-09 -3.263220e-09 -3.253732e-09 -3.267108e-09
##      [,307]      [,308]      [,309]      [,310]
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## [2,] -2.320561e-09 -2.439176e-09  6.496899e-10  1.062636e-09
## [3,]  9.784441e-10  6.496899e-10 -9.284537e-10 -5.420689e-10
## [4,]  1.390069e-09  1.062636e-09 -5.420689e-10 -9.905866e-10
## [5,]  6.277585e-10  4.427807e-10 -5.633818e-10 -9.296028e-10
## [6,] -2.273278e-09 -1.810573e-09  7.565425e-10  8.563252e-10
## [7,] -3.126034e-09 -1.939688e-09  9.508372e-10  1.329953e-09
## [8,] -3.266733e-09 -2.180273e-09  1.032133e-09  1.471438e-09
## [9,] -3.126727e-09 -1.937106e-09  9.478396e-10  1.325798e-09
##      [,311]      [,312]      [,313]      [,314]
## [1,]  6.277585e-10 -2.273278e-09 -3.126034e-09 -3.266733e-09
## [2,]  4.427807e-10 -1.810573e-09 -1.939688e-09 -2.180273e-09
## [3,] -5.633818e-10  7.565425e-10  9.508372e-10  1.032133e-09
## [4,] -9.296028e-10  8.563252e-10  1.329953e-09  1.471438e-09
## [5,] -1.291112e-09  1.947491e-10  6.701857e-10  8.118743e-10
## [6,]  1.947491e-10 -1.869240e-09 -2.042355e-09 -2.136066e-09

```

```

## [7,] 6.701857e-10 -2.042355e-09 -3.251962e-09 -3.326181e-09
## [8,] 8.118743e-10 -2.136066e-09 -3.326181e-09 -3.484006e-09
## [9,] 6.627740e-10 -2.043789e-09 -3.253732e-09 -3.326588e-09
##      [,315]      [,316]      [,317]      [,318]
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## [2,] -1.937106e-09 -2.015371e-09 -1.928504e-09 5.394565e-10
## [3,] 9.478396e-10 9.144318e-10 5.394565e-10 -9.068524e-10
## [4,] 1.325798e-09 1.259713e-09 8.787225e-10 -4.491882e-10
## [5,] 6.627740e-10 5.128480e-10 3.454463e-10 -4.402994e-10
## [6,] -2.043789e-09 -2.143200e-09 -1.517281e-09 7.347473e-10
## [7,] -3.253732e-09 -3.099577e-09 -1.809696e-09 9.164812e-10
## [8,] -3.326588e-09 -3.126727e-09 -1.937106e-09 9.478396e-10
## [9,] -3.255632e-09 -3.101661e-09 -1.807172e-09 9.138794e-10
##      [,319]      [,320]      [,321]      [,322]
## [1,] 1.259713e-09 5.128480e-10 -2.143200e-09 -3.099577e-09
## [2,] 8.787225e-10 3.454463e-10 -1.517281e-09 -1.809696e-09
## [3,] -4.491882e-10 -4.402994e-10 7.347473e-10 9.164812e-10
## [4,] -8.579633e-10 -7.787609e-10 7.626605e-10 1.268190e-09
## [5,] -7.787609e-10 -1.081848e-09 1.485097e-10 5.625668e-10
## [6,] 7.626605e-10 1.485097e-10 -1.721507e-09 -2.033122e-09
## [7,] 1.268190e-09 5.625668e-10 -2.033122e-09 -3.263220e-09
## [8,] 1.325798e-09 6.627740e-10 -2.043789e-09 -3.253732e-09
## [9,] 1.264502e-09 5.560152e-10 -2.035942e-09 -3.267108e-09
##      [,323]      [,324]      [,325]      [,326]      [,327]
## [1,] -3.126727e-09 -3.101661e-09 1.981525e-09 1.121582e-09 1.934774e-11
## [2,] -1.937106e-09 -1.807172e-09 1.121582e-09 8.629182e-10 1.456575e-10
## [3,] 9.478396e-10 9.138794e-10 1.934774e-11 1.456575e-10 5.740245e-11
## [4,] 1.325798e-09 1.264502e-09 5.036019e-10 3.818851e-10 -4.253663e-10
## [5,] 6.627740e-10 5.560152e-10 1.954425e-09 1.286082e-09 -6.694618e-10
## [6,] -2.043789e-09 -2.035942e-09 1.856867e-09 9.650738e-10 -1.482441e-11
## [7,] -3.253732e-09 -3.267108e-09 1.810521e-09 1.206512e-09 -1.501517e-10
## [8,] -3.326588e-09 -3.255632e-09 1.724716e-09 1.106954e-09 3.886151e-11
## [9,] -3.255632e-09 -3.271085e-09 1.827566e-09 1.218418e-09 -1.545818e-10
##      [,328]      [,329]      [,330]      [,331]      [,332]
## [1,] 5.036019e-10 1.954425e-09 1.856867e-09 1.810521e-09 1.724716e-09
## [2,] 3.818851e-10 1.286082e-09 9.650738e-10 1.206512e-09 1.106954e-09
## [3,] -4.253663e-10 -6.694618e-10 -1.482441e-11 -1.501517e-10 3.886151e-11
## [4,] -7.176715e-10 -1.037273e-09 1.597169e-10 5.190321e-10 6.277585e-10
## [5,] -1.037273e-09 -7.198821e-10 1.273899e-09 1.934523e-09 2.066860e-09

```

```

## [6,] 1.597169e-10 1.273899e-09 1.669040e-09 1.739783e-09 1.694221e-09
## [7,] 5.190321e-10 1.934523e-09 1.739783e-09 1.886692e-09 1.697616e-09
## [8,] 6.277585e-10 2.066860e-09 1.694221e-09 1.697616e-09 1.574343e-09
## [9,] 5.128480e-10 1.932806e-09 1.751952e-09 1.900437e-09 1.714679e-09
##      [,333]      [,334]      [,335]      [,336]      [,337]
## [1,] 1.827566e-09 1.121582e-09 8.629182e-10 1.456575e-10 3.818851e-10
## [2,] 1.218418e-09 8.629182e-10 6.428628e-10 3.223399e-10 4.250714e-10
## [3,] -1.545818e-10 1.456575e-10 3.223399e-10 9.439133e-12 -3.733106e-10
## [4,] 5.128480e-10 3.818851e-10 4.250714e-10 -3.733106e-10 -5.710026e-10
## [5,] 1.932806e-09 1.286082e-09 1.186450e-09 -5.196254e-10 -8.054338e-10
## [6,] 1.751952e-09 9.650738e-10 7.343381e-10 1.056101e-10 1.745048e-10
## [7,] 1.900437e-09 1.206512e-09 1.000986e-09 6.360003e-12 3.508261e-10
## [8,] 1.714679e-09 1.106954e-09 8.678136e-10 1.454549e-10 4.427807e-10
## [9,] 1.914366e-09 1.218418e-09 1.010410e-09 2.885030e-12 3.454463e-10
##      [,338]      [,339]      [,340]      [,341]      [,342]
## [1,] 1.286082e-09 9.650738e-10 1.206512e-09 1.106954e-09 1.218418e-09
## [2,] 1.186450e-09 7.343381e-10 1.000986e-09 8.678136e-10 1.010410e-09
## [3,] -5.196254e-10 1.056101e-10 6.360003e-12 1.454549e-10 2.885030e-12
## [4,] -8.054338e-10 1.745048e-10 3.508261e-10 4.427807e-10 3.454463e-10
## [5,] -5.901952e-10 8.696907e-10 1.271775e-09 1.376227e-09 1.269915e-09
## [6,] 8.696907e-10 8.283762e-10 1.058391e-09 9.917494e-10 1.066735e-09
## [7,] 1.271775e-09 1.058391e-09 1.381142e-09 1.235000e-09 1.390451e-09
## [8,] 1.376227e-09 9.917494e-10 1.235000e-09 1.108439e-09 1.245184e-09
## [9,] 1.269915e-09 1.066735e-09 1.390451e-09 1.245184e-09 1.399838e-09
##      [,343]      [,344]      [,345]      [,346]
## [1,] 1.934774e-11 1.456575e-10 5.740245e-11 -4.253663e-10
## [2,] 1.456575e-10 3.223399e-10 9.439133e-12 -3.733106e-10
## [3,] 5.740245e-11 9.439133e-12 2.585190e-10 5.171897e-10
## [4,] -4.253663e-10 -3.733106e-10 5.171897e-10 7.211912e-10
## [5,] -6.694618e-10 -5.196254e-10 9.451014e-10 1.012245e-09
## [6,] -1.482441e-11 1.056101e-10 2.593621e-10 -1.431769e-10
## [7,] -1.501517e-10 6.360003e-12 4.605966e-11 -4.469245e-10
## [8,] 3.886151e-11 1.454549e-10 -6.395172e-11 -5.633818e-10
## [9,] -1.545818e-10 2.885030e-12 5.047031e-11 -4.402994e-10
##      [,347]      [,348]      [,349]      [,350]
## [1,] -6.694618e-10 -1.482441e-11 -1.501517e-10 3.886151e-11
## [2,] -5.196254e-10 1.056101e-10 6.360003e-12 1.454549e-10
## [3,] 9.451014e-10 2.593621e-10 4.605966e-11 -6.395172e-11
## [4,] 1.012245e-09 -1.431769e-10 -4.469245e-10 -5.633818e-10

```

```

## [5,] 1.419952e-09 -2.053268e-10 -7.518850e-10 -8.622936e-10
## [6,] -2.053268e-10 1.637523e-11 -1.338977e-10 -3.795984e-11
## [7,] -7.518850e-10 -1.338977e-10 -2.729938e-10 -1.066296e-10
## [8,] -8.622936e-10 -3.795984e-11 -1.066296e-10 9.260506e-11
## [9,] -7.428015e-10 -1.358318e-10 -2.799990e-10 -1.132382e-10
##      [,351]      [,352]      [,353]      [,354]
## [1,] -1.545818e-10 5.036019e-10 3.818851e-10 -4.253663e-10
## [2,] 2.885030e-12 3.818851e-10 4.250714e-10 -3.733106e-10
## [3,] 5.047031e-11 -4.253663e-10 -3.733106e-10 5.171897e-10
## [4,] -4.402994e-10 -7.176715e-10 -5.710026e-10 7.211912e-10
## [5,] -7.428015e-10 -1.037273e-09 -8.054338e-10 1.012245e-09
## [6,] -1.358318e-10 1.597169e-10 1.745048e-10 -1.431769e-10
## [7,] -2.799990e-10 5.190321e-10 3.508261e-10 -4.469245e-10
## [8,] -1.132382e-10 6.277585e-10 4.427807e-10 -5.633818e-10
## [9,] -2.868643e-10 5.128480e-10 3.454463e-10 -4.402994e-10
##      [,355]      [,356]      [,357]      [,358]
## [1,] -7.176715e-10 -1.037273e-09 1.597169e-10 5.190321e-10
## [2,] -5.710026e-10 -8.054338e-10 1.745048e-10 3.508261e-10
## [3,] 7.211912e-10 1.012245e-09 -1.431769e-10 -4.469245e-10
## [4,] 1.114001e-09 1.563116e-09 -2.459865e-10 -7.883515e-10
## [5,] 1.563116e-09 2.082346e-09 -4.082806e-10 -1.094167e-09
## [6,] -2.459865e-10 -4.082806e-10 4.781147e-11 1.513204e-10
## [7,] -7.883515e-10 -1.094167e-09 1.513204e-10 5.692262e-10
## [8,] -9.296028e-10 -1.291112e-09 1.947491e-10 6.701857e-10
## [9,] -7.787609e-10 -1.081848e-09 1.485097e-10 5.625668e-10
##      [,359]      [,360]      [,361]      [,362]
## [1,] 6.277585e-10 5.128480e-10 1.954425e-09 1.286082e-09
## [2,] 4.427807e-10 3.454463e-10 1.286082e-09 1.186450e-09
## [3,] -5.633818e-10 -4.402994e-10 -6.694618e-10 -5.196254e-10
## [4,] -9.296028e-10 -7.787609e-10 -1.037273e-09 -8.054338e-10
## [5,] -1.291112e-09 -1.081848e-09 -7.198821e-10 -5.901952e-10
## [6,] 1.947491e-10 1.485097e-10 1.273899e-09 8.696907e-10
## [7,] 6.701857e-10 5.625668e-10 1.934523e-09 1.271775e-09
## [8,] 8.118743e-10 6.627740e-10 2.066860e-09 1.376227e-09
## [9,] 6.627740e-10 5.560152e-10 1.932806e-09 1.269915e-09
##      [,363]      [,364]      [,365]      [,366]
## [1,] -6.694618e-10 -1.037273e-09 -7.198821e-10 1.273899e-09
## [2,] -5.196254e-10 -8.054338e-10 -5.901952e-10 8.696907e-10
## [3,] 9.451014e-10 1.012245e-09 1.419952e-09 -2.053268e-10

```

```

## [4,] 1.012245e-09 1.563116e-09 2.082346e-09 -4.082806e-10
## [5,] 1.419952e-09 2.082346e-09 3.394140e-09 1.262417e-10
## [6,] -2.053268e-10 -4.082806e-10 1.262417e-10 1.070680e-09
## [7,] -7.518850e-10 -1.094167e-09 -8.518695e-10 1.195200e-09
## [8,] -8.622936e-10 -1.291112e-09 -1.151455e-09 1.220576e-09
## [9,] -7.428015e-10 -1.081848e-09 -8.306527e-10 1.197545e-09
##      [,367]      [,368]      [,369]      [,370]      [,371]
## [1,] 1.934523e-09 2.066860e-09 1.932806e-09 1.856867e-09 9.650738e-10
## [2,] 1.271775e-09 1.376227e-09 1.269915e-09 9.650738e-10 7.343381e-10
## [3,] -7.518850e-10 -8.622936e-10 -7.428015e-10 -1.482441e-11 1.056101e-10
## [4,] -1.094167e-09 -1.291112e-09 -1.081848e-09 1.597169e-10 1.745048e-10
## [5,] -8.518695e-10 -1.151455e-09 -8.306527e-10 1.273899e-09 8.696907e-10
## [6,] 1.195200e-09 1.220576e-09 1.197545e-09 1.669040e-09 8.283762e-10
## [7,] 2.160474e-09 2.230954e-09 2.156236e-09 1.739783e-09 1.058391e-09
## [8,] 2.230954e-09 2.415431e-09 2.226796e-09 1.694221e-09 9.917494e-10
## [9,] 2.156236e-09 2.226796e-09 2.152300e-09 1.751952e-09 1.066735e-09
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## [2,] 1.056101e-10 1.745048e-10 8.696907e-10 8.283762e-10 1.058391e-09
## [3,] 2.593621e-10 -1.431769e-10 -2.053268e-10 1.637523e-11 -1.338977e-10
## [4,] -1.431769e-10 -2.459865e-10 -4.082806e-10 4.781147e-11 1.513204e-10
## [5,] -2.053268e-10 -4.082806e-10 1.262417e-10 1.070680e-09 1.195200e-09
## [6,] 1.637523e-11 4.781147e-11 1.070680e-09 1.604602e-09 1.547614e-09
## [7,] -1.338977e-10 1.513204e-10 1.195200e-09 1.547614e-09 1.874199e-09
## [8,] -3.795984e-11 1.947491e-10 1.220576e-09 1.488947e-09 1.742093e-09
## [9,] -1.358318e-10 1.485097e-10 1.197545e-09 1.557414e-09 1.883006e-09
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## [2,] 9.917494e-10 1.066735e-09 1.206512e-09 1.000986e-09 6.360003e-12
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## [4,] 1.947491e-10 1.485097e-10 5.190321e-10 3.508261e-10 -4.469245e-10
## [5,] 1.220576e-09 1.197545e-09 1.934523e-09 1.271775e-09 -7.518850e-10
## [6,] 1.488947e-09 1.557414e-09 1.739783e-09 1.058391e-09 -1.338977e-10
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## [2,] 1.235000e-09 1.390451e-09 1.106954e-09 8.678136e-10 1.454549e-10
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## [5,] 2.230954e-09 2.156236e-09 2.066860e-09 1.376227e-09 -8.622936e-10
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## [9,] 1.821265e-09 2.106326e-09 1.714679e-09 1.245184e-09 -1.132382e-10
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## [5,] 2.152300e-09 1.856867e-09 9.650738e-10 -1.482441e-11
## [6,] 1.892014e-09 1.451994e-08 1.090779e-08 -3.875257e-09
## [7,] 2.106326e-09 1.619709e-08 1.085177e-08 -4.731295e-09
## [8,] 1.836380e-09 1.728755e-08 1.246712e-08 -4.535577e-09
## [9,] 2.118756e-09 1.620570e-08 1.081921e-08 -4.744471e-09
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## [5,] 1.597169e-10 1.273899e-09 1.669040e-09 1.739783e-09
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## [7,] -2.142662e-09 1.739783e-09 1.309496e-08 1.673751e-08
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## [5,] 1.694221e-09 1.751952e-09 9.650738e-10 7.343381e-10
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## [4,] 7.087711e-10 1.189335e-09 1.745048e-10 -2.478217e-09 -1.520530e-09
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## [2,] 1.547532e-09 7.087711e-10 1.056101e-10 -1.761926e-09
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## [6,] 3.249929e-09 8.285542e-10 1.637523e-11 -3.467826e-09
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## [3,] -3.930710e-09 -3.770452e-09 -3.942928e-09 -4.731295e-09
## [4,] -1.721031e-09 -1.869240e-09 -1.721507e-09 -2.142662e-09
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## [6,] 1.119903e-08 1.200223e-08 1.120811e-08 1.309496e-08
## [7,] 1.329499e-08 1.380080e-08 1.330160e-08 1.673751e-08
## [8,] 1.380080e-08 1.483514e-08 1.380182e-08 1.743743e-08
## [9,] 1.330160e-08 1.380182e-08 1.330928e-08 1.674294e-08
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## [2,] 1.113462e-08 -1.613743e-09 -1.520530e-09 1.058391e-09
## [3,] -1.613743e-09 3.825881e-09 7.355717e-10 -1.338977e-10
## [4,] -1.520530e-09 7.355717e-10 7.640617e-10 1.513204e-10
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## [6,] 8.845625e-09 -3.930710e-09 -1.721031e-09 1.547614e-09
## [7,] 1.066325e-08 -5.254544e-09 -2.030405e-09 1.874199e-09
## [8,] 1.185665e-08 -5.019093e-09 -2.042355e-09 1.742093e-09
## [9,] 1.062973e-08 -5.273816e-09 -2.033122e-09 1.883006e-09
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## [3,] -3.930710e-09 -5.254544e-09 -5.019093e-09 -5.273816e-09
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## [3,] -4.535577e-09 -1.670713e-09 3.691557e-09 7.565425e-10
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## [8,] 1.871301e-08 1.355176e-08 -4.840329e-09 -2.136066e-09
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## [5,] 1.753223e-09 1.751952e-09 1.066735e-09 -1.358318e-10
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## [5,] 1.485097e-10 1.197545e-09 1.557414e-09 1.883006e-09
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## [4,] 9.173012e-10 1.263261e-09 5.190321e-10 -2.142662e-09
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## [4,] -1.934090e-09 5.426849e-10 8.822765e-10 3.508261e-10 -1.520530e-09
## [5,] 1.000986e-09 6.360003e-12 3.508261e-10 1.271775e-09 1.058391e-09

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## [9,] 1.353572e-08 -2.279814e-09 -1.809696e-09 1.390451e-09 1.062973e-08
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## [4,] -1.812401e-09 -1.939688e-09 -1.809696e-09 9.173012e-10
## [5,] 1.381142e-09 1.235000e-09 1.390451e-09 -1.501517e-10
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## [5,] 5.190321e-10 3.508261e-10 -4.469245e-10 -7.883515e-10
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## [8,] -3.126034e-09 -1.939688e-09 9.508372e-10 1.329953e-09
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## [3,] -4.469245e-10 7.355717e-10 9.191863e-10 9.508372e-10
## [4,] -7.883515e-10 7.640617e-10 1.272036e-09 1.329953e-09
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## [5,] -2.729938e-10 5.692262e-10 2.160474e-09 1.874199e-09
## [6,] -5.254544e-09 -2.030405e-09 1.874199e-09 1.329499e-08
## [7,] -7.687791e-09 -3.259420e-09 2.081831e-09 1.810381e-08
## [8,] -7.394628e-09 -3.251962e-09 1.806270e-09 1.861935e-08
## [9,] -7.716874e-09 -3.263220e-09 2.094019e-09 1.810955e-08
##      [,547]      [,548]      [,549]      [,550]
## [1,] 2.548310e-08 2.624676e-08 2.549147e-08 2.400101e-08
## [2,] 1.509914e-08 1.646442e-08 1.505927e-08 1.581107e-08

```



```

## [3,] -7.687791e-09 -7.394628e-09 -7.716874e-09 -6.429716e-09
## [4,] -3.259420e-09 -3.251962e-09 -3.263220e-09 -3.126034e-09
## [5,] 2.081831e-09 1.806270e-09 2.094019e-09 1.697616e-09
## [6,] 1.810381e-08 1.861935e-08 1.810955e-08 1.743743e-08
## [7,] 2.918897e-08 2.975816e-08 2.920126e-08 2.624676e-08
## [8,] 2.975816e-08 3.112298e-08 2.975841e-08 2.770029e-08
## [9,] 2.920126e-08 2.975841e-08 2.921510e-08 2.624335e-08
##      [,551]      [,552]      [,553]      [,554]
## [1,] 1.581107e-08 -6.429716e-09 -3.126034e-09 1.697616e-09
## [2,] 1.546134e-08 -2.209910e-09 -1.939688e-09 1.235000e-09
## [3,] -2.209910e-09 5.367740e-09 9.508372e-10 -1.066296e-10
## [4,] -1.939688e-09 9.508372e-10 1.329953e-09 6.701857e-10
## [5,] 1.235000e-09 -1.066296e-10 6.701857e-10 2.230954e-09
## [6,] 1.185665e-08 -5.019093e-09 -2.042355e-09 1.742093e-09
## [7,] 1.646442e-08 -7.394628e-09 -3.251962e-09 1.806270e-09
## [8,] 1.834951e-08 -7.219300e-09 -3.326181e-09 1.588130e-09
## [9,] 1.640910e-08 -7.419732e-09 -3.253732e-09 1.821265e-09
##      [,555]      [,556]      [,557]      [,558]
## [1,] 1.743743e-08 2.624676e-08 2.770029e-08 2.624335e-08
## [2,] 1.185665e-08 1.646442e-08 1.834951e-08 1.640910e-08
## [3,] -5.019093e-09 -7.394628e-09 -7.219300e-09 -7.419732e-09
## [4,] -2.042355e-09 -3.251962e-09 -3.326181e-09 -3.253732e-09
## [5,] 1.742093e-09 1.806270e-09 1.588130e-09 1.821265e-09
## [6,] 1.380080e-08 1.861935e-08 1.964902e-08 1.861659e-08
## [7,] 1.861935e-08 2.975816e-08 3.112298e-08 2.975841e-08
## [8,] 1.964902e-08 3.112298e-08 3.324913e-08 3.110893e-08
## [9,] 1.861659e-08 2.975841e-08 3.110893e-08 2.976029e-08
##      [,559]      [,560]      [,561]      [,562]
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## [2,] 1.428442e-08 1.353572e-08 -2.279814e-09 -1.809696e-09
## [3,] -6.709534e-09 -2.279814e-09 5.704958e-09 9.164812e-10
## [4,] -3.099577e-09 -1.809696e-09 9.164812e-10 1.268190e-09
## [5,] 1.900437e-09 1.390451e-09 -2.799990e-10 5.625668e-10
## [6,] 1.674294e-08 1.062973e-08 -5.273816e-09 -2.033122e-09
## [7,] 2.549147e-08 1.505927e-08 -7.716874e-09 -3.263220e-09
## [8,] 2.624335e-08 1.640910e-08 -7.419732e-09 -3.253732e-09
## [9,] 2.550122e-08 1.502027e-08 -7.746080e-09 -3.267108e-09
##      [,563]      [,564]      [,565]      [,566]
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## [4,] 5.625668e-10 -2.033122e-09 -3.263220e-09 -3.253732e-09
## [5,] 2.156236e-09 1.883006e-09 2.094019e-09 1.821265e-09
## [6,] 1.883006e-09 1.330160e-08 1.810955e-08 1.861659e-08
## [7,] 2.094019e-09 1.810955e-08 2.920126e-08 2.975841e-08
## [8,] 1.821265e-09 1.861659e-08 2.975841e-08 3.110893e-08
## [9,] 2.106326e-09 1.811634e-08 2.921510e-08 2.976029e-08
##      [,567]      [,568]      [,569]      [,570]
## [1,] 2.550122e-08 2.313719e-08 1.607788e-08 -5.636372e-09
## [2,] 1.502027e-08 1.607788e-08 1.639068e-08 -2.215152e-09
## [3,] -7.746080e-09 -5.636372e-09 -2.215152e-09 4.867790e-09
## [4,] -3.267108e-09 -3.221755e-09 -2.320561e-09 9.784441e-10
## [5,] 2.106326e-09 1.724716e-09 1.106954e-09 3.886151e-11
## [6,] 1.811634e-08 1.728755e-08 1.246712e-08 -4.535577e-09
## [7,] 2.921510e-08 2.400101e-08 1.581107e-08 -6.429716e-09
## [8,] 2.976029e-08 2.573748e-08 1.794787e-08 -6.247708e-09
## [9,] 2.923051e-08 2.400057e-08 1.575877e-08 -6.448943e-09
##      [,571]      [,572]      [,573]      [,574]      [,575]
## [1,] -3.221755e-09 1.724716e-09 1.728755e-08 2.400101e-08 2.573748e-08
## [2,] -2.320561e-09 1.106954e-09 1.246712e-08 1.581107e-08 1.794787e-08
## [3,] 9.784441e-10 3.886151e-11 -4.535577e-09 -6.429716e-09 -6.247708e-09
## [4,] 1.390069e-09 6.277585e-10 -2.273278e-09 -3.126034e-09 -3.266733e-09
## [5,] 6.277585e-10 2.066860e-09 1.694221e-09 1.697616e-09 1.574343e-09
## [6,] -2.273278e-09 1.694221e-09 1.401251e-08 1.743743e-08 1.871301e-08
## [7,] -3.126034e-09 1.697616e-09 1.743743e-08 2.624676e-08 2.770029e-08
## [8,] -3.266733e-09 1.574343e-09 1.871301e-08 2.770029e-08 2.993269e-08
## [9,] -3.126727e-09 1.714679e-09 1.743632e-08 2.624335e-08 2.768545e-08
##      [,576]      [,577]      [,578]      [,579]
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## [2,] 1.575877e-08 1.639068e-08 1.895318e-08 -1.700153e-09
## [3,] -6.448943e-09 -2.215152e-09 -1.700153e-09 1.796609e-09
## [4,] -3.126727e-09 -2.320561e-09 -2.439176e-09 6.496899e-10
## [5,] 1.714679e-09 1.106954e-09 8.678136e-10 1.454549e-10
## [6,] 1.743632e-08 1.246712e-08 1.333500e-08 -1.670713e-09
## [7,] 2.624335e-08 1.581107e-08 1.546134e-08 -2.209910e-09
## [8,] 2.768545e-08 1.794787e-08 1.821360e-08 -2.172568e-09
## [9,] 2.624161e-08 1.575877e-08 1.538534e-08 -2.213073e-09
##      [,580]      [,581]      [,582]      [,583]      [,584]

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## [1,] -2.320561e-09 1.106954e-09 1.246712e-08 1.581107e-08 1.794787e-08
## [2,] -2.439176e-09 8.678136e-10 1.333500e-08 1.546134e-08 1.821360e-08
## [3,] 6.496899e-10 1.454549e-10 -1.670713e-09 -2.209910e-09 -2.172568e-09
## [4,] 1.062636e-09 4.427807e-10 -1.810573e-09 -1.939688e-09 -2.180273e-09
## [5,] 4.427807e-10 1.376227e-09 9.917494e-10 1.235000e-09 1.108439e-09
## [6,] -1.810573e-09 9.917494e-10 1.030510e-08 1.185665e-08 1.355176e-08
## [7,] -1.939688e-09 1.235000e-09 1.185665e-08 1.646442e-08 1.834951e-08
## [8,] -2.180273e-09 1.108439e-09 1.355176e-08 1.834951e-08 2.095913e-08
## [9,] -1.937106e-09 1.245184e-09 1.181224e-08 1.640910e-08 1.827999e-08
##      [,585]      [,586]      [,587]      [,588]
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## [2,] 1.538534e-08 -2.215152e-09 -1.700153e-09 1.796609e-09
## [3,] -2.213073e-09 4.867790e-09 1.796609e-09 -2.635686e-09
## [4,] -1.937106e-09 9.784441e-10 6.496899e-10 -9.284537e-10
## [5,] 1.245184e-09 3.886151e-11 1.454549e-10 -6.395172e-11
## [6,] 1.181224e-08 -4.535577e-09 -1.670713e-09 3.691557e-09
## [7,] 1.640910e-08 -6.429716e-09 -2.209910e-09 5.367740e-09
## [8,] 1.827999e-08 -6.247708e-09 -2.172568e-09 5.332673e-09
## [9,] 1.635510e-08 -6.448943e-09 -2.213073e-09 5.384030e-09
##      [,589]      [,590]      [,591]      [,592]
## [1,] 9.784441e-10 3.886151e-11 -4.535577e-09 -6.429716e-09
## [2,] 6.496899e-10 1.454549e-10 -1.670713e-09 -2.209910e-09
## [3,] -9.284537e-10 -6.395172e-11 3.691557e-09 5.367740e-09
## [4,] -5.420689e-10 -5.633818e-10 7.565425e-10 9.508372e-10
## [5,] -5.633818e-10 -8.622936e-10 -3.795984e-11 -1.066296e-10
## [6,] 7.565425e-10 -3.795984e-11 -3.770452e-09 -5.019093e-09
## [7,] 9.508372e-10 -1.066296e-10 -5.019093e-09 -7.394628e-09
## [8,] 1.032133e-09 9.260506e-11 -4.840329e-09 -7.219300e-09
## [9,] 9.478396e-10 -1.132382e-10 -5.035906e-09 -7.419732e-09
##      [,593]      [,594]      [,595]      [,596]
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## [2,] -2.172568e-09 -2.213073e-09 -2.320561e-09 -2.439176e-09
## [3,] 5.332673e-09 5.384030e-09 9.784441e-10 6.496899e-10
## [4,] 1.032133e-09 9.478396e-10 1.390069e-09 1.062636e-09
## [5,] 9.260506e-11 -1.132382e-10 6.277585e-10 4.427807e-10
## [6,] -4.840329e-09 -5.035906e-09 -2.273278e-09 -1.810573e-09
## [7,] -7.219300e-09 -7.419732e-09 -3.126034e-09 -1.939688e-09
## [8,] -7.097777e-09 -7.241743e-09 -3.266733e-09 -2.180273e-09
## [9,] -7.241743e-09 -7.444971e-09 -3.126727e-09 -1.937106e-09

```

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##          [,597]          [,598]          [,599]          [,600]
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## [2,]  6.496899e-10  1.062636e-09  4.427807e-10 -1.810573e-09
## [3,] -9.284537e-10 -5.420689e-10 -5.633818e-10  7.565425e-10
## [4,] -5.420689e-10 -9.905866e-10 -9.296028e-10  8.563252e-10
## [5,] -5.633818e-10 -9.296028e-10 -1.291112e-09  1.947491e-10
## [6,]  7.565425e-10  8.563252e-10  1.947491e-10 -1.869240e-09
## [7,]  9.508372e-10  1.329953e-09  6.701857e-10 -2.042355e-09
## [8,]  1.032133e-09  1.471438e-09  8.118743e-10 -2.136066e-09
## [9,]  9.478396e-10  1.325798e-09  6.627740e-10 -2.043789e-09
##          [,601]          [,602]          [,603]          [,604]          [,605]
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## [2,] -1.939688e-09 -2.180273e-09 -1.937106e-09  1.106954e-09  8.678136e-10
## [3,]  9.508372e-10  1.032133e-09  9.478396e-10  3.886151e-11  1.454549e-10
## [4,]  1.329953e-09  1.471438e-09  1.325798e-09  6.277585e-10  4.427807e-10
## [5,]  6.701857e-10  8.118743e-10  6.627740e-10  2.066860e-09  1.376227e-09
## [6,] -2.042355e-09 -2.136066e-09 -2.043789e-09  1.694221e-09  9.917494e-10
## [7,] -3.251962e-09 -3.326181e-09 -3.253732e-09  1.697616e-09  1.235000e-09
## [8,] -3.326181e-09 -3.484006e-09 -3.326588e-09  1.574343e-09  1.108439e-09
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##          [,606]          [,607]          [,608]          [,609]
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## [4,] -5.633818e-10 -9.296028e-10 -1.291112e-09  1.947491e-10
## [5,] -8.622936e-10 -1.291112e-09 -1.151455e-09  1.220576e-09
## [6,] -3.795984e-11  1.947491e-10  1.220576e-09  1.488947e-09
## [7,] -1.066296e-10  6.701857e-10  2.230954e-09  1.742093e-09
## [8,]  9.260506e-11  8.118743e-10  2.415431e-09  1.695818e-09
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##          [,610]          [,611]          [,612]          [,613]          [,614]
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## [2,]  1.235000e-09  1.108439e-09  1.245184e-09  1.246712e-08  1.333500e-08
## [3,] -1.066296e-10  9.260506e-11 -1.132382e-10 -4.535577e-09 -1.670713e-09
## [4,]  6.701857e-10  8.118743e-10  6.627740e-10 -2.273278e-09 -1.810573e-09
## [5,]  2.230954e-09  2.415431e-09  2.226796e-09  1.694221e-09  9.917494e-10
## [6,]  1.742093e-09  1.695818e-09  1.753223e-09  1.401251e-08  1.030510e-08
## [7,]  1.806270e-09  1.588130e-09  1.821265e-09  1.743743e-08  1.185665e-08
## [8,]  1.588130e-09  1.402449e-09  1.606150e-09  1.871301e-08  1.355176e-08

```

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##      [,615]      [,616]      [,617]      [,618]
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## [2,] -1.670713e-09 -1.810573e-09 9.917494e-10 1.030510e-08
## [3,] 3.691557e-09 7.565425e-10 -3.795984e-11 -3.770452e-09
## [4,] 7.565425e-10 8.563252e-10 1.947491e-10 -1.869240e-09
## [5,] -3.795984e-11 1.947491e-10 1.220576e-09 1.488947e-09
## [6,] -3.770452e-09 -1.869240e-09 1.488947e-09 1.200223e-08
## [7,] -5.019093e-09 -2.042355e-09 1.742093e-09 1.380080e-08
## [8,] -4.840329e-09 -2.136066e-09 1.695818e-09 1.483514e-08
## [9,] -5.035906e-09 -2.043789e-09 1.753223e-09 1.380182e-08
##      [,619]      [,620]      [,621]      [,622]
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## [2,] 1.185665e-08 1.355176e-08 1.181224e-08 1.581107e-08
## [3,] -5.019093e-09 -4.840329e-09 -5.035906e-09 -6.429716e-09
## [4,] -2.042355e-09 -2.136066e-09 -2.043789e-09 -3.126034e-09
## [5,] 1.742093e-09 1.695818e-09 1.753223e-09 1.697616e-09
## [6,] 1.380080e-08 1.483514e-08 1.380182e-08 1.743743e-08
## [7,] 1.861935e-08 1.964902e-08 1.861659e-08 2.624676e-08
## [8,] 1.964902e-08 2.121828e-08 1.963652e-08 2.770029e-08
## [9,] 1.861659e-08 1.963652e-08 1.861505e-08 2.624335e-08
##      [,623]      [,624]      [,625]      [,626]
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## [2,] 1.546134e-08 -2.209910e-09 -1.939688e-09 1.235000e-09
## [3,] -2.209910e-09 5.367740e-09 9.508372e-10 -1.066296e-10
## [4,] -1.939688e-09 9.508372e-10 1.329953e-09 6.701857e-10
## [5,] 1.235000e-09 -1.066296e-10 6.701857e-10 2.230954e-09
## [6,] 1.185665e-08 -5.019093e-09 -2.042355e-09 1.742093e-09
## [7,] 1.646442e-08 -7.394628e-09 -3.251962e-09 1.806270e-09
## [8,] 1.834951e-08 -7.219300e-09 -3.326181e-09 1.588130e-09
## [9,] 1.640910e-08 -7.419732e-09 -3.253732e-09 1.821265e-09
##      [,627]      [,628]      [,629]      [,630]
## [1,] 1.743743e-08 2.624676e-08 2.770029e-08 2.624335e-08
## [2,] 1.185665e-08 1.646442e-08 1.834951e-08 1.640910e-08
## [3,] -5.019093e-09 -7.394628e-09 -7.219300e-09 -7.419732e-09
## [4,] -2.042355e-09 -3.251962e-09 -3.326181e-09 -3.253732e-09
## [5,] 1.742093e-09 1.806270e-09 1.588130e-09 1.821265e-09
## [6,] 1.380080e-08 1.861935e-08 1.964902e-08 1.861659e-08
## [7,] 1.861935e-08 2.975816e-08 3.112298e-08 2.975841e-08

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## [8,] 1.964902e-08 3.112298e-08 3.324913e-08 3.110893e-08
## [9,] 1.861659e-08 2.975841e-08 3.110893e-08 2.976029e-08
##      [,631]      [,632]      [,633]      [,634]      [,635]
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## [2,] 1.794787e-08 1.821360e-08 -2.172568e-09 -2.180273e-09 1.108439e-09
## [3,] -6.247708e-09 -2.172568e-09 5.332673e-09 1.032133e-09 9.260506e-11
## [4,] -3.266733e-09 -2.180273e-09 1.032133e-09 1.471438e-09 8.118743e-10
## [5,] 1.574343e-09 1.108439e-09 9.260506e-11 8.118743e-10 2.415431e-09
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## [7,] 2.770029e-08 1.834951e-08 -7.219300e-09 -3.326181e-09 1.588130e-09
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## [5,] 1.695818e-09 1.588130e-09 1.402449e-09 1.606150e-09
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## [2,] 1.575877e-08 1.538534e-08 -2.213073e-09 -1.937106e-09
## [3,] -6.448943e-09 -2.213073e-09 5.384030e-09 9.478396e-10
## [4,] -3.126727e-09 -1.937106e-09 9.478396e-10 1.325798e-09
## [5,] 1.714679e-09 1.245184e-09 -1.132382e-10 6.627740e-10
## [6,] 1.743632e-08 1.181224e-08 -5.035906e-09 -2.043789e-09
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## [2,] 1.245184e-09 1.181224e-08 1.640910e-08 1.827999e-08
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## [5,] 2.226796e-09 1.753223e-09 1.821265e-09 1.606150e-09
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## [3,] -7.444971e-09 -5.913487e-09 -2.214465e-09 4.994422e-09
## [4,] -3.255632e-09 -3.083121e-09 -2.015371e-09 9.144318e-10
## [5,] 1.836380e-09 1.827566e-09 1.218418e-09 -1.545818e-10
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## [5,] 1.714679e-09 1.914366e-09 1.218418e-09 1.010410e-09
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## [4,] 5.394565e-10 8.787225e-10 3.454463e-10 -1.517281e-09 -1.809696e-09
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## [4,] 9.478396e-10 1.325798e-09 6.627740e-10 -2.043789e-09
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## [2,] 1.640910e-08 1.827999e-08 1.635510e-08 1.424504e-08
## [3,] -7.419732e-09 -7.241743e-09 -7.444971e-09 -6.731346e-09
## [4,] -3.253732e-09 -3.326588e-09 -3.255632e-09 -3.101661e-09
## [5,] 1.821265e-09 1.606150e-09 1.836380e-09 1.914366e-09
## [6,] 1.861659e-08 1.963652e-08 1.861505e-08 1.674957e-08
## [7,] 2.975841e-08 3.110893e-08 2.976029e-08 2.550122e-08
## [8,] 3.110893e-08 3.322181e-08 3.109694e-08 2.624161e-08
## [9,] 2.976029e-08 3.109694e-08 2.976384e-08 2.551235e-08
##      [,722]      [,723]      [,724]      [,725]
## [1,] 1.424504e-08 -6.731346e-09 -3.101661e-09 1.914366e-09
## [2,] 1.347273e-08 -2.282702e-09 -1.807172e-09 1.399838e-09
## [3,] -2.282702e-09 5.719645e-09 9.138794e-10 -2.868643e-10
## [4,] -1.807172e-09 9.138794e-10 1.264502e-09 5.560152e-10
## [5,] 1.399838e-09 -2.868643e-10 5.560152e-10 2.152300e-09
## [6,] 1.059710e-08 -5.293168e-09 -2.035942e-09 1.892014e-09
## [7,] 1.502027e-08 -7.746080e-09 -3.267108e-09 2.106326e-09
## [8,] 1.635510e-08 -7.444971e-09 -3.255632e-09 1.836380e-09
## [9,] 1.498216e-08 -7.775419e-09 -3.271085e-09 2.118756e-09
##      [,726]      [,727]      [,728]      [,729]
## [1,] 1.674957e-08 2.550122e-08 2.624161e-08 2.551235e-08

```

```
## [2,] 1.059710e-08 1.502027e-08 1.635510e-08 1.498216e-08
## [3,] -5.293168e-09 -7.746080e-09 -7.444971e-09 -7.775419e-09
## [4,] -2.035942e-09 -3.267108e-09 -3.255632e-09 -3.271085e-09
## [5,] 1.892014e-09 2.106326e-09 1.836380e-09 2.118756e-09
## [6,] 1.330928e-08 1.811634e-08 1.861505e-08 1.812417e-08
## [7,] 1.811634e-08 2.921510e-08 2.976029e-08 2.923051e-08
## [8,] 1.861505e-08 2.976029e-08 3.109694e-08 2.976384e-08
## [9,] 1.812417e-08 2.923051e-08 2.976384e-08 2.924748e-08
```

```
CoVariance(allIdx,
            oneBench)
```

```
##
## Covariance: Stoxx Dharma Q.Cap Quest Trium
## BlackLong Stoxx SP SPEur
## Covariance: Stoxx 5.074465e-05 3.314936e-05 -6.676118e-06 -1.000535e-05
## SPhEur
## Covariance: Stoxx 1.029373e-05 4.896002e-05 4.229554e-05 4.384981e-05
## SPhEur
## Covariance: Stoxx 4.245229e-05
```

```
CoSkewness(allIdx,
            oneBench)
```

```
##
## Coskewness: Stoxx Dharma Q.Cap Quest Trium
## BlackLong Stoxx SP SPEur
## Coskewness: Stoxx -1.163169e-07 -2.511866e-07 -1.151855e-08 5.193412e-08
## SPhEur
## Coskewness: Stoxx -1.177713e-08 -1.035168e-07 -7.480817e-08 -9.500836e-08
## SPhEur
## Coskewness: Stoxx -7.278341e-08
```

```
CoKurtosis(allIdx,
            oneBench)
```

```
##
## Cokurtosis: Stoxx Dharma Q.Cap Quest Trium
## BlackLong Stoxx SP SPEur
## Cokurtosis: Stoxx 1.298272e-08 1.014471e-08 -3.467826e-09 -2.434988e-09
## SPhEur
## Cokurtosis: Stoxx 1.604602e-09 1.239427e-08 1.119903e-08 1.200223e-08
## SPhEur
## Cokurtosis: Stoxx 1.120811e-08
```

```
M3.MM(allIdx, as.mat=FALSE, unbias=TRUE)
```

```
## [1] -2.371506e-07 -3.415374e-07 6.236465e-08 3.359898e-08 -2.935725e-08
```

```

## [6] -1.644069e-07 -2.763692e-07 -3.108294e-07 -2.736668e-07 -4.213619e-07
## [11] 1.082539e-07 6.164618e-08 -1.337566e-08 -2.831369e-07 -3.405346e-07
## [16] -3.827404e-07 -3.379697e-07 4.104310e-08 4.648600e-10 3.603094e-08
## [21] 1.245025e-08 5.955295e-08 6.860402e-08 5.962333e-08 3.265907e-09
## [26] 3.450381e-08 4.459621e-08 1.266021e-08 1.941651e-08 1.247814e-08
## [31] 2.820711e-08 -1.270896e-08 -5.638215e-08 -4.299281e-08 -5.601032e-08
## [36] -1.181566e-07 -1.505245e-07 -1.779021e-07 -1.480814e-07 -3.160765e-07
## [41] -3.534556e-07 -3.141673e-07 -4.017994e-07 -3.508136e-07 -3.122582e-07
## [46] -5.734816e-07 1.396644e-07 1.167671e-07 2.095509e-08 -3.826430e-07
## [51] -3.602235e-07 -4.297362e-07 -3.571848e-07 -3.332357e-08 -1.559763e-08
## [56] 3.116829e-08 8.066271e-08 7.755659e-08 9.032106e-08 7.778403e-08
## [61] -2.129838e-08 1.761776e-08 7.402966e-08 2.741844e-08 3.608094e-08
## [66] 2.733118e-08 1.543381e-08 -2.419652e-09 -3.706175e-08 -2.731922e-08
## [71] -3.693657e-08 -2.551596e-07 -2.429035e-07 -2.852486e-07 -2.408927e-07
## [76] -3.647185e-07 -4.052840e-07 -3.626412e-07 -4.543899e-07 -4.026465e-07
## [81] -3.605756e-07 -8.785498e-09 -1.570809e-08 -1.594973e-08 3.517083e-08
## [86] 5.820361e-08 4.164809e-08 5.770751e-08 -1.624107e-08 -3.083834e-08
## [91] -7.388509e-11 1.496680e-09 3.709463e-09 1.297034e-09 -3.586933e-08
## [96] 1.974307e-08 3.791846e-08 4.189959e-08 3.755012e-08 -1.170074e-08
## [101] 3.986490e-09 1.074534e-08 3.464214e-09 6.984776e-08 6.780983e-08
## [106] 6.988917e-08 7.421322e-08 6.788480e-08 6.995042e-08 -2.202028e-08
## [111] -5.047456e-08 -2.153516e-08 1.894077e-08 1.871175e-08 1.870068e-08
## [116] -6.626433e-08 1.158879e-08 3.478967e-08 4.220300e-08 3.437486e-08
## [121] 5.275556e-08 1.354374e-08 2.191163e-08 1.330117e-08 1.212796e-08
## [126] 1.386278e-08 1.199628e-08 1.453454e-08 1.365532e-08 1.185704e-08
## [131] -1.154541e-07 -6.614390e-09 2.155045e-08 4.236601e-08 2.081175e-08
## [136] -1.196341e-08 -2.664682e-08 -1.322708e-08 -2.659204e-08 -7.476248e-08
## [141] -6.519526e-08 -7.448214e-08 -5.710588e-08 -6.473839e-08 -7.419883e-08
## [146] -1.051541e-07 -7.599141e-08 -9.651111e-08 -7.393463e-08 -1.558037e-07
## [151] -1.829749e-07 -1.539680e-07 -2.188692e-07 -1.805709e-07 -1.521243e-07
## [156] -3.489446e-07 -3.924328e-07 -3.476986e-07 -4.492585e-07 -3.902451e-07
## [161] -3.464458e-07 -5.181447e-07 -4.463615e-07 -3.880668e-07 -3.451872e-07

```

```
M4.MM(allIdx, as.mat=FALSE)
```

```

## [1] 2.237498e-08 1.549855e-08 -5.311637e-09 -3.507738e-09 1.981525e-09
## [6] 1.723652e-08 2.171542e-08 2.313719e-08 2.172948e-08 1.641814e-08
## [11] -2.418169e-09 -2.804045e-09 1.121582e-09 1.252268e-08 1.415399e-08
## [16] 1.607788e-08 1.411764e-08 4.816485e-09 1.049248e-09 1.934774e-11
## [21] -4.456084e-09 -5.898991e-09 -5.636372e-09 -5.913487e-09 1.528106e-09

```

```

## [26] 5.036019e-10 -2.704595e-09 -3.082632e-09 -3.221755e-09 -3.083121e-09
## [31] 1.954425e-09 1.856867e-09 1.810521e-09 1.724716e-09 1.827566e-09
## [36] 1.451994e-08 1.619709e-08 1.728755e-08 1.620570e-08 2.305107e-08
## [41] 2.400101e-08 2.305772e-08 2.573748e-08 2.400057e-08 2.306602e-08
## [46] 2.021777e-08 -2.175934e-09 -3.339185e-09 8.629182e-10 1.417810e-08
## [51] 1.386047e-08 1.639068e-08 1.379921e-08 1.912516e-09 8.159049e-10
## [56] 1.456575e-10 -2.011008e-09 -2.214801e-09 -2.215152e-09 -2.214465e-09
## [61] 1.330170e-09 3.818851e-10 -2.468440e-09 -2.018933e-09 -2.320561e-09
## [66] -2.015371e-09 1.286082e-09 9.650738e-10 1.206512e-09 1.106954e-09
## [71] 1.218418e-09 1.090779e-08 1.085177e-08 1.246712e-08 1.081921e-08
## [76] 1.432497e-08 1.581107e-08 1.428442e-08 1.794787e-08 1.575877e-08
## [81] 1.424504e-08 -2.671382e-09 -9.408777e-10 5.740245e-11 3.680578e-09
## [86] 4.980431e-09 4.867790e-09 4.994422e-09 -5.197837e-10 -4.253663e-10
## [91] 8.890382e-10 9.173012e-10 9.784441e-10 9.144318e-10 -6.694618e-10
## [96] -1.482441e-11 -1.501517e-10 3.886151e-11 -1.545818e-10 -3.875257e-09
## [101] -4.731295e-09 -4.535577e-09 -4.744471e-09 -6.687891e-09 -6.429716e-09
## [106] -6.709534e-09 -6.247708e-09 -6.448943e-09 -6.731346e-09 -9.933237e-10
## [111] -7.176715e-10 1.117451e-09 1.263261e-09 1.390069e-09 1.259713e-09
## [116] -1.037273e-09 1.597169e-10 5.190321e-10 6.277585e-10 5.128480e-10
## [121] -2.437634e-09 -2.142662e-09 -2.273278e-09 -2.143200e-09 -3.097647e-09
## [126] -3.126034e-09 -3.099577e-09 -3.266733e-09 -3.126727e-09 -3.101661e-09
## [131] -7.198821e-10 1.273899e-09 1.934523e-09 2.066860e-09 1.932806e-09
## [136] 1.669040e-09 1.739783e-09 1.694221e-09 1.751952e-09 1.886692e-09
## [141] 1.697616e-09 1.900437e-09 1.574343e-09 1.714679e-09 1.914366e-09
## [146] 1.298272e-08 1.309496e-08 1.401251e-08 1.310298e-08 1.673751e-08
## [151] 1.743743e-08 1.674294e-08 1.871301e-08 1.743632e-08 1.674957e-08
## [156] 2.548310e-08 2.624676e-08 2.549147e-08 2.770029e-08 2.624335e-08
## [161] 2.550122e-08 2.993269e-08 2.768545e-08 2.624161e-08 2.551235e-08
## [166] 2.898706e-08 -2.438270e-09 -4.857336e-09 6.428628e-10 1.857195e-08
## [171] 1.522189e-08 1.895318e-08 1.514331e-08 2.143573e-09 1.054314e-09
## [176] 3.223399e-10 -1.987969e-09 -1.612894e-09 -1.700153e-09 -1.610353e-09
## [181] 1.747494e-09 4.250714e-10 -3.350842e-09 -1.934090e-09 -2.439176e-09
## [186] -1.928504e-09 1.186450e-09 7.343381e-10 1.000986e-09 8.678136e-10
## [191] 1.010410e-09 1.319942e-08 1.113462e-08 1.333500e-08 1.107913e-08
## [196] 1.360031e-08 1.546134e-08 1.353572e-08 1.821360e-08 1.538534e-08
## [201] 1.347273e-08 -6.263545e-10 -6.139298e-10 9.439133e-12 1.547532e-09
## [206] 1.598039e-09 1.796609e-09 1.600777e-09 -5.136606e-10 -3.733106e-10
## [211] 7.087711e-10 5.426849e-10 6.496899e-10 5.394565e-10 -5.196254e-10
## [216] 1.056101e-10 6.360003e-12 1.454549e-10 2.885030e-12 -1.761926e-09

```

```

## [221] -1.613743e-09 -1.670713e-09 -1.612618e-09 -2.277017e-09 -2.209910e-09
## [226] -2.279814e-09 -2.172568e-09 -2.213073e-09 -2.282702e-09 -9.211164e-10
## [231] -5.710026e-10 1.189335e-09 8.822765e-10 1.062636e-09 8.787225e-10
## [236] -8.054338e-10 1.745048e-10 3.508261e-10 4.427807e-10 3.454463e-10
## [241] -2.478217e-09 -1.520530e-09 -1.810573e-09 -1.517281e-09 -1.812401e-09
## [246] -1.939688e-09 -1.809696e-09 -2.180273e-09 -1.937106e-09 -1.807172e-09
## [251] -5.901952e-10 8.696907e-10 1.271775e-09 1.376227e-09 1.269915e-09
## [256] 8.283762e-10 1.058391e-09 9.917494e-10 1.066735e-09 1.381142e-09
## [261] 1.235000e-09 1.390451e-09 1.108439e-09 1.245184e-09 1.399838e-09
## [266] 1.014471e-08 8.845625e-09 1.030510e-08 8.818083e-09 1.066325e-08
## [271] 1.185665e-08 1.062973e-08 1.355176e-08 1.181224e-08 1.059710e-08
## [276] 1.509914e-08 1.646442e-08 1.505927e-08 1.834951e-08 1.640910e-08
## [281] 1.502027e-08 2.095913e-08 1.827999e-08 1.635510e-08 1.498216e-08
## [286] 4.377844e-09 5.919724e-10 2.585190e-10 -2.108416e-09 -3.001490e-09
## [291] -2.635686e-09 -3.005273e-09 6.046577e-10 5.171897e-10 -6.540196e-10
## [296] -9.081328e-10 -9.284537e-10 -9.068524e-10 9.451014e-10 2.593621e-10
## [301] 4.605966e-11 -6.395172e-11 5.047031e-11 3.249929e-09 3.825881e-09
## [306] 3.691557e-09 3.838213e-09 5.690862e-09 5.367740e-09 5.704958e-09
## [311] 5.332673e-09 5.384030e-09 5.719645e-09 5.931977e-10 7.211912e-10
## [316] -3.330313e-10 -4.545071e-10 -5.420689e-10 -4.491882e-10 1.012245e-09
## [321] -1.431769e-10 -4.469245e-10 -5.633818e-10 -4.402994e-10 8.285542e-10
## [326] 7.355717e-10 7.565425e-10 7.347473e-10 9.191863e-10 9.508372e-10
## [331] 9.164812e-10 1.032133e-09 9.478396e-10 9.138794e-10 1.419952e-09
## [336] -2.053268e-10 -7.518850e-10 -8.622936e-10 -7.428015e-10 1.637523e-11
## [341] -1.338977e-10 -3.795984e-11 -1.358318e-10 -2.729938e-10 -1.066296e-10
## [346] -2.799990e-10 9.260506e-11 -1.132382e-10 -2.868643e-10 -3.467826e-09
## [351] -3.930710e-09 -3.770452e-09 -3.942928e-09 -5.254544e-09 -5.019093e-09
## [356] -5.273816e-09 -4.840329e-09 -5.035906e-09 -5.293168e-09 -7.687791e-09
## [361] -7.394628e-09 -7.716874e-09 -7.219300e-09 -7.419732e-09 -7.746080e-09
## [366] -7.097777e-09 -7.241743e-09 -7.444971e-09 -7.775419e-09 1.059388e-09
## [371] 1.114001e-09 -6.415560e-10 -8.644649e-10 -9.905866e-10 -8.579633e-10
## [376] 1.563116e-09 -2.459865e-10 -7.883515e-10 -9.296028e-10 -7.787609e-10
## [381] 1.044544e-09 7.640617e-10 8.563252e-10 7.626605e-10 1.272036e-09
## [386] 1.329953e-09 1.268190e-09 1.471438e-09 1.325798e-09 1.264502e-09
## [391] 2.082346e-09 -4.082806e-10 -1.094167e-09 -1.291112e-09 -1.081848e-09
## [396] 4.781147e-11 1.513204e-10 1.947491e-10 1.485097e-10 5.692262e-10
## [401] 6.701857e-10 5.625668e-10 8.118743e-10 6.627740e-10 5.560152e-10
## [406] -2.434988e-09 -1.721031e-09 -1.869240e-09 -1.721507e-09 -2.030405e-09
## [411] -2.042355e-09 -2.033122e-09 -2.136066e-09 -2.043789e-09 -2.035942e-09

```

```
## [416] -3.259420e-09 -3.251962e-09 -3.263220e-09 -3.326181e-09 -3.253732e-09
## [421] -3.267108e-09 -3.484006e-09 -3.326588e-09 -3.255632e-09 -3.271085e-09
## [426] 3.394140e-09 1.262417e-10 -8.518695e-10 -1.151455e-09 -8.306527e-10
## [431] 1.070680e-09 1.195200e-09 1.220576e-09 1.197545e-09 2.160474e-09
## [436] 2.230954e-09 2.156236e-09 2.415431e-09 2.226796e-09 2.152300e-09
## [441] 1.604602e-09 1.547614e-09 1.488947e-09 1.557414e-09 1.874199e-09
## [446] 1.742093e-09 1.883006e-09 1.695818e-09 1.753223e-09 1.892014e-09
## [451] 2.081831e-09 1.806270e-09 2.094019e-09 1.588130e-09 1.821265e-09
## [456] 2.106326e-09 1.402449e-09 1.606150e-09 1.836380e-09 2.118756e-09
## [461] 1.239427e-08 1.119903e-08 1.200223e-08 1.120811e-08 1.329499e-08
## [466] 1.380080e-08 1.330160e-08 1.483514e-08 1.380182e-08 1.330928e-08
## [471] 1.810381e-08 1.861935e-08 1.810955e-08 1.964902e-08 1.861659e-08
## [476] 1.811634e-08 2.121828e-08 1.963652e-08 1.861505e-08 1.812417e-08
## [481] 2.918897e-08 2.975816e-08 2.920126e-08 3.112298e-08 2.975841e-08
## [486] 2.921510e-08 3.324913e-08 3.110893e-08 2.976029e-08 2.923051e-08
## [491] 3.632221e-08 3.322181e-08 3.109694e-08 2.976384e-08 2.924748e-08
```

```
DownsideDeviation(allIdx,
MAR=0.0)
```

```
##
## Dharma Q.Cap Quest
## Downside Deviation (MAR = 0%) 0.005672227 0.005454397 0.003536509
## Trium BlackLong Stoxx
## Downside Deviation (MAR = 0%) 0.002428382 0.003064572 0.004735204
## SP SPEur SPhEur
## Downside Deviation (MAR = 0%) 0.00577894 0.006009658 0.00583952
```

```
DownsidePotential(allIdx,
MAR=0.0)
```

```
##
## Dharma Q.Cap Quest
## Downside Potential (MAR = 0%) 0.002600863 0.002072908 0.00170552
## Trium BlackLong Stoxx
## Downside Potential (MAR = 0%) 0.001223605 0.001216399 0.002105825
## SP SPEur SPhEur
## Downside Potential (MAR = 0%) 0.00240769 0.002470048 0.002465389
```

```
SemiDeviation(allIdx)
```

```
##
## Dharma Q.Cap Quest Trium BlackLong
## Semi-Deviation 0.006186662 0.005759667 0.003604464 0.00223528 0.003047989
```



```
##                Stoxx        SP        SPEur        SPhEur
## Semi-Deviation 0.005156706 0.006227808 0.006547119 0.006237239
```

```
SemiVariance(allIdx)
```

```
##                Dharma        Q.Cap        Quest        Trium        BlackLong
## Semi-Variance 0.008986412 0.008707798 0.004617409 0.003379426 0.005159726
##                Stoxx        SP        SPEur        SPhEur
## Semi-Variance 0.007531851 0.008672978 0.009117657 0.008599681
```

```
DownsideFrequency(allIdx, MAR=0)
```

```
##                Dharma        Q.Cap        Quest        Trium
## Downside Frequency (MAR = 0%) 0.4166667 0.3385417 0.4583333 0.4375
##                BlackLong        Stoxx        SP        SPEur
## Downside Frequency (MAR = 0%) 0.3489583 0.3854167 0.3958333 0.3958333
##                SPhEur
## Downside Frequency (MAR = 0%) 0.4114583
```

```
DRatio(allIdx)
```

```
##                Dharma        Q.Cap        Quest        Trium        BlackLong        Stoxx
## d ratio 0.5099624 0.4089791 1.030021 2.178918 0.889632 0.4498198
##                SP        SPEur        SPhEur
## d ratio 0.4943794 0.4706212 0.5514904
```

```
DrawdownDeviation(allIdx)
```

```
##                Dharma        Q.Cap        Quest        Trium
## Drawdown Deviation 0.009233877 0.008801696 0.007999526 0.005413109
##                BlackLong        Stoxx        SP        SPEur
## Drawdown Deviation 0.004822055 0.006839051 0.007473513 0.00758683
##                SPhEur
## Drawdown Deviation 0.007682677
```

```
#Drawdowns(returns[paste( periods[3],"/"), 1])
```

```
#findDrawdowns(mainIdx)
```

```
#sortDrawdowns(findDrawdowns(mainIdx))
```

```
ETL(allIdx,
    p=0.099,
    method = "historical")
```

```

##          Dharma      Q.Cap      Quest      Trium      BlackLong
## ES -0.01550043 -0.01398797 -0.008890603 -0.005547603 -0.007430197
##          Stoxx      SP      SPEur      SPhEur
## ES -0.01303131 -0.01542903 -0.01589075 -0.01561233

sigma <- M2.ewma(allIdx, lambda = 0.94)
m3      <- M3.ewma(allIdx, lambda = 0.94)
m4      <- M4.ewma(allIdx, lambda = 0.94)
#compute equal weigthe portfolio
mu <- colMeans(allIdx)
p <- length(mu)
ES(p=0.95, portfolio_method = "component",
   weights= rep(1/p,p),
   mu= mu, sigma= sigma, m3=m3, m4=m4)

## $MES
## [1] 0.01378401
##
## $contribution
## [1] 2.040453e-03 2.803129e-03 -1.045421e-03 1.324288e-04 5.320112e-05
## [6] 1.334364e-03 2.698654e-03 3.036654e-03 2.730544e-03
##
## $pct_contrib_MES
## [1] 0.148030491 0.203360955 -0.075843064 0.009607425 0.003859627
## [6] 0.096805233 0.195781527 0.220302683 0.198095121

FamaBeta(allIdx,
          oneBench)

##          Dharma      Q.Cap      Quest      Trium BlackLong Stoxx      SP
## Fama Beta 1.190615 1.036492 0.7449293 0.4400971 0.5460648      1 1.183655
##          SPEur      SPhEur
## Fama Beta 1.235581 1.186007

Frequency(mainIdx)

## [1] 252

frequency(mainIdx)

```

```
## [1] 1
```

```
HurstIndex(mainIdx) # 1 persistent, 0.5 random, 0 mean reverting
```

```
## Dharma
## Hurst Index 0.3730141
```

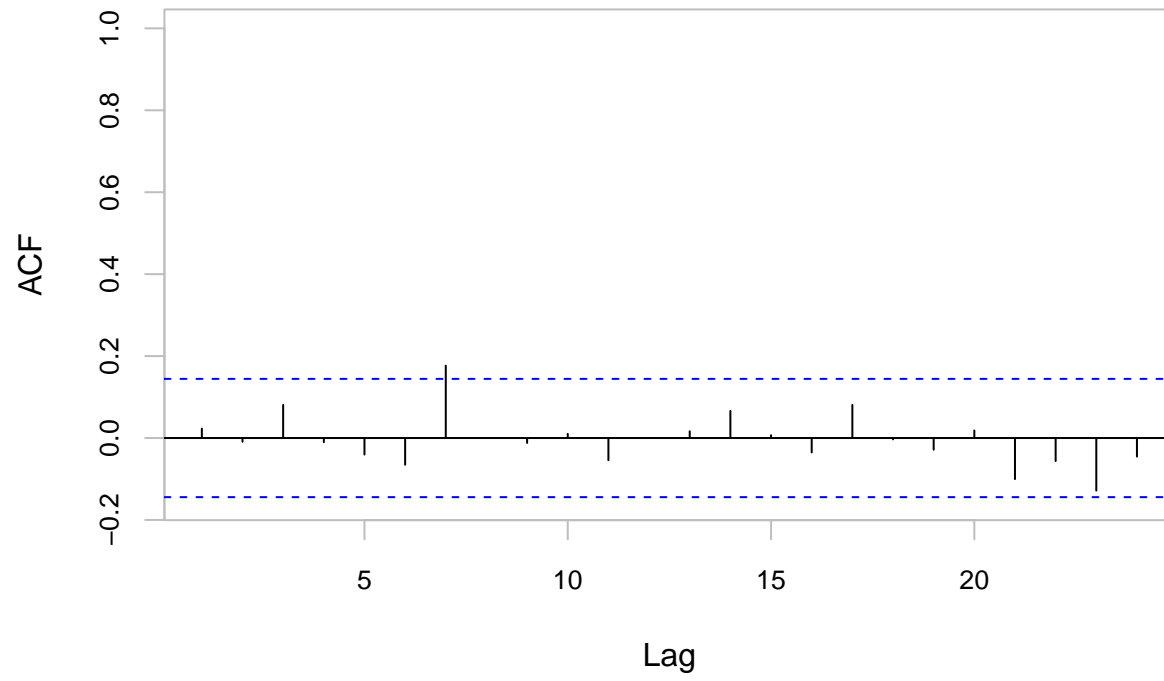
```
summary((exp(allIdx)-1) * 100)[,-1]
```

```
## Dharma Q.Cap Quest
## Min. :-2.8861 Min. :-3.79925 Min. :-2.17344
## 1st Qu.: -0.3270 1st Qu.: -0.19871 1st Qu.: -0.25594
## Median : 0.1471 Median : 0.13202 Median : 0.00000
## Mean : 0.1110 Mean : 0.07937 Mean : 0.01525
## 3rd Qu.: 0.5976 3rd Qu.: 0.44653 3rd Qu.: 0.22064
## Max. : 3.0537 Max. : 2.29614 Max. : 1.95596
## Trium BlackLong Stox
## Min. :-1.96891 Min. :-2.665350 Min. :-2.45646
## 1st Qu.: -0.20731 1st Qu.: -0.123704 1st Qu.: -0.22142
## Median : 0.00000 Median : 0.000000 Median : 0.11595
## Mean : -0.03912 Mean : -0.003464 Mean : 0.09315
## 3rd Qu.: 0.10315 3rd Qu.: 0.195408 3rd Qu.: 0.45085
## Max. : 1.16402 Max. : 0.978474 Max. : 2.83187
## SP SPEur SPhEur
## Min. :-2.97420 Min. :-3.69420 Min. :-2.95556
## 1st Qu.: -0.22539 1st Qu.: -0.23777 1st Qu.: -0.23893
## Median : 0.09365 Median : 0.06593 Median : 0.07230
## Mean : 0.10542 Mean : 0.12614 Mean : 0.09329
## 3rd Qu.: 0.63540 3rd Qu.: 0.56461 3rd Qu.: 0.61513
## Max. : 3.43339 Max. : 3.27490 Max. : 3.43561
```

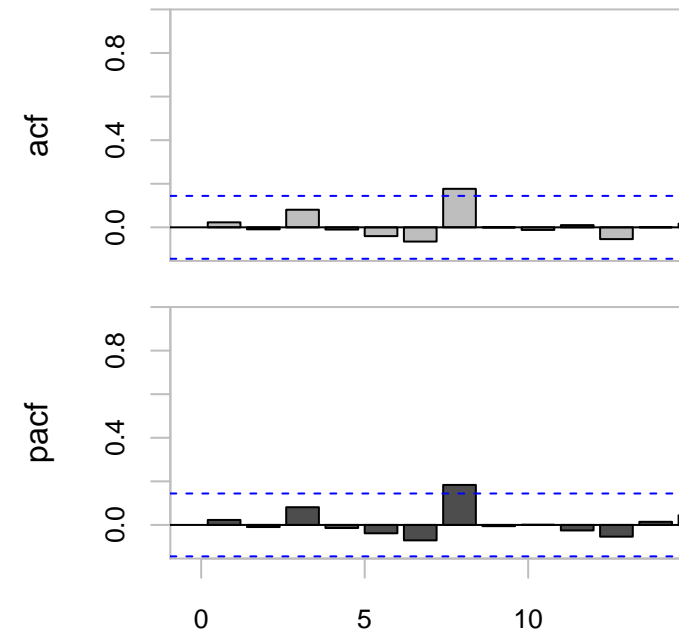
Portrait: ## some graphs

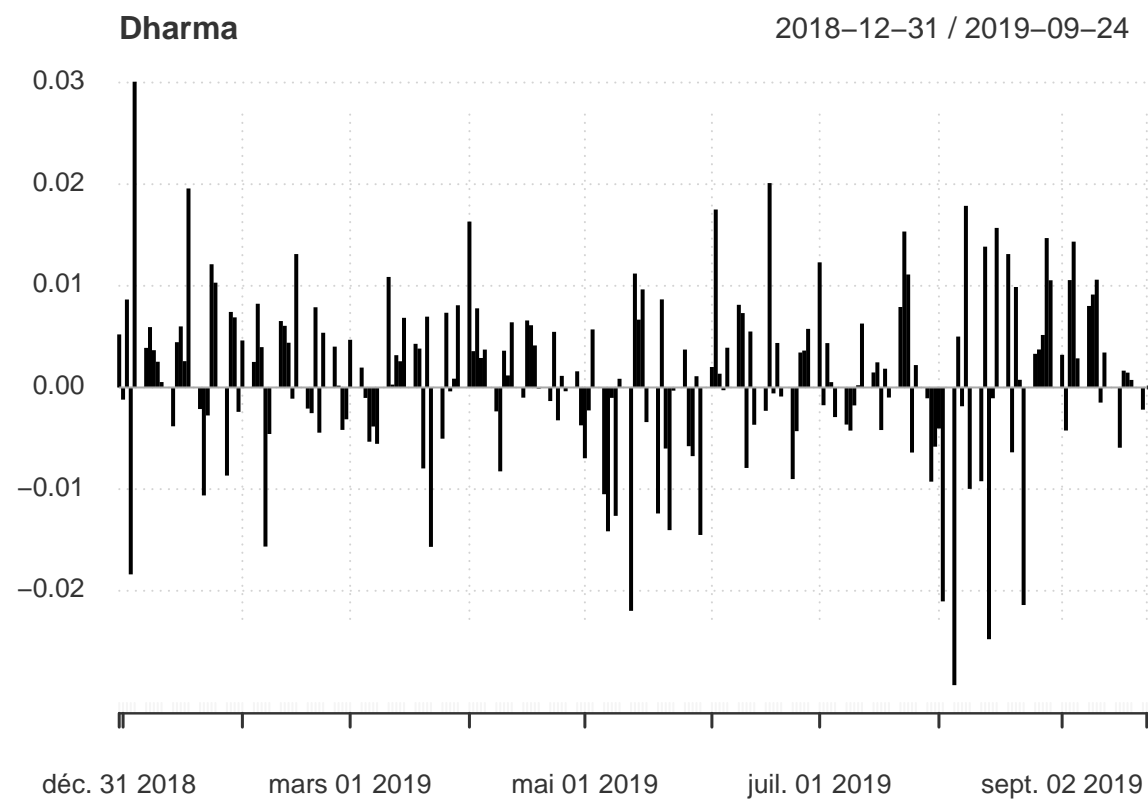
graphs:

Dharma

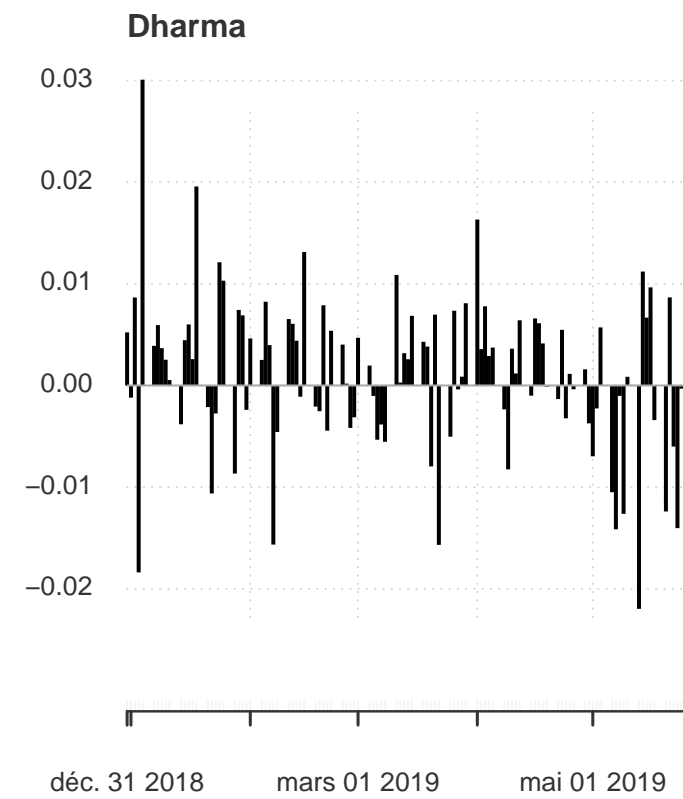
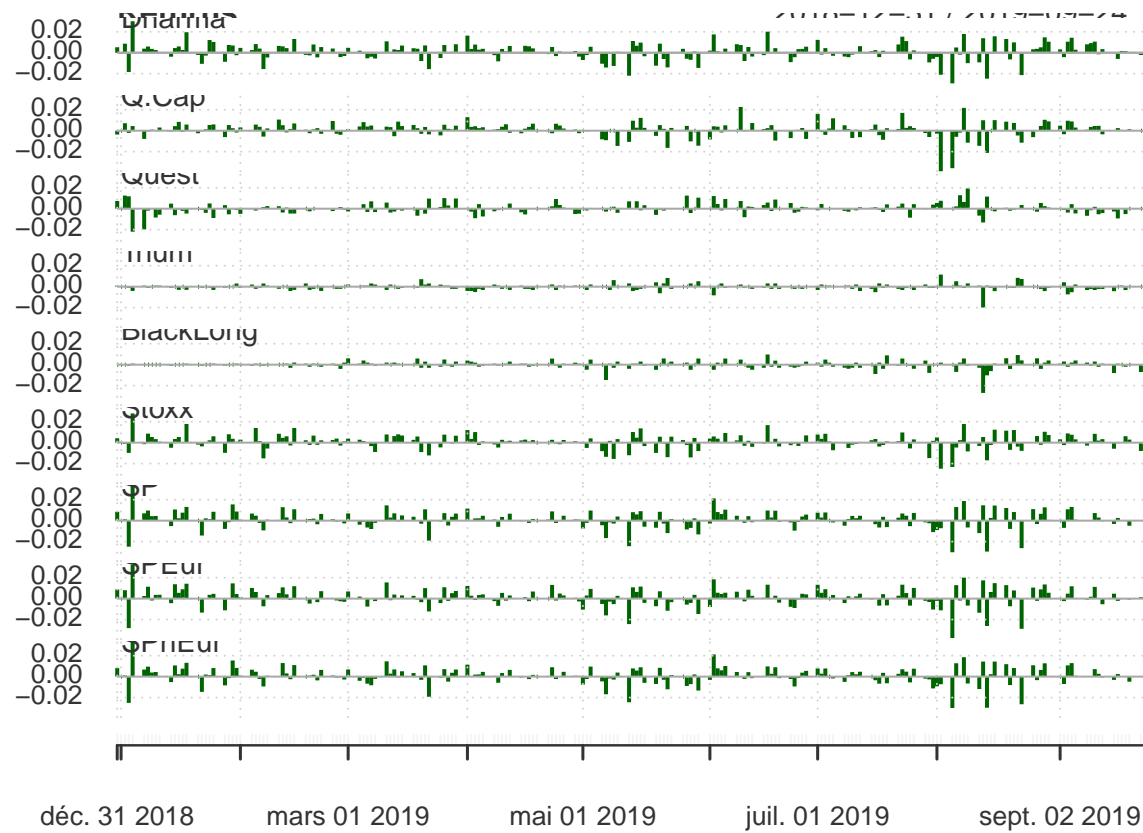


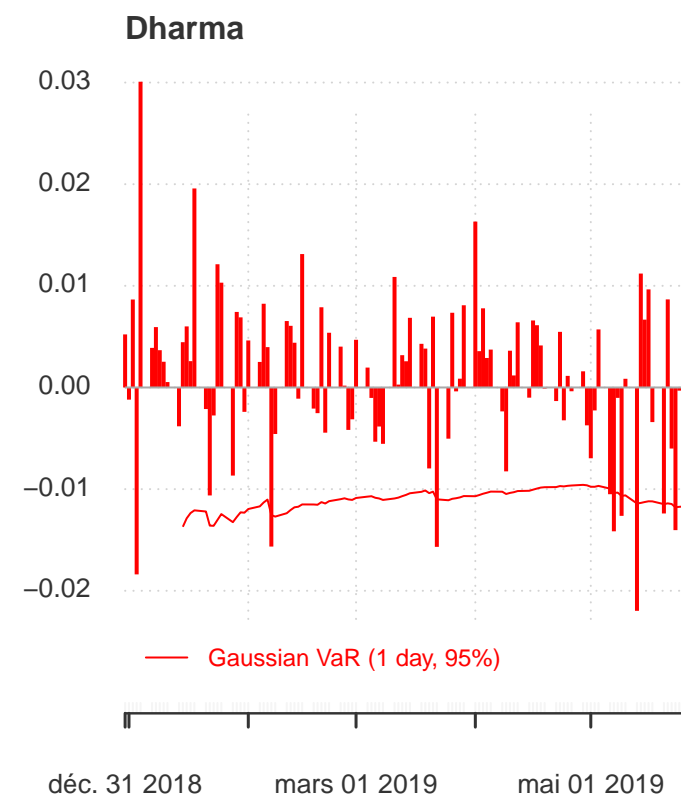
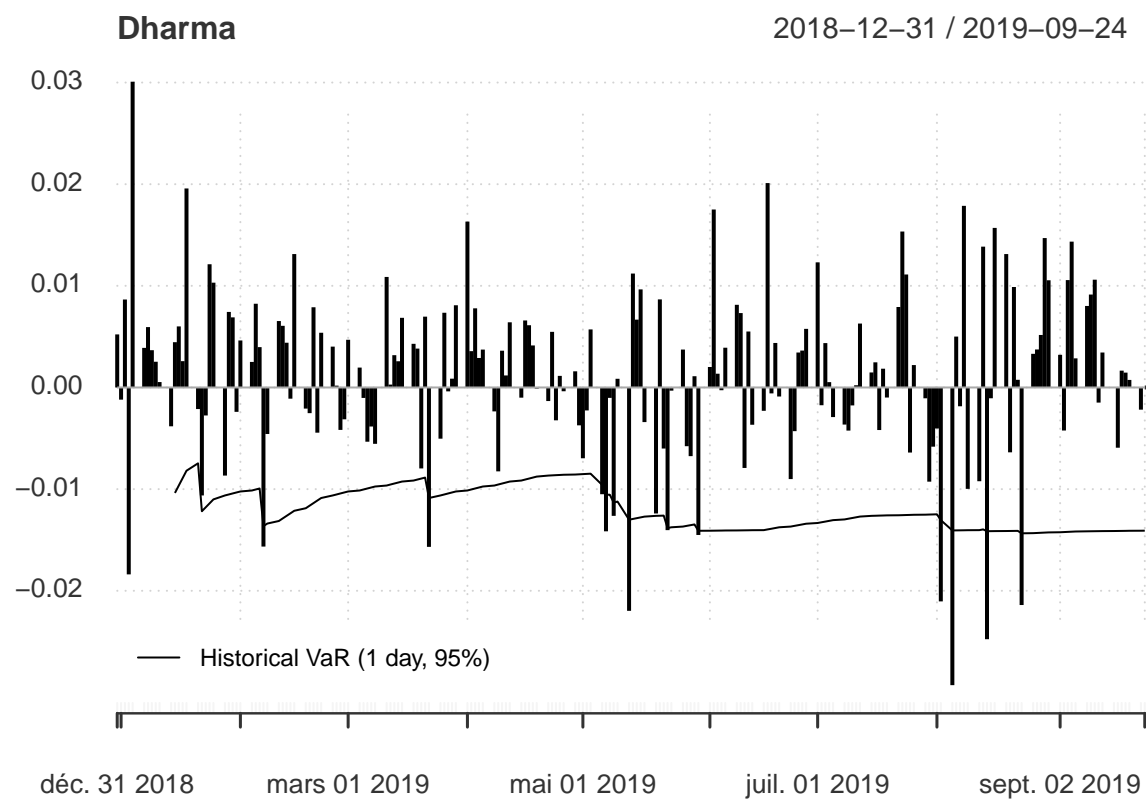
Dharma

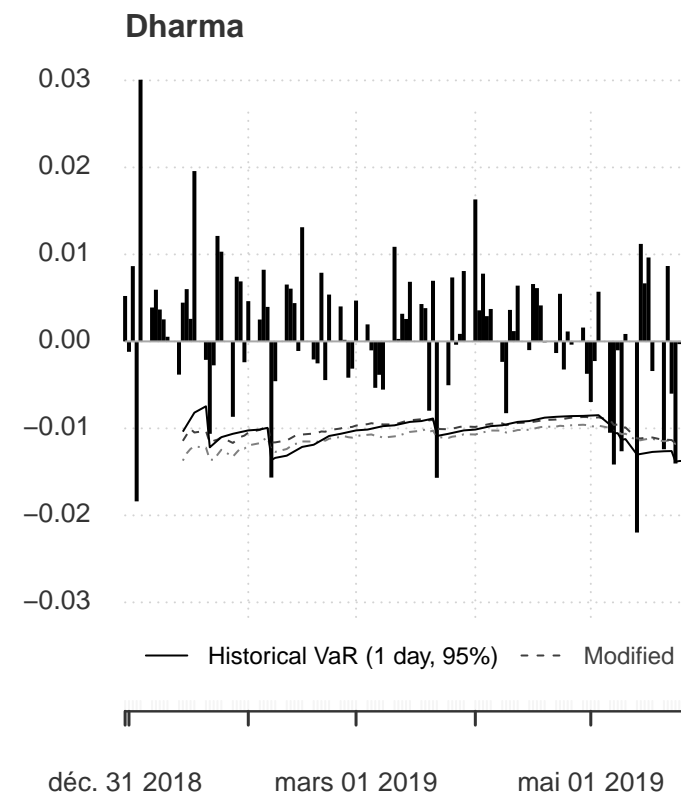
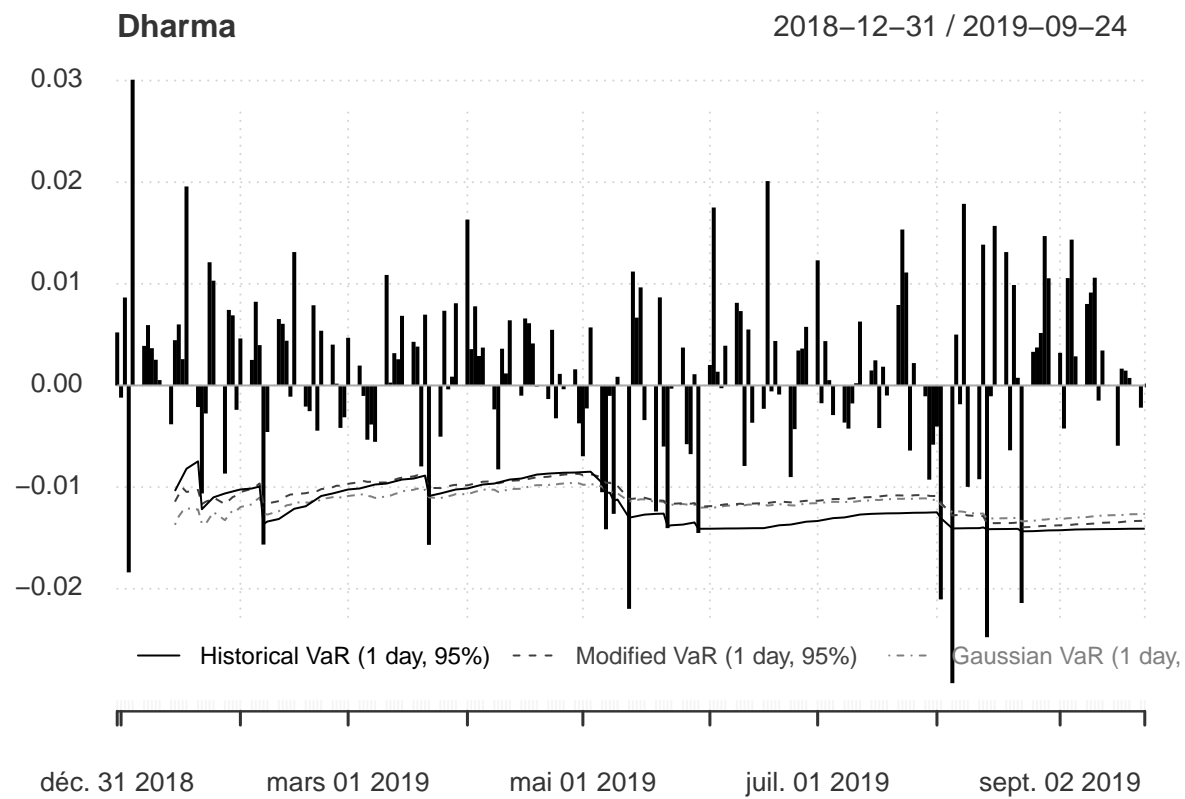


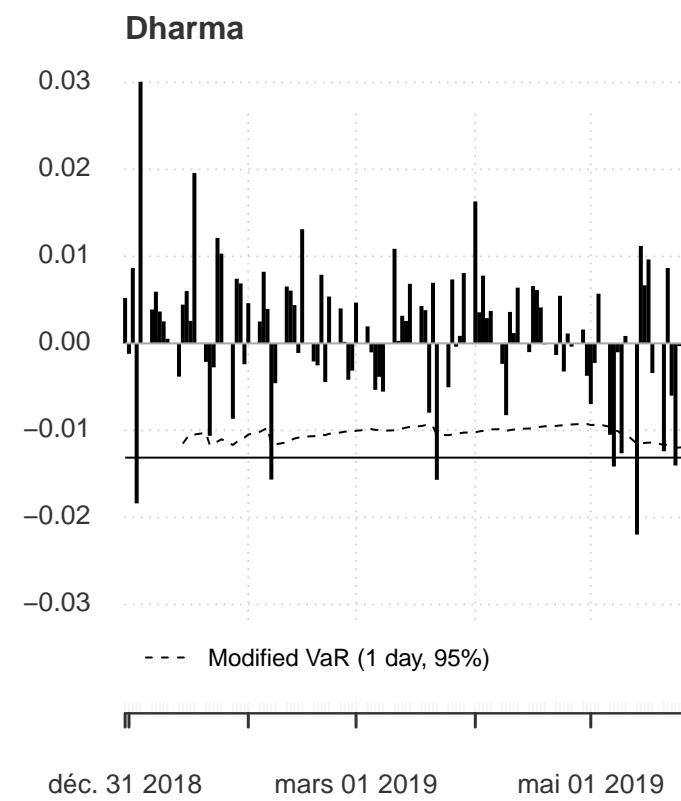
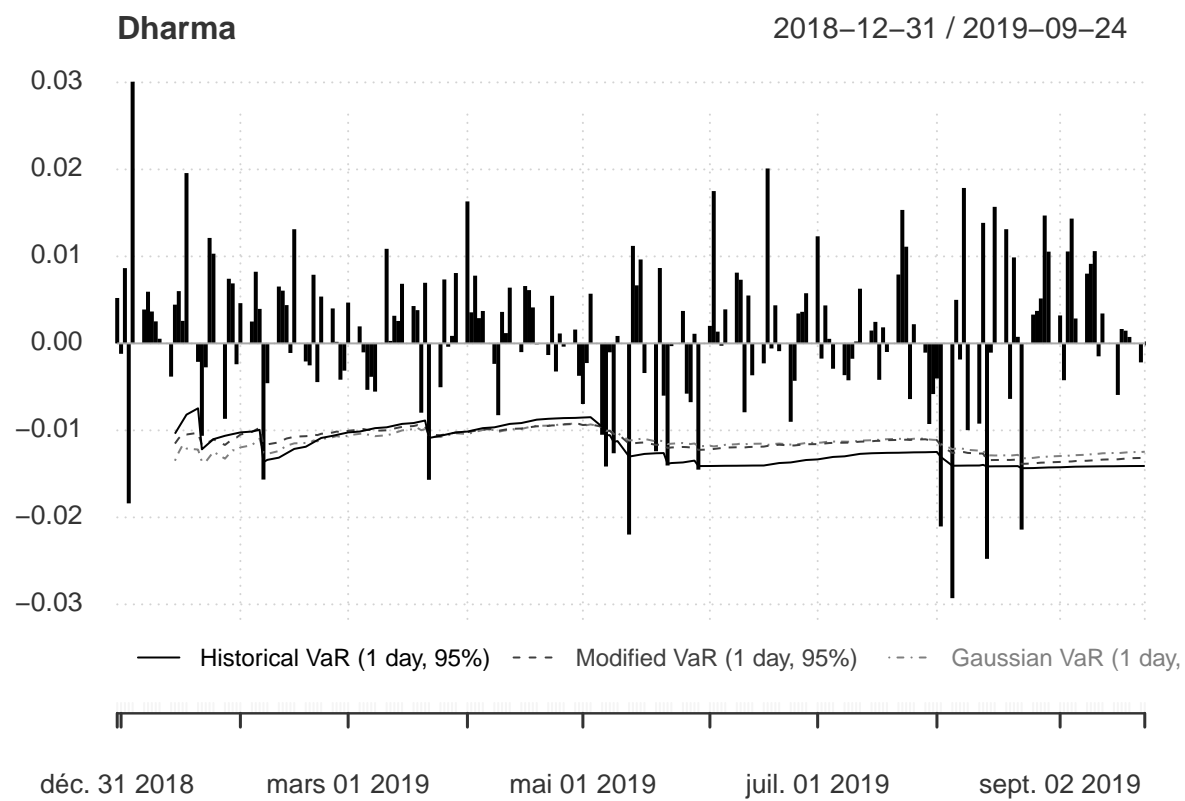


```
## Warning in charts.Bar(allIdx, main = "Returns"): The cex.legend argument  
## of chart.TimeSeries has been deprecated, and may be removed in a future  
## release, see help('chart.TimeSeries') for more information.
```

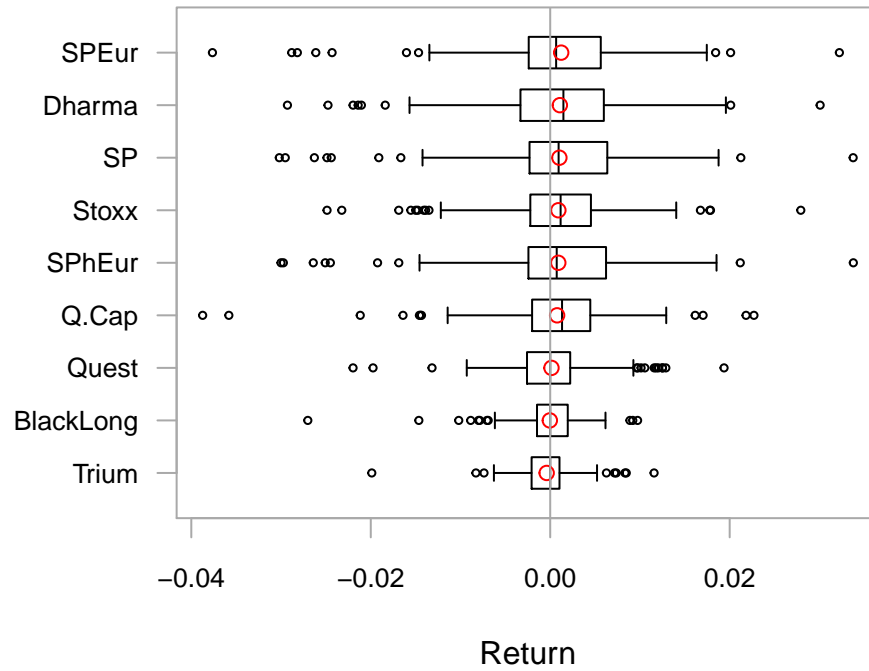




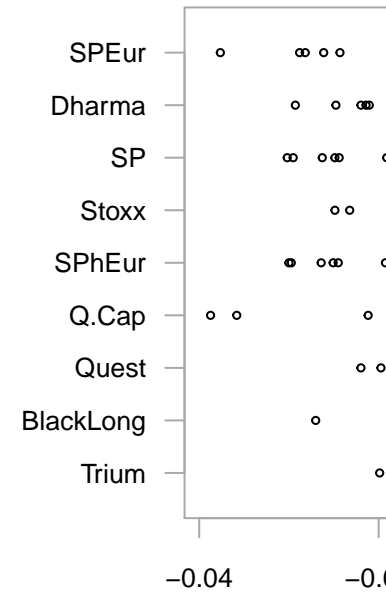


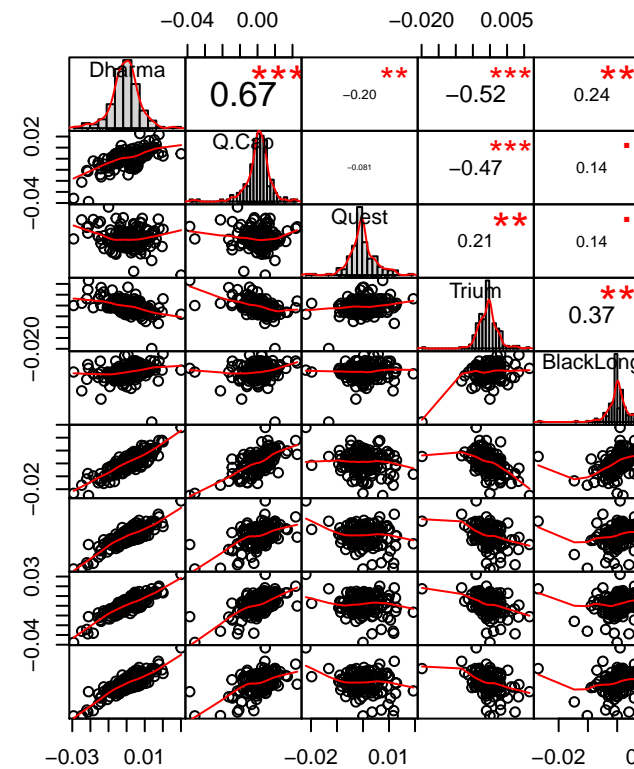
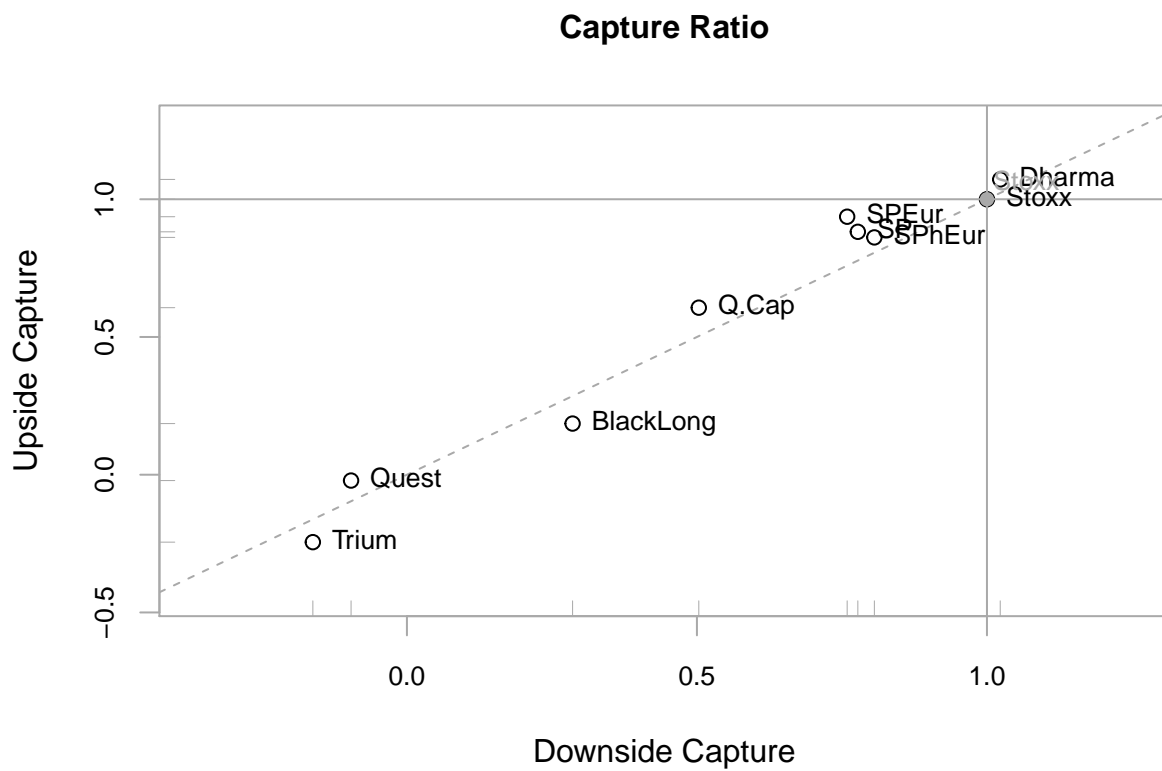


Return Distribution Comparison



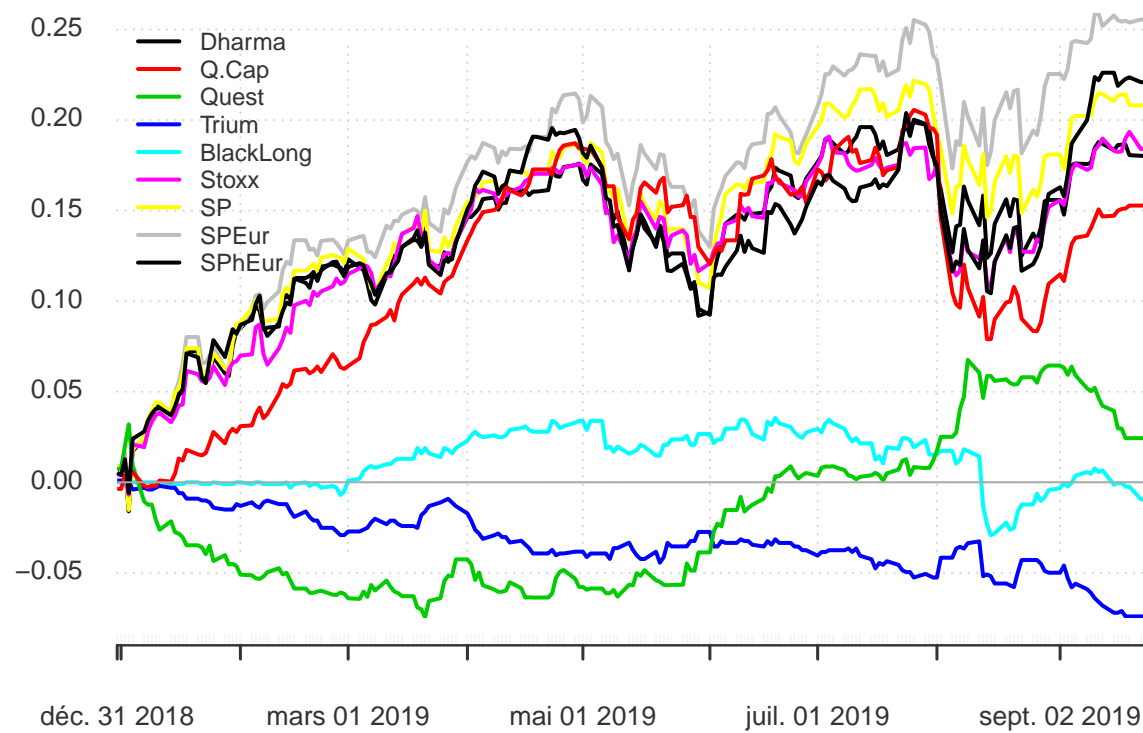
Return



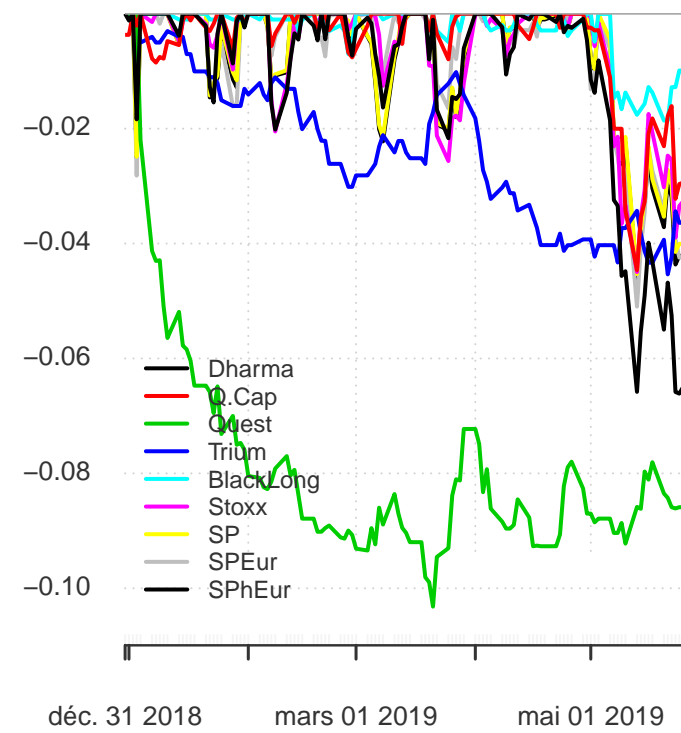


Dharma

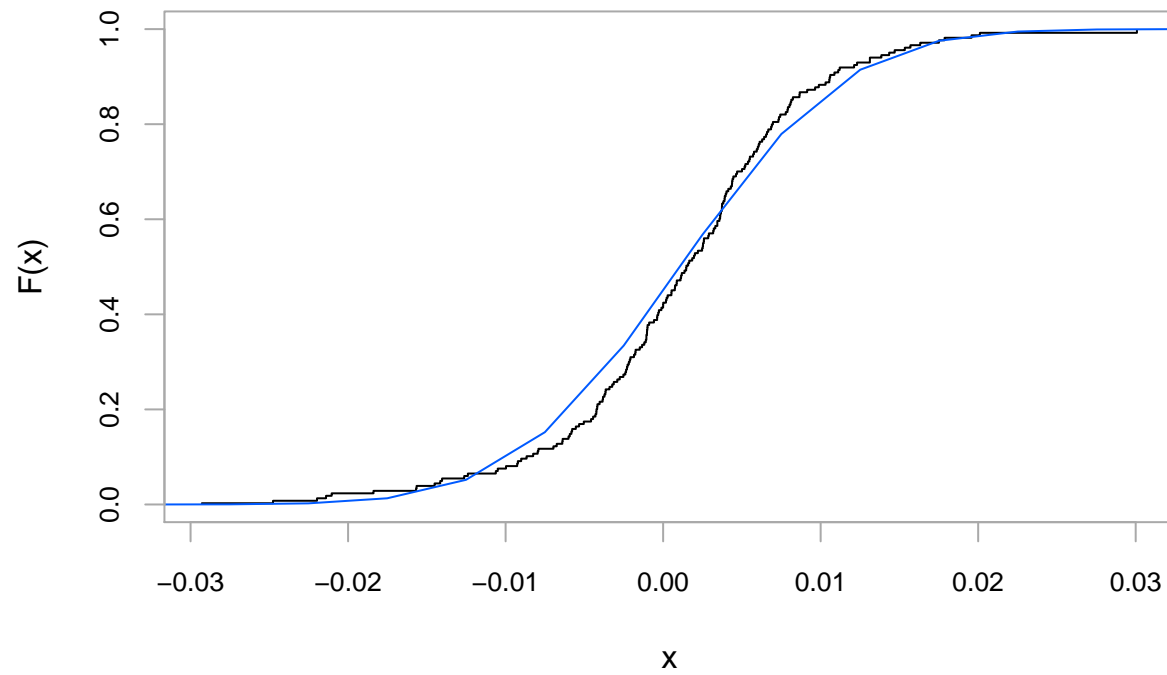
2018-12-31 / 2019-09-24



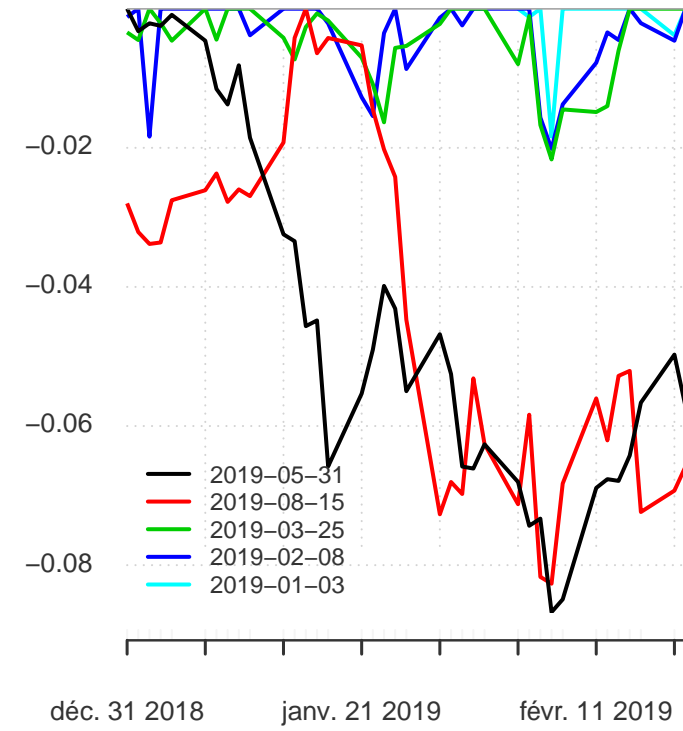
Dharma



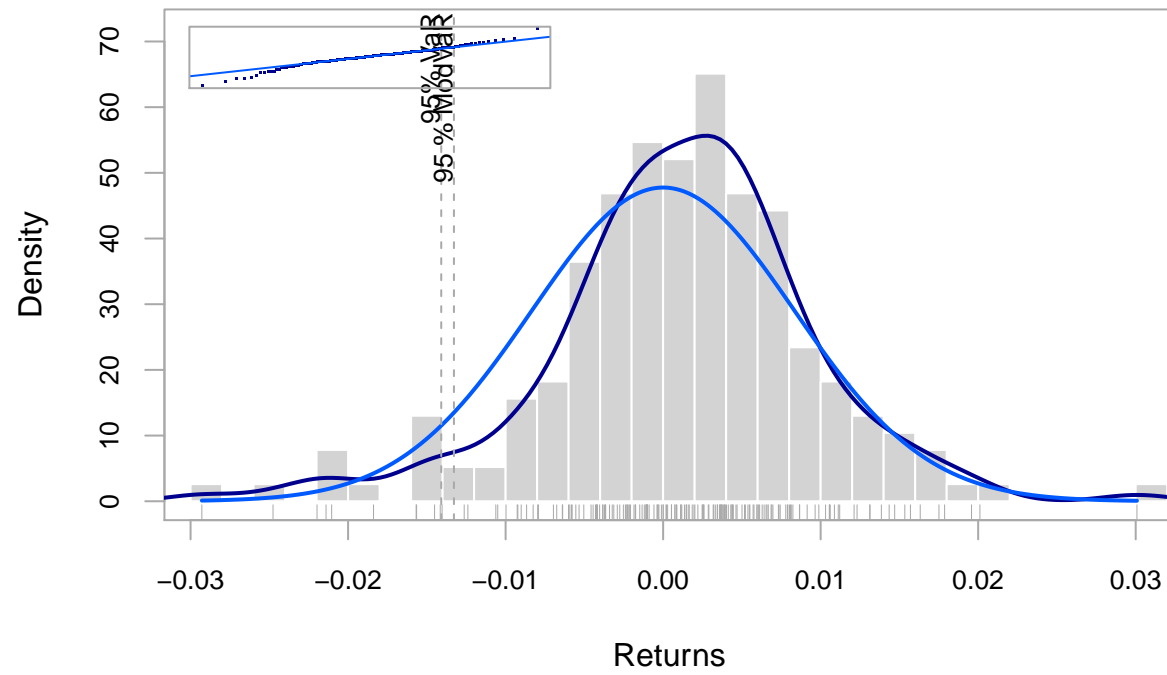
Empirical CDF



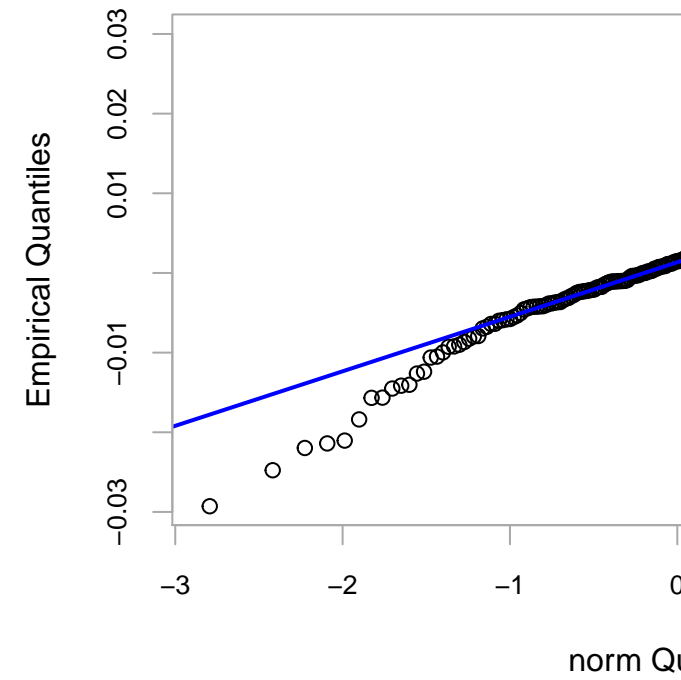
Dharma Event Study



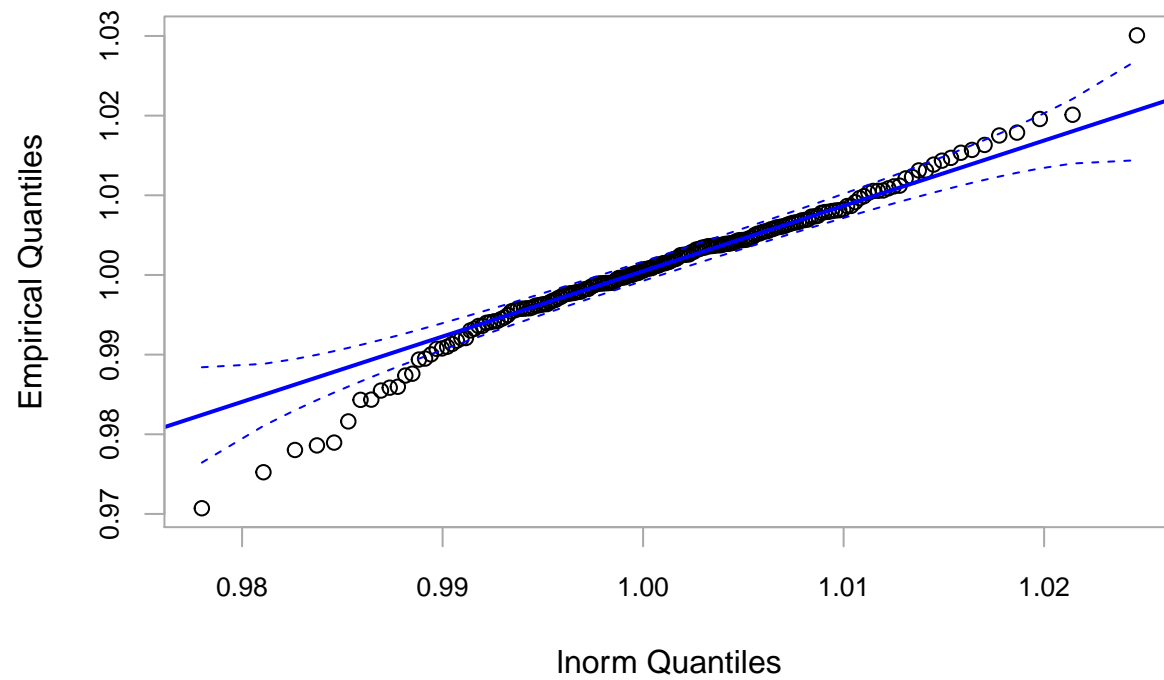
Dharma



Dharma

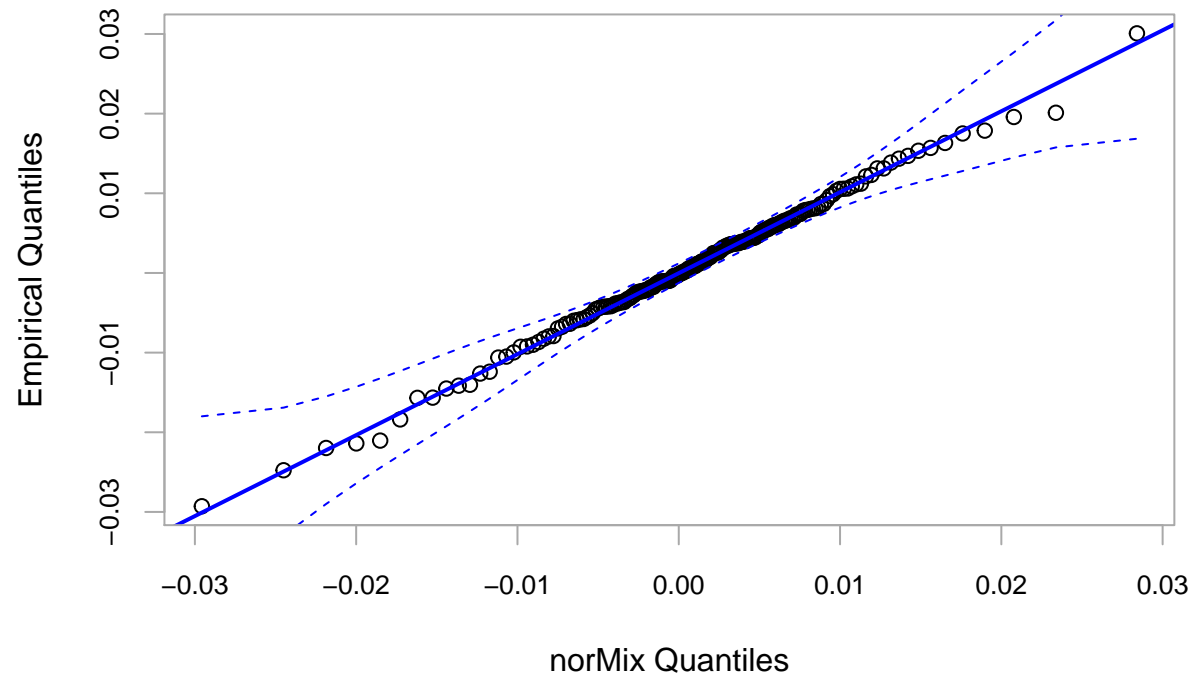


log-normal distrivbution



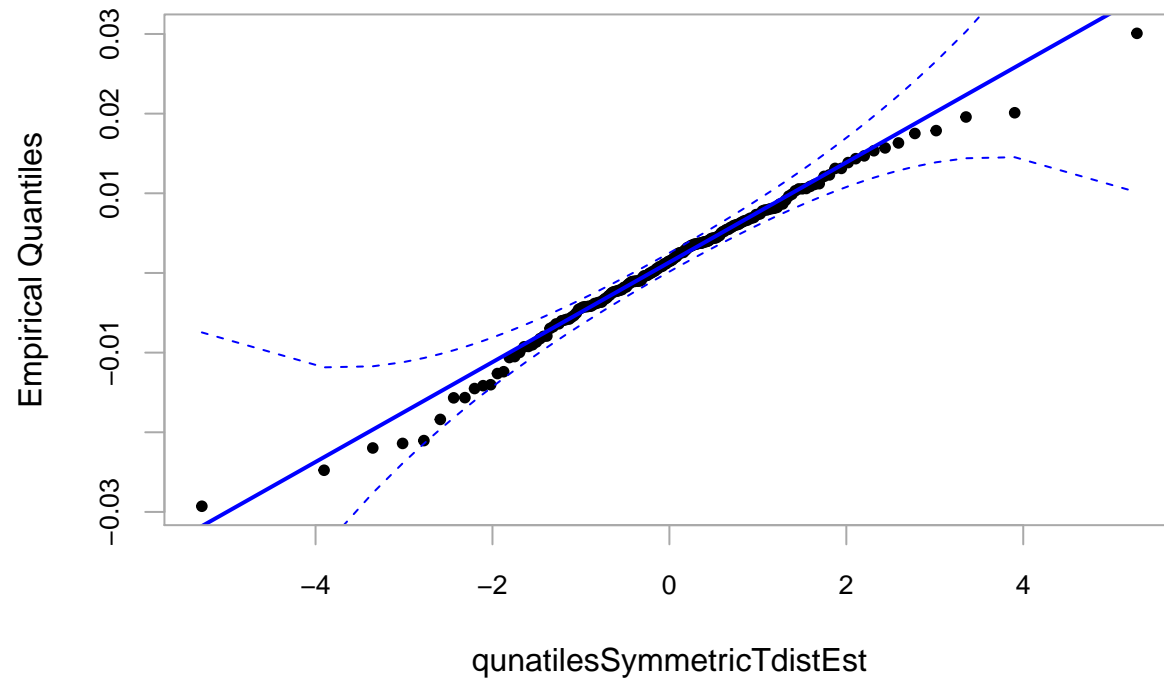
EM converged in 91 iterations (with relative change=1.45471e-08)

normal mixture distribution



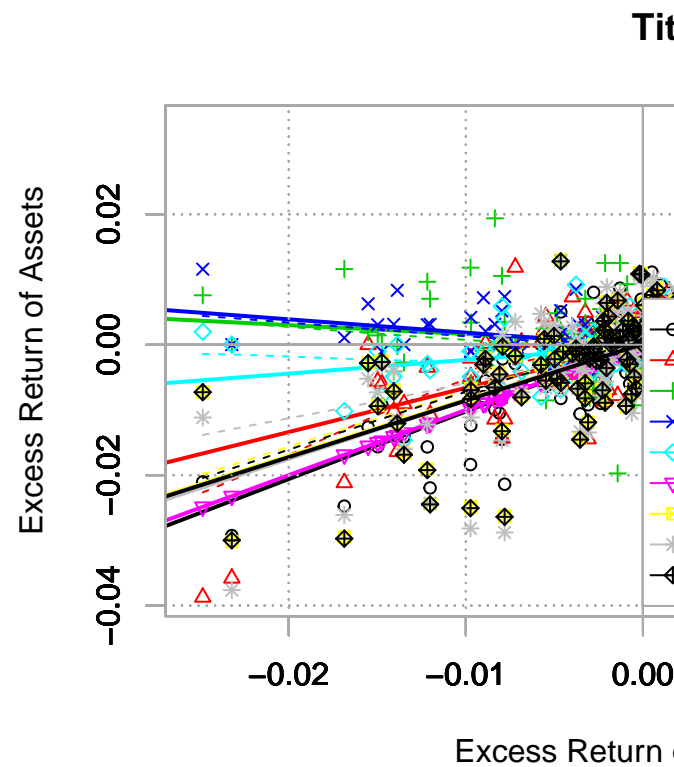
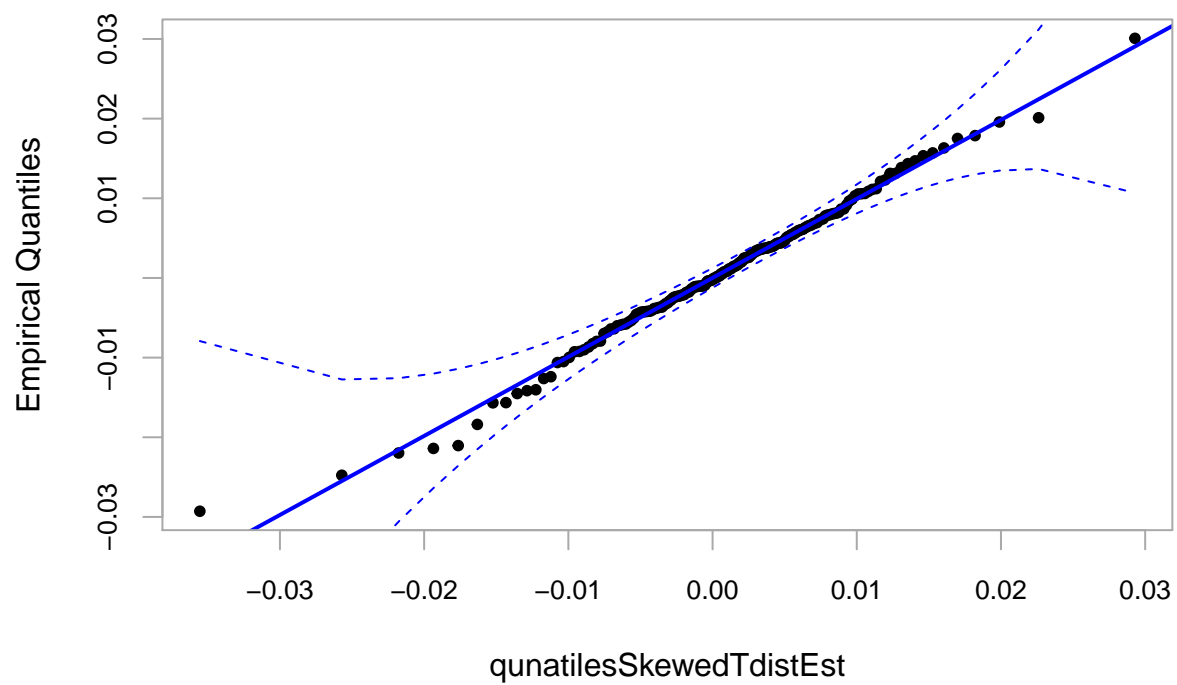
```
## Loading required package: stats4
##
## Attaching package: 'sn'
## The following object is masked from 'package:stats':
##
##      sd
## location    scale    dof
##    0.001    0.006    4.243
```


MO Symmetric t-Distribution



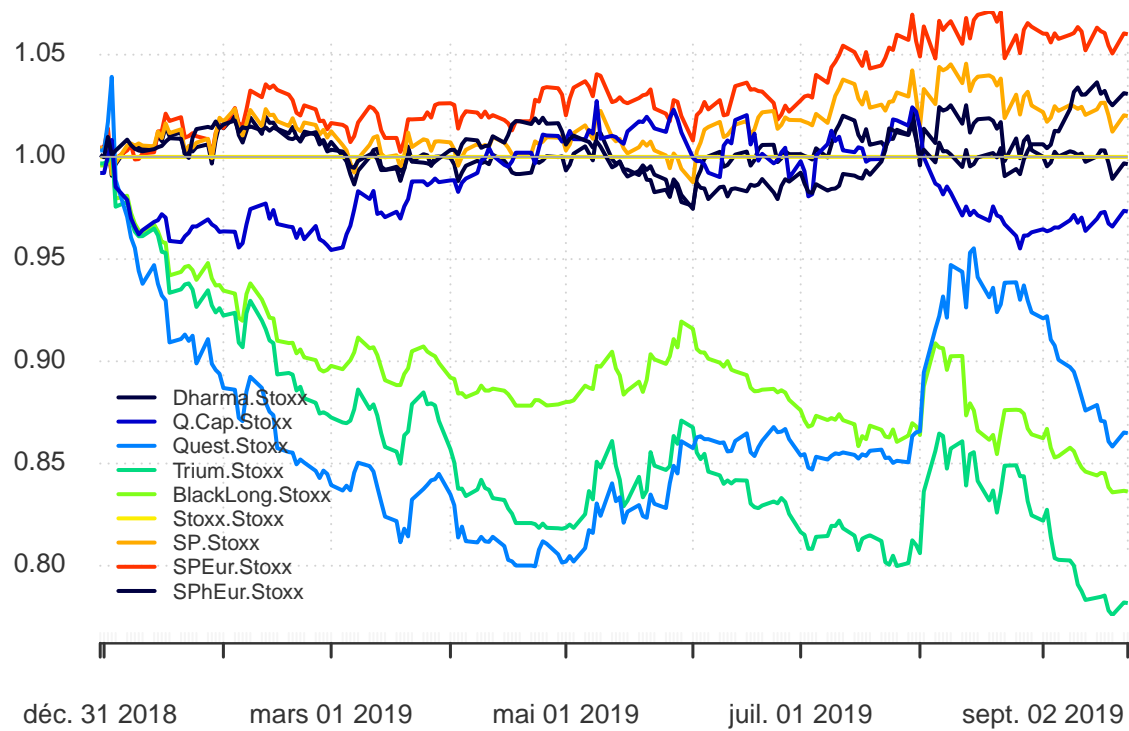
##	location	scale	skew	dof
##	0.004	0.007	-0.538	4.444

MO Returns Skewed t-Distribution

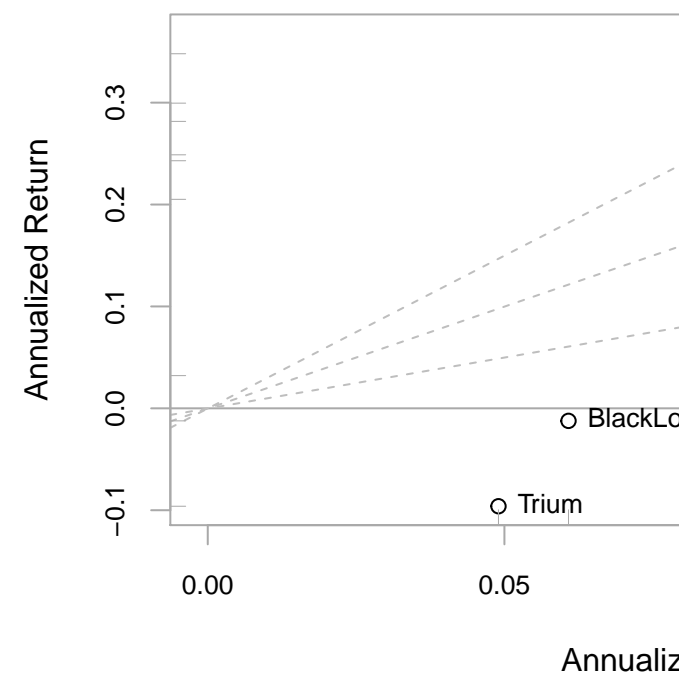


Relative Performance to SXXP

2018-12-31 / 2019-09-24

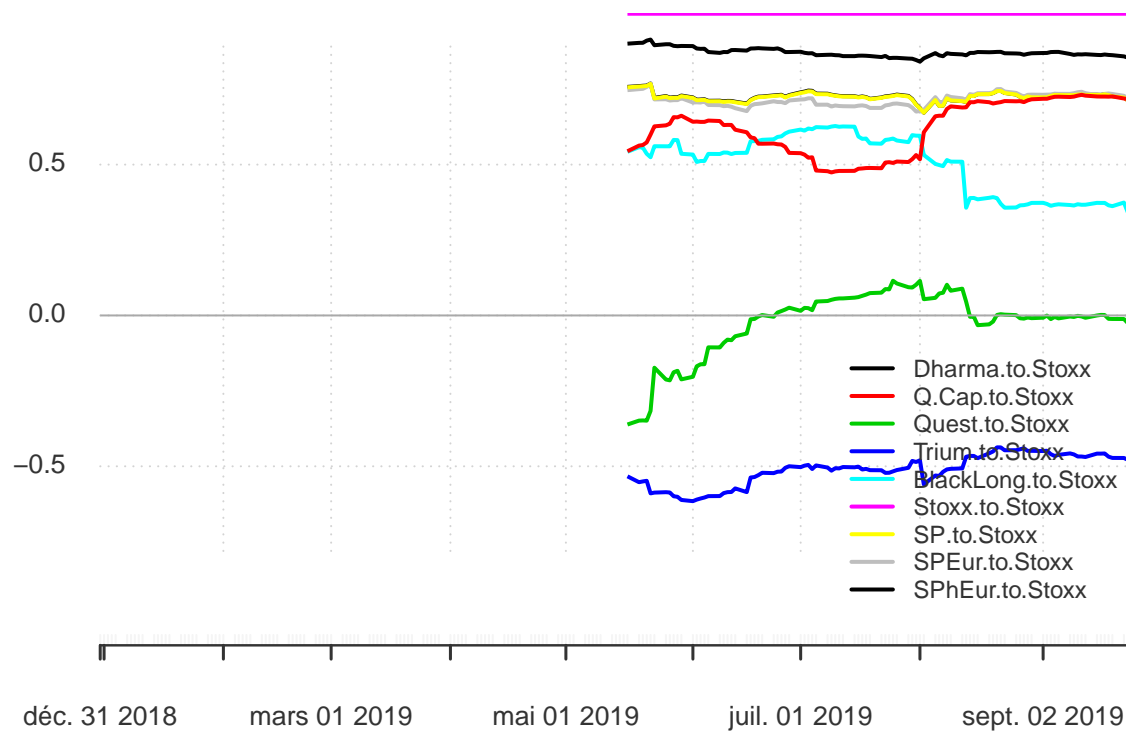


Annualized Return

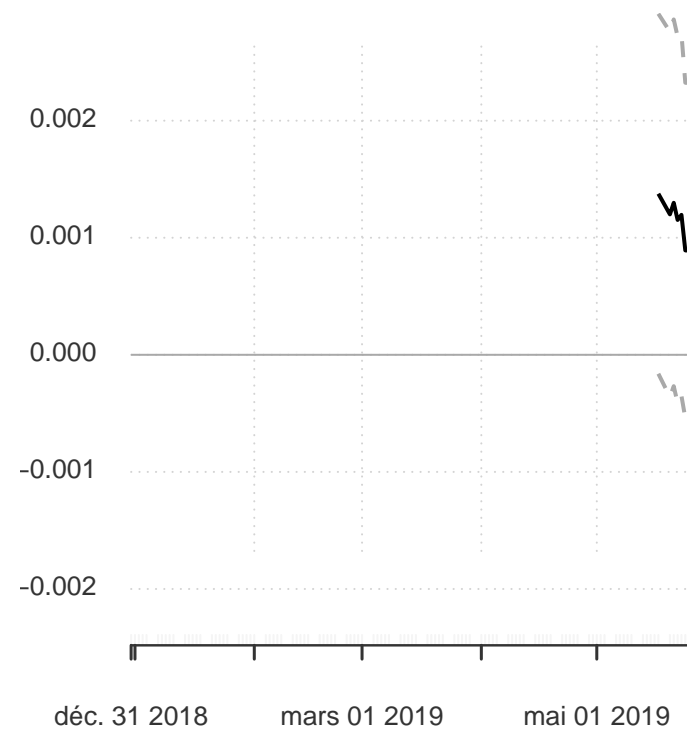


Dharma.to.Stoxx

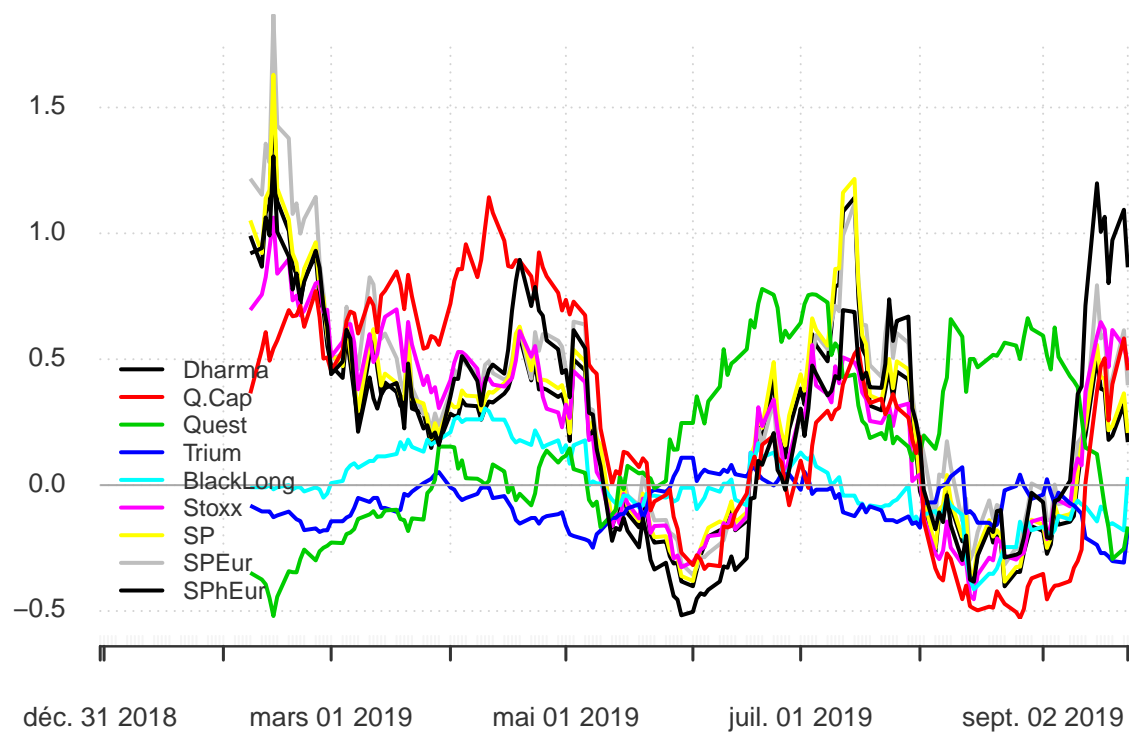
2018-12-31 / 2019-09-24



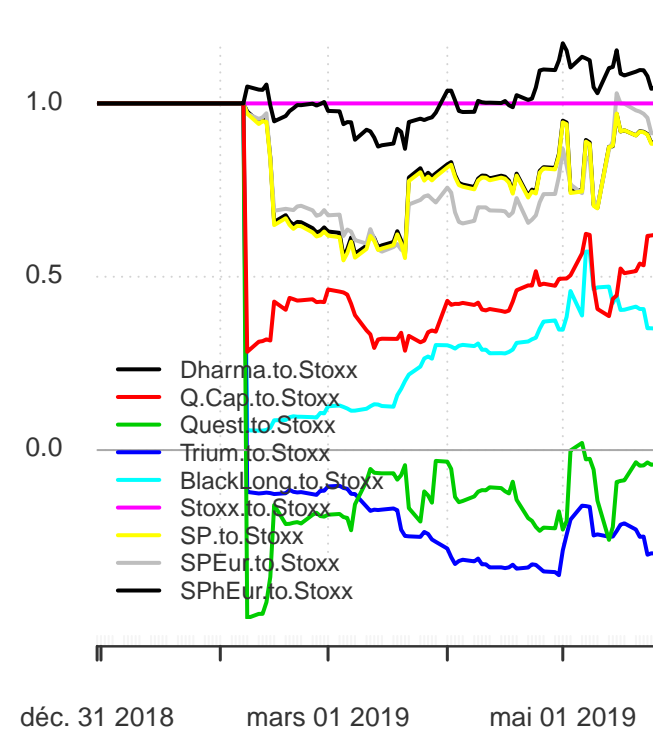
Dharma Rolling 100-day Performance

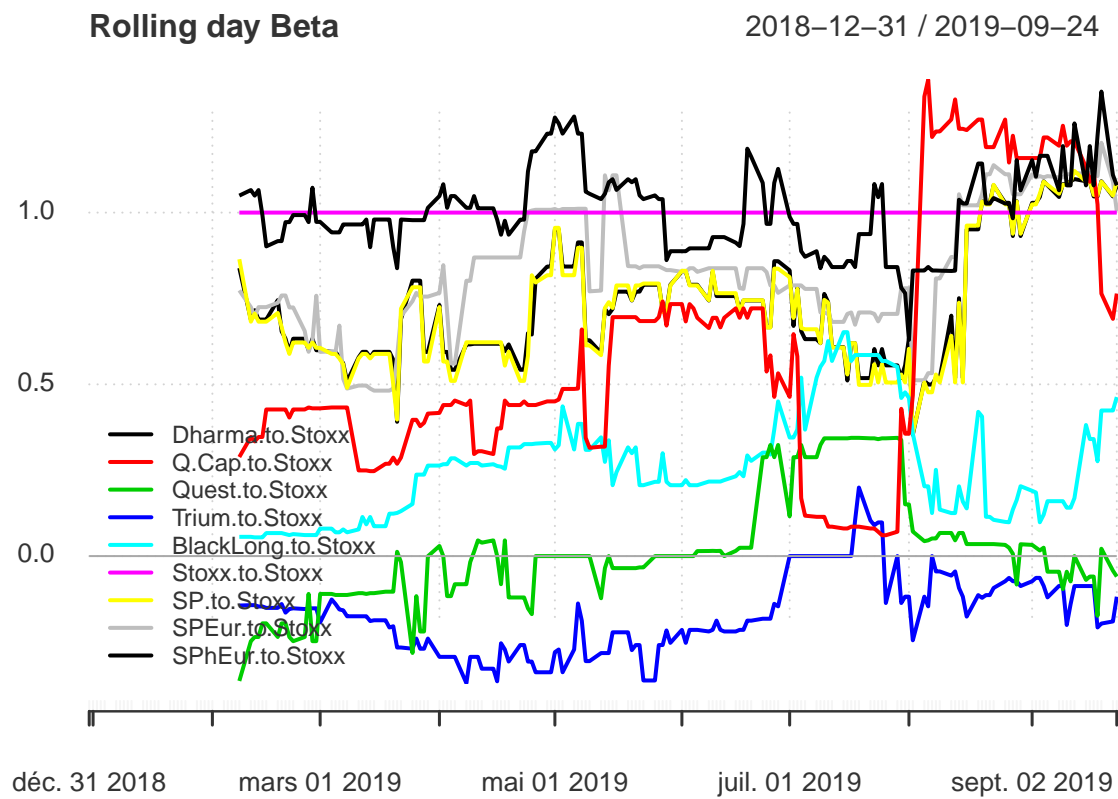


Dharma Rolling 30-day Return.annualized 2018-12-31 / 2019-09-24

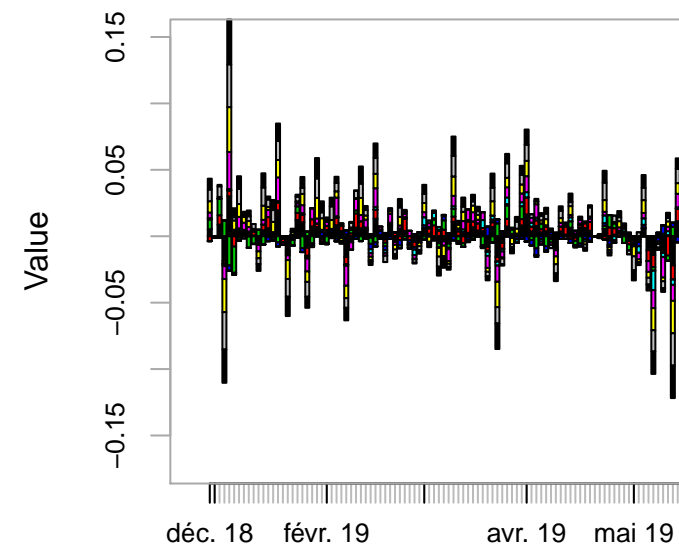
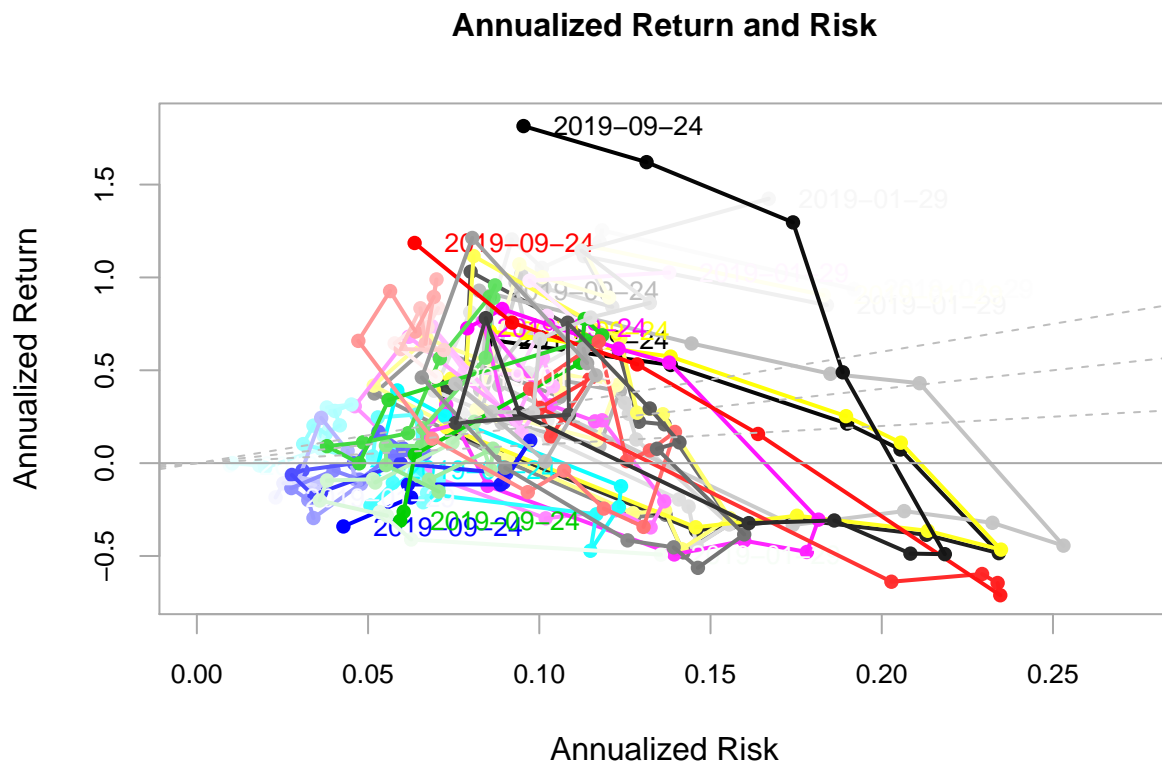


Rolling 30-day Beta





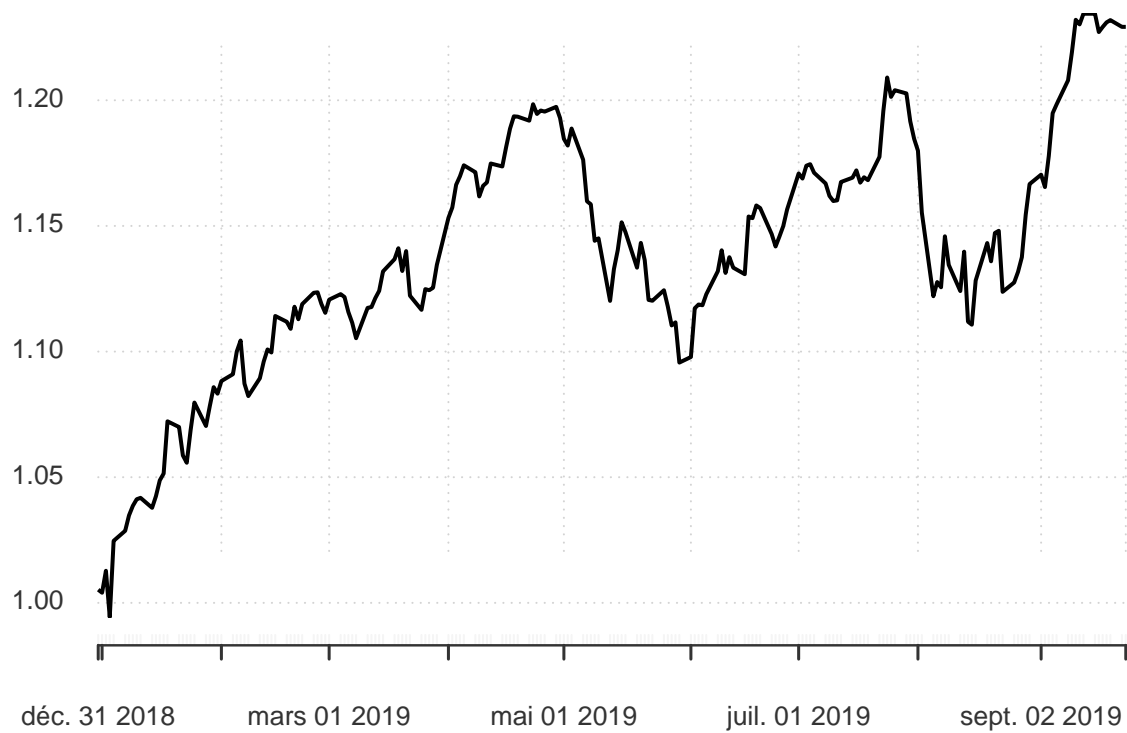
'1983378703938, 0, -0.00131501754631635, -0.009753816
79251732575378, -0.00144607152662157, 0.008645227648
42044030213162, 0.0200339684075151625, 0.02000957196897
486352486130642, 0.00350815044676533, 0.005375330141
36850759938067, 0.0178584598249607, -0.001818401110
56616546327082, -0.000550805062523807, 0.00221481059
08291529189112, -0.00972246620378403, 0.008001811930
79489887410612, 0.00784423256490641, 0.002893052062
368905002992185, 0.0139932318289668, 0.001461645132
49984458414705, -0.00558872031627367, 0.008483613977
08921340147724, 0.00603875270560028, -0.002654654721
48429831542299, 0.00226991430522716, -0.002166624525
729526478391245, -0.00207964335908972, 0.002246341014
53500486945286, 0.00391884536115882, -0.002781039706
182555258681873, 0.003894626655655757, 0.002817975969
15664604563844, -0.000408834577005428, -0.0032722459
986496914760597, 0.0078010183312412, -0.000572471757
987



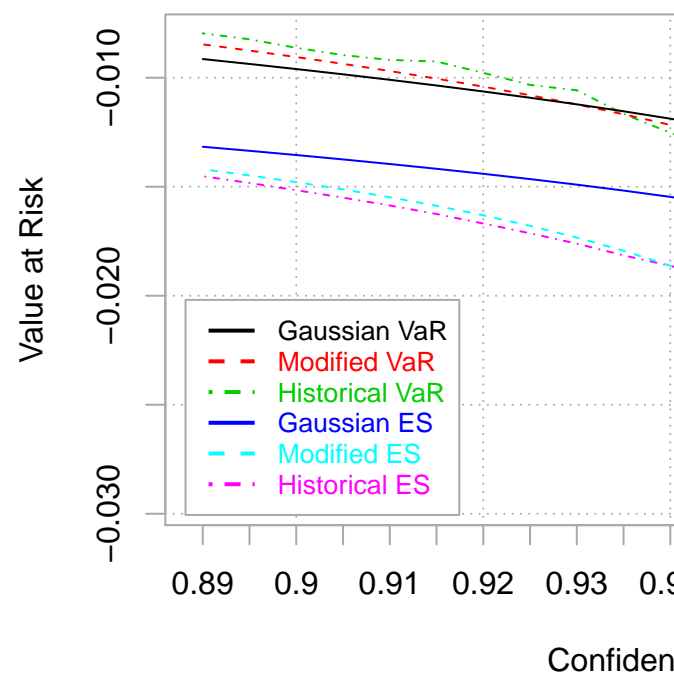
- | | | |
|----------|-------------|-------------|
| ■ Dharma | ■ Trium | ■ BlackLong |
| ■ Q.Cap | ■ BlackLong | ■ BlackLong |
| ■ Quest | ■ Stox | ■ Stox |

Dharma

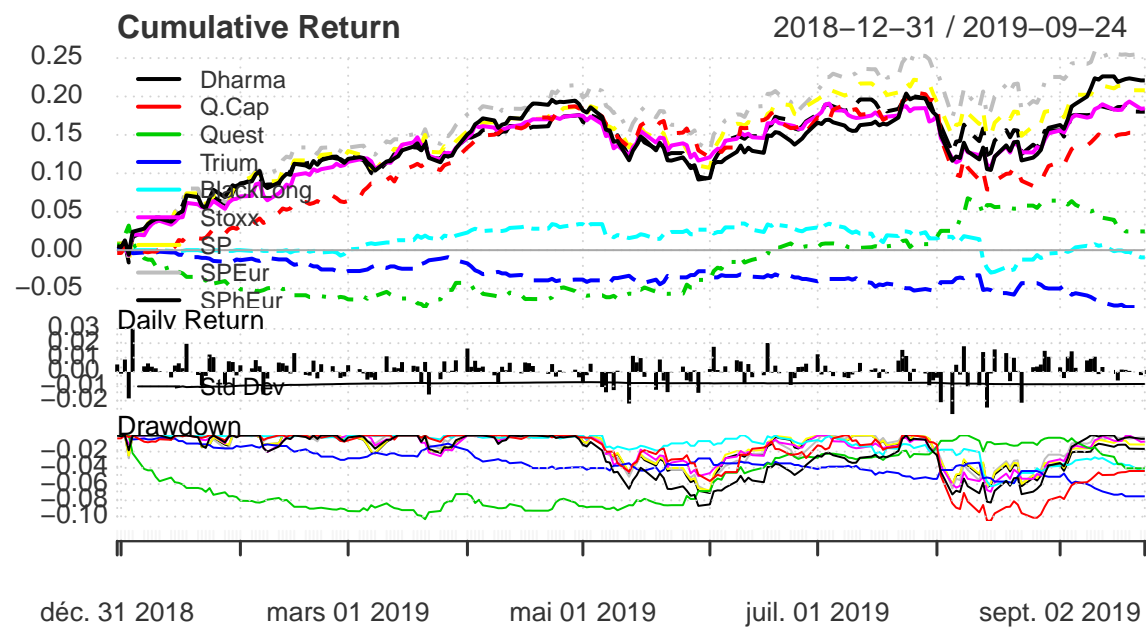
2018-12-31 / 2019-09-24



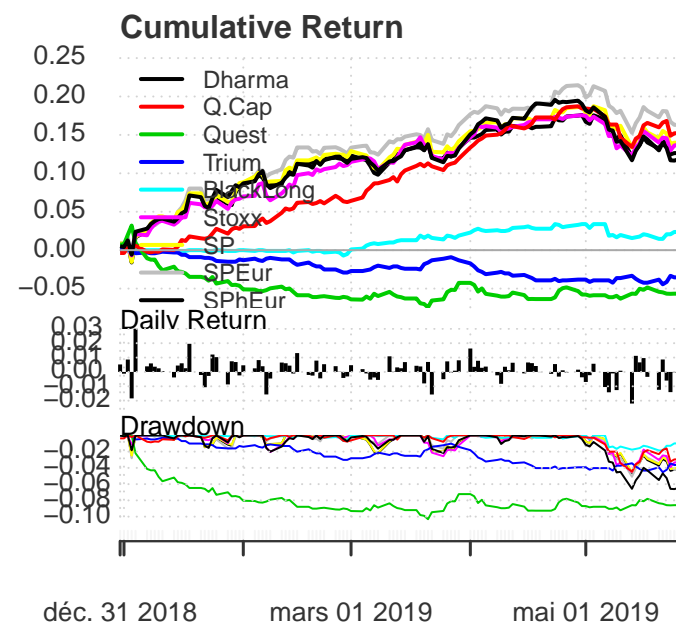
Risk Confidence Se



Dharma Performance



Dharma Performance



Rolling 100 day Performance

