BA: Protocol

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| **Week** | **Date** | **Topics Discussed** | **Follow-up** | **Deadline Follow-up** |
| 1 | 2019-02-18 | GH distribution skewed slightly better than non-skewed according to log-likelihood  CS: ML maybe doesn’t consider tails enough; will check distribution to clear meaning of parameters  Why are Treasuries not skewed like JPY? | Check if higher DoFs fit better in QQ (try 3.5/4.0)  Try to understand GH function better  Poisson: Loss of -1 every 1000 days, else profit of 1/1000  Search for data of DJIA with 1929 crisis  Skewed and non-skewed t-distr vs. true from -5sigma to 5sigma (0.1 steps) MSE test (regression line) and plot | 2019-02-25 |
| 2 | 2019-02-25 | Not done; CS to send e-mail with info but never received | See previous meeting |  |
| 3 | 2019-03-04 | EM-algo not working as described/expected in paper  Find timeframe so that stocks are negatively and bonds positively skewed  Ticks for BT:  Bonds: Lehman, Salomon, JPM bond indices; alternatively bonds (TY1 - index, TY1 - comdt)  Futures: GFUT: role 5D prior to first notices, ratio  Skewed, normal Student-t and Gauss should be explained in essay  Use ML to estimate params  For the moment forget Poisson  Multivariate estimate; 3-sigma VaR of estimated distr to see how fat-tails are different are for each asset;  Optimization over time horizon with simulated data: compare VaR and expected shortfall (ES is subadditive), sigma 1 to 3; select one asset for each class depending on how nice estimated parameters are |  |  |
| 4 | 2019-03-12 | Find daily bond index (futures) TY1 Comdty with 1987 crisis; also check for DJI data  Check again for significance of Gamma and bootstrap parameters  Ask Breymann/check sources how ML-EM algo works?  Compare marginal distribution of e.g. bonds and stocks to measure how they differ (QQ-plot, log-scale?)  Plot tails of assets with different colored functions to show if they have different gamma  Need to check if GHYP is needed (else only different Student’s t univariate)  Simulate multiple times and compare weights with those obtained with Breymann’s function (but ES used is same)  Bootstrap historical data to check parameters a nd to compare with results using Breymann’s function  Play around with different data subsets (timeframes)  Standardize data before fitting (makes sense because of risk weights for portfolio optim instead of proper weights)  Divide Sigmas by standard dev for parameter estimation |  |  |
| 5 | 2019-03-18 | Negative Gamma for bonds same as in paper  Scaling doesn’t seem to work as expected (doesn’t change weights much) <- can avoid scaling  Select assets and skeweness and returns (S&P equity -0.1 4%, Treasuries bonds 0 <4%, JPY FX 0.05 <0%, Gold commodities -0.05 0%) to argument skeweness thesis  DoF 4.1 (possibly change back to 4 later if no problems arise)  Continue with multivariate thesis  Remake ES-plot against horizon for 4 assets above (area plot) with non-negative weights  [Implement Kupiec and other tests for backtesting of VaR and ES] <- CS thinks not necessarily relevant to topic, think about it and make proposals but first finalize original theme <- stress tests with comparison of portfolios and measures of risks (VaR, ES, etc…) important for short-term investment, backtesting (VaR, ES), estimation error of parameters (bootstrap of original data) and create distribution for each param, distribution of weights, efficient frontier, shrinkage of return estimates (correlations - heat map with significance <- absolute T statistic >= 2)  Calculate DoFs and skewness of data (DJI, …)  Substitute 0 historical data with previous day  Check what happens when returns = 0, correlations = 0  [Possibly short out-of-the-money put options with BS-formula?] |  |  |
| 6 | 2019-03-25 | Skeweness seems still too small and risky assets still overweighted  Maximize risk-return ratio (VaR, ES, sigma) use futures index, one time return all equal and one time proportional to sigma, one time proportional to ES  Explore more about influence of horizon  Plot efficient frontier for each horizon (efficient surface); portfolio can be optimized from there; use 4.2 DoF [maybe modify Breymann’s function]  BA should be self-contained  Worst-case |  |  |
| 7 | 2019-04-01 |  |  |  |
| 8 | 2019-04-08 |  |  |  |
| 9 | 2019-04-15 |  |  |  |
| 10 | 2019-04-22 |  |  |  |
| 11 | 2019-04-29 |  |  |  |
| 12 | 2019-05-06 |  |  |  |
| 13 | 2019-05-13 |  |  |  |
| 14 | 2019-05-20 |  |  |  |
| 15 | 2019-05-27 |  |  |  |
| 16 | 2019-06-03 | Deadline for turning in: 2019-06-07 |  |  |