MATLAB Script

Base Portfolio

```
%% 1 new cvar efficient frontier test
pbase = PortfolioCVaR;
pbase = pbase.setAssetList(assets(1:3));
pbase = pbase.setScenarios(assetdata(:,1:3));
pbase = pbase.setDefaultConstraints;
pbase = pbase.setProbabilityLevel(0.95);
%% 2 plot efficient frontier and estimate value-at-risk for portfolioCVAR
pbasewgts = pbase.estimateFrontier(10);
figure;
[pbaseRisk, pbaseReturns] = pbase.plotFrontier(pbasewgts)
%% 3 estimate, Return,Risk,Standard Deviaton and VaR
pretbase = estimatePortReturn(pbase, pbasewgts);
prskbase = estimatePortRisk(pbase, pbasewgts);
pstdbase = estimatePortStd(pbase, pbasewgts);
pvarbase = estimatePortVaR(pbase, pbasewgts);
variablesbase =[pretbase, prskbase, pstdbase, pvarbase];
variablesbase
%% 4 check portfolio feasibility relative to initial problem ( ans =10*1)
checkFeasibility(pbase, pbasewgts)


%% 5 mean variance portfolio
pmvbase = Portfolio;
pmvbase = pmvbase.setAssetList(assets(1:3));
pmvbase = pmvbase.estimateAssetMoments(assetdata(:,1:3));
pmvbase = pmvbase.setDefaultConstraints;
%% 6 Plot the Mean-Variance efficient frontier
% Get the weights of the mean-variance efficient portfolios
pmvbasewgts = pmvbase.estimateFrontier(10);
% Plot the portfolios, and get the portfolio risks/returns
figure; [pmvbaseRisk, pmvbaseReturns] = pmvbase.plotFrontier(pmvbasewgts);


%% 7 Compare CVaR and Mean-Variance portfolios and add CVaR Portfolios to
Mean-Variance Plot
pbaseRiskStd = pbase.estimatePortStd(pbasewgts);
figure;
pmvbase.plotFrontier(10);
hold on
plot(pbaseRiskStd,pbaseReturns,'-r','LineWidth',2);
legend('Mean-Variance Efficient Frontier','CVaR Efficient
Frontier','Location','SouthEast')

%% 8 compare weights

area(pbasewgts');
title('CVaR Portfolio Weights');

%% 9 Create Table, then export table to excel and lable all column variables
weightsbase = pmvbasewgts'
tablebase = [variablesbase, weightsbase]
tablebase

%% max sharpe ratio
```

```matlab
maxsharpebase = estimateMaxSharpeRatio(pmvbase)
```

Market analysis

```matlab
%% Base plus all markets
%% final CVaR with Base + Infra Markets (one-by-one), Base + all
%% new cvar efficient frontier test
pall = PortfolioCVaR;
pall = pall.setAssetList(assets([1 2 3 4 5 6]));
pall = pall.setScenarios(assetdata([1:730],[1 2 3 4 5 6]));
pall = pall.setDefaultConstraints;
pall = pall.setProbabilityLevel(0.95);
%% plot efficient frontier and estimate value-at-risk for portfolioCVAR
pallwgts = pall.estimateFrontier(10);
figure;
[pallRisk, pallReturns] = pall.plotFrontier(pallwgts)
%% estimate, Return,Risk,Standard Deviaton and VaR
pretall = estimatePortReturn(pall, pallwgts);
prskall = estimatePortRisk(pall, pallwgts);
pstdall = estimatePortStd(pall, pallwgts);
pvarall = estimatePortVaR(pall, pallwgts);
variableall =[pretall, prskall, pstdall, pvarall];
variableall
%% check portfolio feasibility relative to initial problem ( ans =10*1)
checkFeasibility(pall, pallwgts)
%% mean variance portfolio
pmvall = Portfolio;
pmvall = pmvall.setAssetList(assets([1 2 3 4 5 6]));
pmvall = pmvall.estimateAssetMoments(assetdata([1:730],[1 2 3 4 5 6]));
pmvall = pmvall.setDefaultConstraints;
%% Plot the Mean-Variance efficient frontier
% Get the weights of the mean-variance efficient portfolios
pmvallwgts = pmvall.estimateFrontier(10);
% Plot the portfolios, and get the portfolio risks/returns
figure; [pmvallRisk, pmvallReturns] = pmvall.plotFrontier(pmvallwgts);
%% efficient frontier with infra weights illustrated
area(pmvallwgts');
title('Efficient frontier weights')


%% efficient frontier without infra weights illustrated
area(pmvbasewgts');
title('Efficient frontier weights')


%% Compare CVaR and Mean-Variance portfolios and add CVaR Portfolios to Mean-
Variance Plot
pallRiskStd = pall.estimatePortStd(pallwgts);
figure;
pmvall.plotFrontier(10);
hold on
plot(pallRiskStd,pallReturns,'-r','LineWidth',2);
legend('Mean-Variance Efficient Frontier','CVaR Efficient
Frontier','Location','SouthEast')


%% compare weights
```

```matlab
area(pallwgts');
title('CVaR Portfolio Weights');

%% Create Table, then export table to excel and lable all column variables
weightsall = pmvallwgts'
tableall = [variableall, weightsall]
tableall
%%
pmvbasewgts = pmvbase.estimateFrontier(10);
pmvbase.plotFrontier(pmvbasewgts)
hold on

pmvallwgts = pmvall.estimateFrontier(10);
pmvall.plotFrontier(pmvallwgts);
hold off

%% max sharpe ratio
maxsharpeall = estimateMaxSharpeRatio(pmvall)
```

Sector analysis

```matlab
%% Base plus all subsectors
%% final CVaR with Base + subsectors
%% new cvar efficient frontier test
psub = PortfolioCVaR;
psub = psub.setAssetList(assets2([1 2 3 4 5 6 7 8 9 10]));
psub = psub.setScenarios(assetdata2([1:730],[1 2 3 4 5 6 7 8 9 10]));
psub = psub.setDefaultConstraints;
psub = psub.setProbabilityLevel(0.95);
%% plot efficient frontier and estimate value-at-risk for portfolioCVAR
psubwgts = psub.estimateFrontier(10);
figure;
[psubRisk, psubReturns] = psub.plotFrontier(psubwgts)
%% estimate, Return,Risk,Standard Deviaton and VaR
presub = estimatePortReturn(psub, psubwgts);
prsksub = estimatePortRisk(psub, psubwgts);
pstdsub = estimatePortStd(psub, psubwgts);
pvarsub = estimatePortVaR(psub, psubwgts);
variablesub =[presub, prsksub, pstdsub, pvarsub];
variablesub
%% check portfolio feasibility relative to initial problem ( ans =10*1)
checkFeasibility(psub, psubwgts)
%% mean variance portfolio
pmvsub = Portfolio;
pmvsub = pmvsub.setAssetList(assets2([1 2 3 4 5 6 7 8 9 10]));
pmvsub = pmvsub.estimateAssetMoments(assetdata2([1:730],[1 2 3 4 5 6 7 8 9 10]));
pmvsub = pmvsub.setDefaultConstraints;
%% Plot the Mean-Variance efficient frontier
% Get the weights of the mean-variance efficient portfolios
pmvsubwgts = pmvsub.estimateFrontier(10);
% Plot the portfolios, and get the portfolio risks/returns
figure; [pmvsubbRisk, pmvsubReturns] = pmvsub.plotFrontier(pmvsubwgts);

%% efficient frontier with infra weights illustrated
area(pmvsubwgts');
title('Efficient frontier weights')
```

```matlab
%% efficient frontier without infra weights illustrated
area(pmvbasewgts');
title('Efficient frontier weights')


%% Compare CVaR and Mean-Variance portfolios and add CVaR Portfolios to Mean-
Variance Plot
psubRiskStd = psub.estimatePortStd(psubwgts);
figure;
pmvsub.plotFrontier(10);
hold on
plot(psubRiskStd,psubReturns,'-r','LineWidth',2);
legend('Mean-Variance Efficient Frontier','CVaR Efficient
Frontier','Location','SouthEast')

%% compare weights

area(psubwgts');
title('CVaR Portfolio Weights');


%% Create Table, then export table to excel and lable all column variables
weightssub = pmvsubwgts'
tablesub = [variablesub, weightssub]
tablesub
%%
pmvbasewgts = pmvbase.estimateFrontier(10);
pmvbase.plotFrontier(pmvbasewgts)
hold on

pmvsubwgts = pmvsub.estimateFrontier(10);
pmvsub.plotFrontier(pmvsubwgts);
hold off
```