

EXHIBITS

Exhibit 1: Percentage CVaR contribution of asset 1 in function of its portfolio weight for a two-asset portfolio with asset returns that have a bivariate normal distribution with means μ_1 and μ_2 , correlation 0.5 and standard deviations σ_1 and σ_2 , respectively.

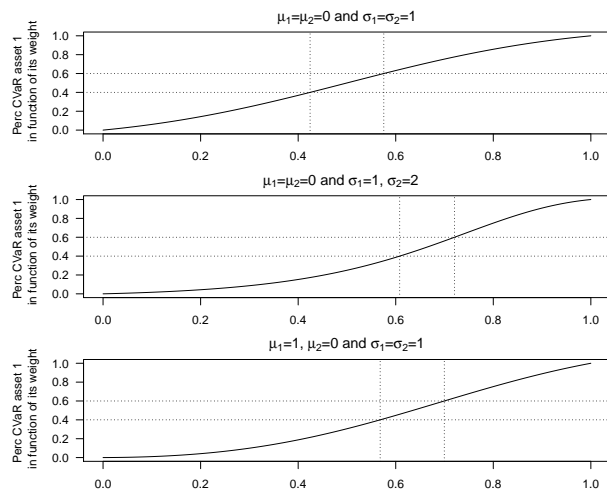


Exhibit 2: Weight and CVaR allocation of bond-equity portfolios, together with the in-sample annualized mean and monthly 95% CVaR over the period January 1976-June 2010.

	Weight allocation		CVaR allocation		Ann. mean	95% CVaR
	Bond	Equity	Bond	Equity		
Equal-weight	50%	50%	3.47%	96.53%	8.90%	4.87%
60/40 weight	60%	40%	13.79%	86.21%	8.63%	4.03%
Min CVaR	96.86%	3.14%	96.86%	3.14%	7.63%	2.44%
Min CVaR concentration	77.01%	22.91%	50%	50%	8.17%	3.00%
60/40 risk allocation	81.23%	18.77%	60%	40%	8.05%	2.80%

Exhibit 3: Annualized mean returns versus the monthly portfolio CVaR and largest percentage CVaR contribution for the mean-StdDev, mean-CVaR and mean-CVaR concentration efficient portfolios. The frontier is estimated using all January 1976-June 2010 monthly returns.

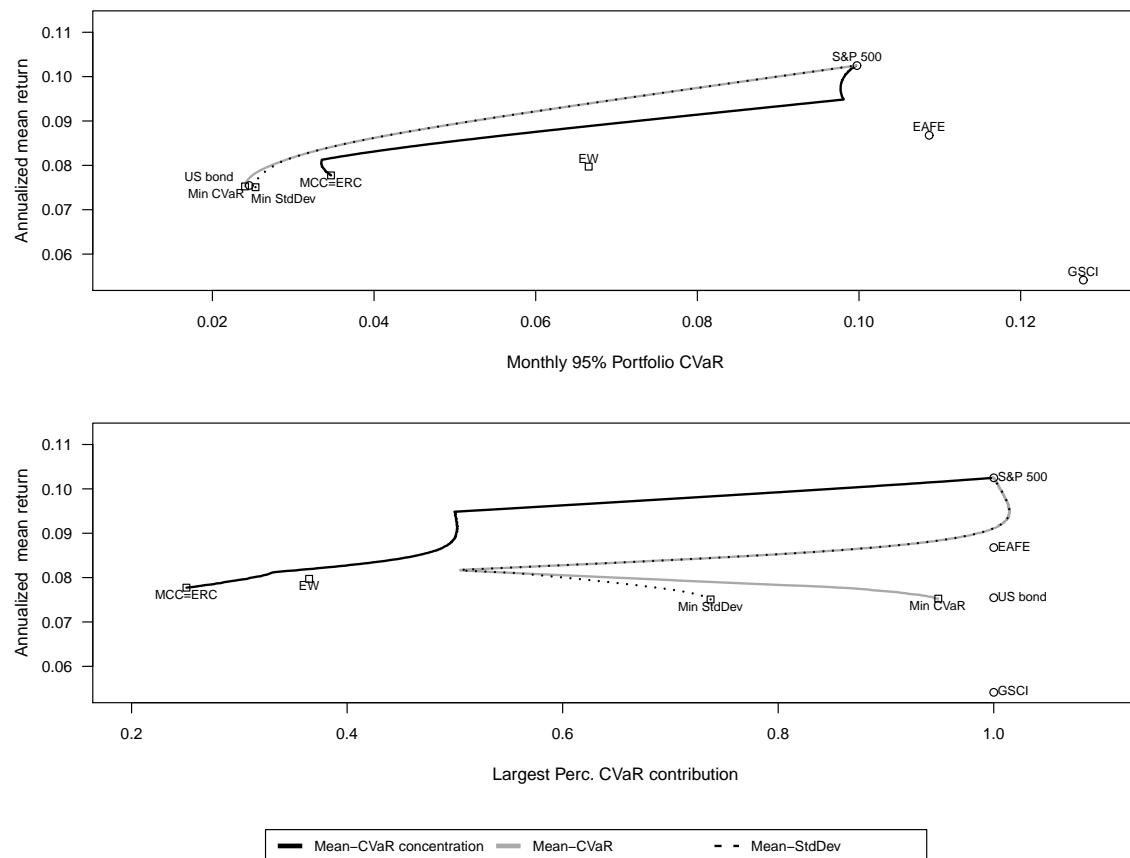


Exhibit 4: Weight and CVaR allocation of mean-StdDev, mean-CVaR and mean-CVaR concentration efficient portfolios for various levels of annualized portfolio returns. The frontier is estimated using all January 1976-June 2010 monthly returns.

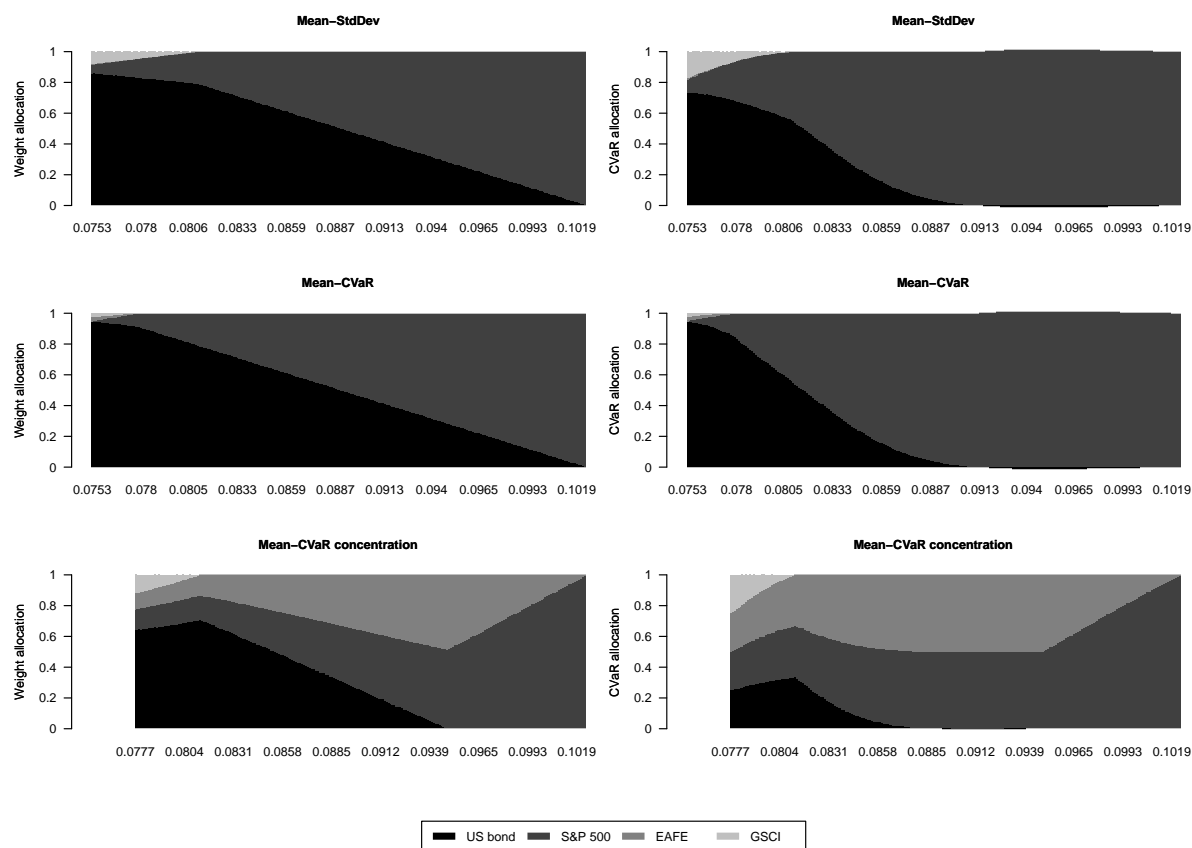


Exhibit 5: Stacked bar weight and CVaR contribution plots for the equal-weight, minimum CVaR and minimum CVaR concentration portfolios invested in the Merrill Lynch US bond, S&P 500, MSCI EAFE and S&P GSCI indices. The portfolios are rebalanced quarterly.

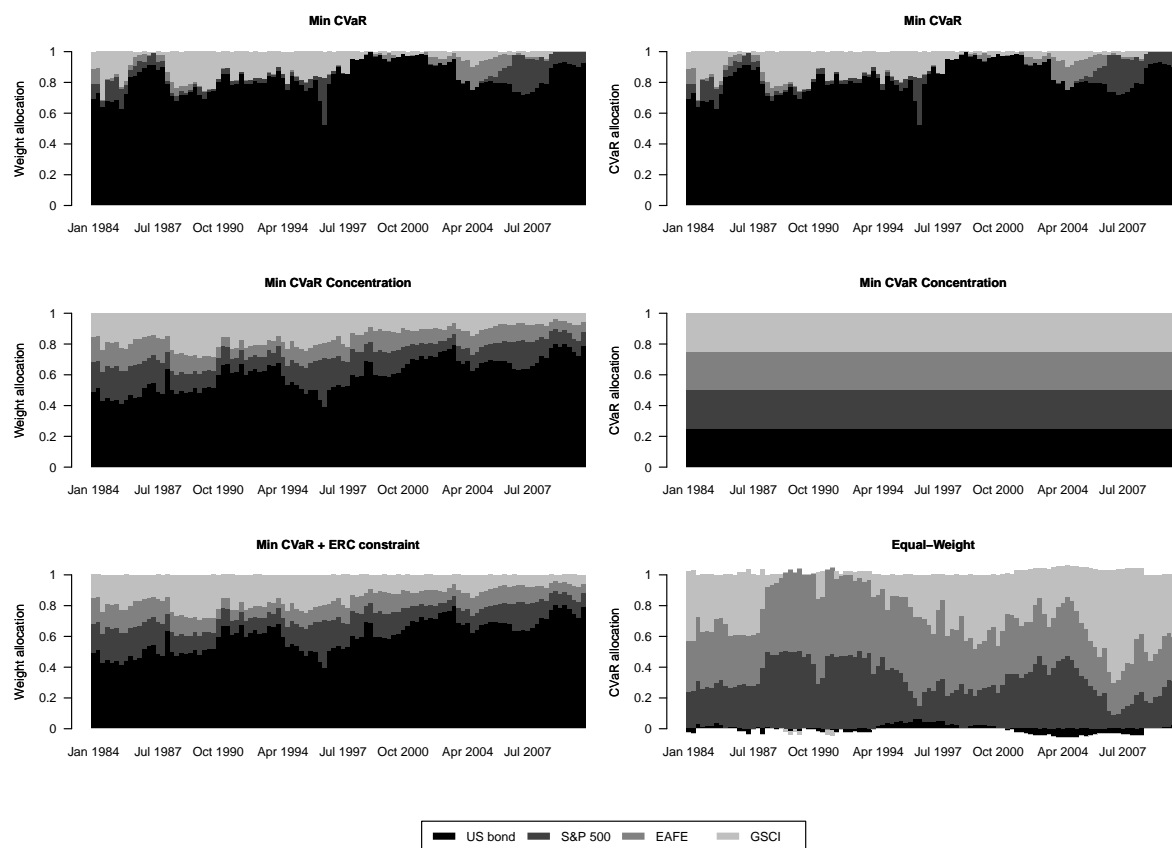


Exhibit 6: Monthly CVaR of the equal-weight and risk budget optimized portfolios invested in the Merrill Lynch US bond, S&P 500, MSCI EAFE and S&P GSCI indices. The portfolios are rebalanced quarterly. The shaded regions indicate a bear market regime.

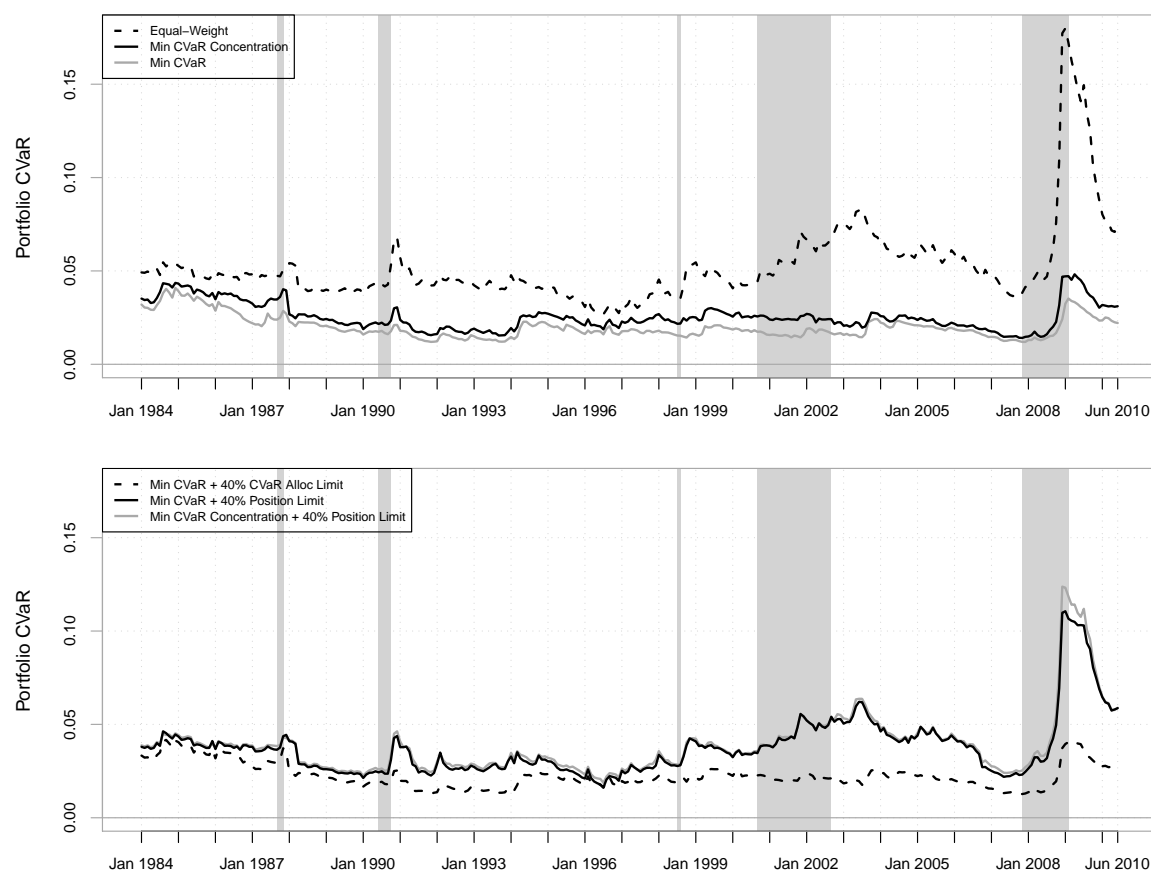


Exhibit 7: Relative performance of the risk budget optimized portfolios versus the equal-weight portfolio invested in the Merrill Lynch US bond, S&P 500, MSCI EAFE and S&P GSCI indices. The portfolios are rebalanced quarterly. The shaded regions indicate a bear market regime.

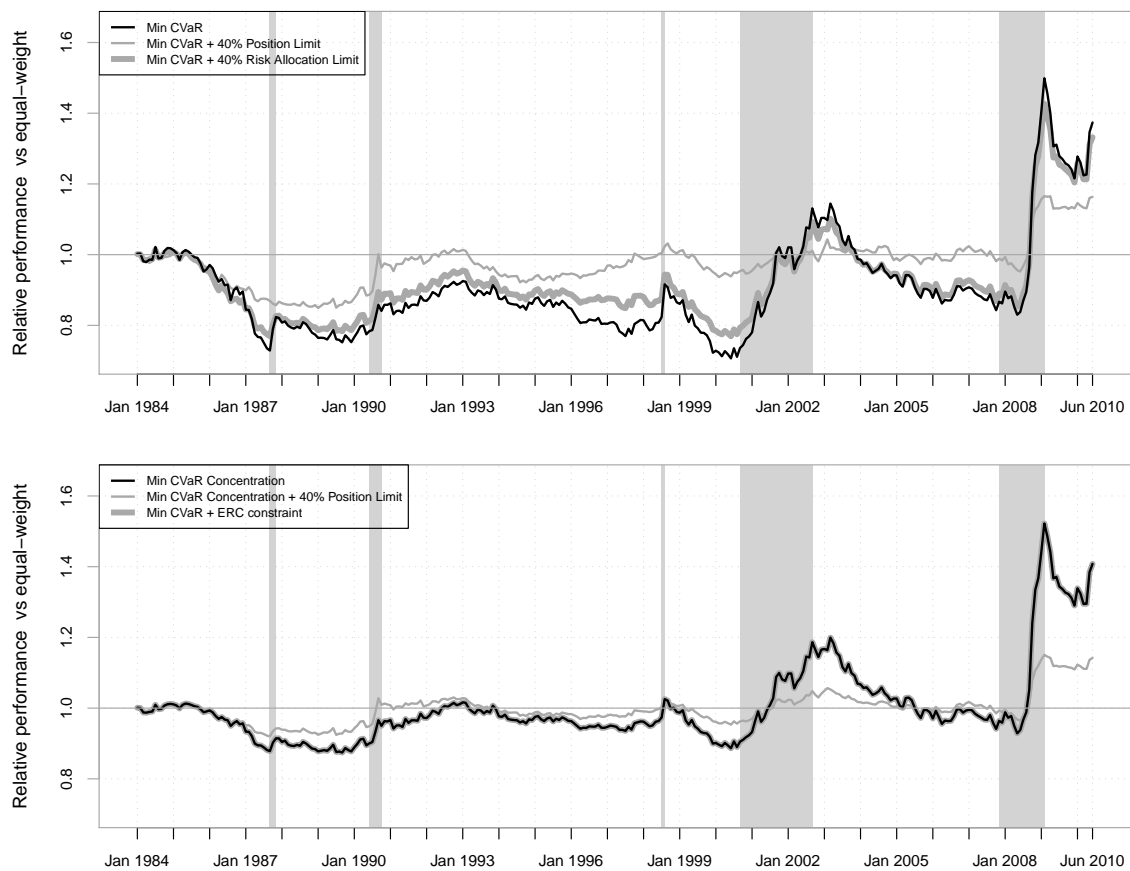


Exhibit 8: Summary statistics of monthly out-of-sample returns on investment strategies over the period January 1984 - June 2010.

		Equal Weight	Min CVaR			Min CVaR Concentration		
			40% Position Limit	40% CVaR Alloc Limit	ERC	40% Position Limit		
<i>Full period (in %)</i>								
Ann. Mean		7.32	8.07	7.72	7.99	8.22	8.23	7.63
Ann. StdDev		10.42	4.53	8.77	5.35	5.78	5.78	8.46
Monthly Hist CVaR		7.42	2.34	6.15	2.95	3.35	3.35	5.91
Portfolio turnover		1.26	2.14	3.55	2.64	1.74	1.74	1.51
<i>Bear stock market (in %)</i>								
Ann. Mean		-24.36	6.31	-17.29	-0.61	-3.81	-3.79	-16.51
Ann. StdDev		15.46	6.00	13.03	7.10	7.44	7.44	12.58
Monthly Hist CVaR		13.71	3.30	11.05	5.37	6.28	6.27	10.80
<i>Normal/Bull stock market (in %)</i>								
Ann. Mean		13.37	8.40	12.50	9.63	10.52	10.52	12.24
Ann. StdDev		8.08	4.20	6.92	4.81	5.16	5.16	6.67
Monthly Hist CVaR		4.09	2.04	3.50	2.27	2.38	2.38	3.38
<i>Drawdowns higher than 10%</i>								
Credit crisis*		0.48	0.09	0.37	0.13	0.15	0.15	0.38
Dot-com bubble burst**		0.25		0.19				0.17
Asian-Russian crisis***		0.12						
Black Monday****		0.11		0.12				
<i>Summary statistics on level and concentration of portfolio losses exceeding 10%</i>								
$-w_t' r_t$	median	0.16	0.11	0.13	0.12	0.12	0.12	0.12
	max	0.22	0.17	0.21	0.15	0.14	0.14	0.19
$\max_i \frac{(w_{(i)t} r_{(i)t})}{w_t' r_t}$	median	0.43	0.97	0.51	0.85	0.83	0.83	0.58
	max	0.45	1.02	0.74	0.97	0.92	0.92	0.66

* May-Oct 2008 for the Min CVaR strategy, June 2008-Feb 2009 for all other styles. ** Sep 2000-Sep 2002.

*** April-Aug 1998. **** Sep-Nov 1987.

Exhibit 9: Stacked bar weight and CVaR contribution plots for the constrained minimum CVaR portfolios invested in the Merrill Lynch US bond, S&P500, MSCI EAFE and S&P GSCI indices. The portfolios are rebalanced quarterly.

