

Performance Metrics for Hedge Funds

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Intro to Hedge Funds

Traditional Buy-Side:

- **Market Equilibrium: Supply = Demand**
- **No Short Sales**
- **Leverage is Bad**
- **Reduce Turnover**
- **Performance vs Market Benchmarks**

Hedge Funds:

- **None of the Above**
- **Hard to evaluate *ex ante***
- **Hard to evaluate *ex post***
 - **No benchmarks**
 - **Return is not a sufficient statistic**
 - **Low Vol & Low Corr also count**

Example

Investments	Return per year r %	Volatility Per year σ %	Sharpe Ratio $(r-r_f)/\sigma$	Correlations		
				Bonds	Stocks	Hedge Fund
Lehman Bond Index B	6.02	3.29	0.30	1		
SP500 Stock Index S	20.42	17.64	0.87	0.192	1	
Hedge Fund HF	10.31	7.40	0.71	-0.138	0.094	1
PensionFund $PF=0.6S+0.4B$	14.66	10.91	0.88			
Portfolio $P=0.8 PF+0.2 HF$	13.78	8.96	0.98			

Exhibit 1. Performance statistics for several portfolios from of July 1, 1997 to June 30, 2000. The Sharpe ratio for a portfolio with return r and volatility σ is defined as $(r-r_f)/\sigma$, where $r_f=5.04\%$ is the riskless rate of return during the period. Pension Fund is a 60/40 combination of stocks and bonds. Portfolio PF is an 80/20 combination of the Pension Fund and Hedge Fund.

Example

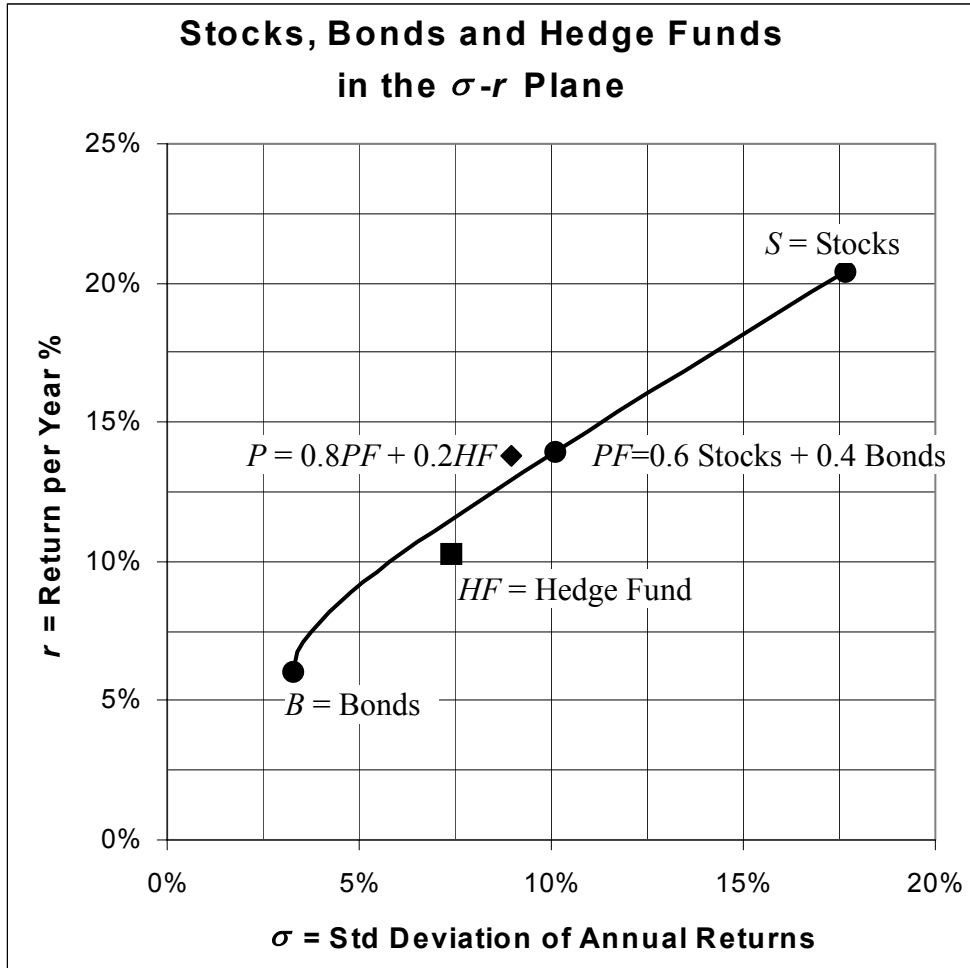


Exhibit 2. The Markowitz risk-return plane. Performance statistics span 7/1997 through 6/2000. The S&P 500 index represents stocks S ; the Lehman Aggregate Bond Index represents bonds B . HF is a hedge fund. Portfolio HF is a 60/40 mix of stocks and bonds. Portfolio P is an 80/20 mix of PF and HF . On the basis of reward-to-risk, the hedge fund is inferior to most stock-bond portfolios, while portfolio P is superior to most stock-bond portfolios.

The Appraisal Model

Assumption 1 *The capital market is Markowitz and includes cash, bonds and stocks. There are also hedge funds whose total capital under management is small.*

Assumption 2 *The population consists of savers, who keep their funds in cash, and investors, who invest in stocks, bonds and, possibly, hedge funds.*

Assumption 3 *There is a representative investor with quadratic utility*

$$Q = r - \lambda \sigma^2$$

r = return on investment

σ = volatility of return

λ = coefficient of risk aversion

The Appraisal Model

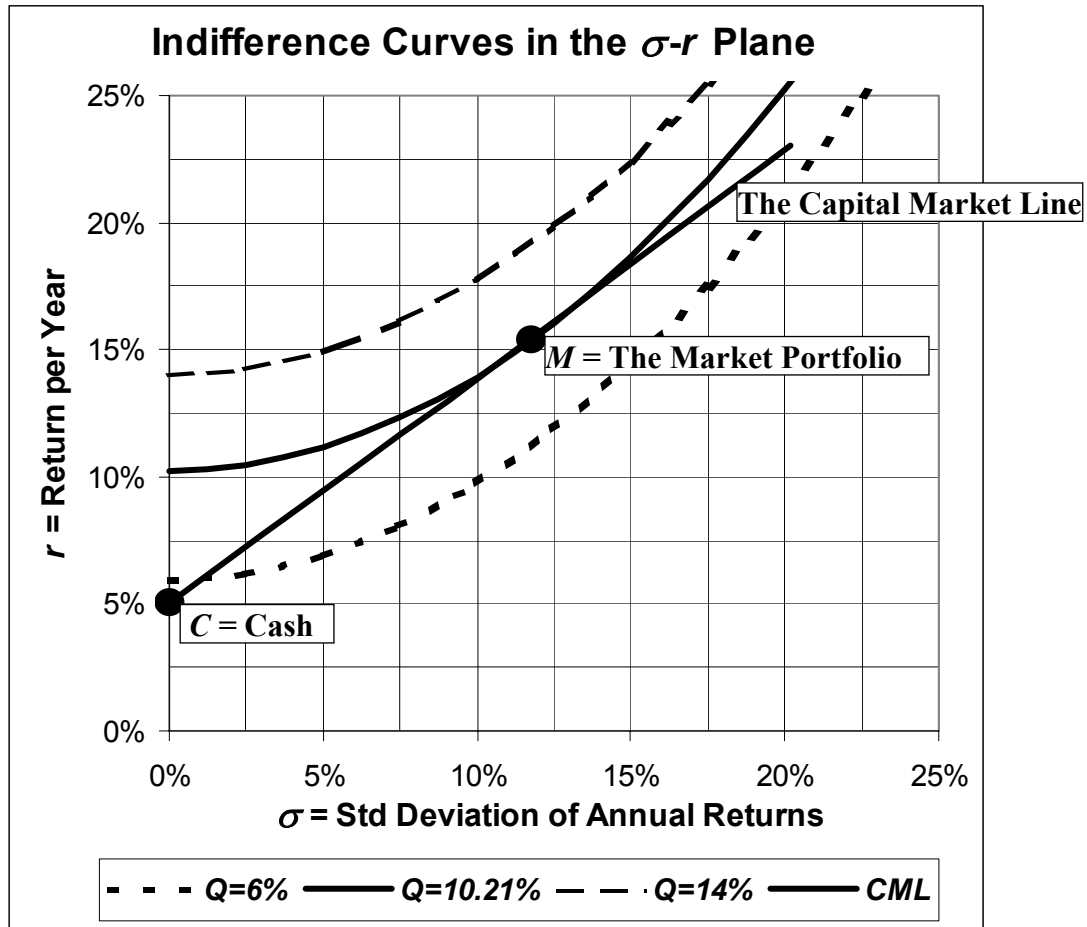


Exhibit 3. The risk-reward plane with three indifference curves $r=Q + \lambda\sigma^2$, where the risk aversion coefficient $\lambda=3.75$, and the constant utility $Q=6\%$, 10.21% and 14% . The Capital Market Line is a straight line through points C and M . Point C , $r_f=5.04\%$, $\sigma_f=0$, represents cash. Point M , $r_M=15.38\%$, $\sigma_M=11.74\%$, represents the market portfolio comprised of stocks and bonds. The statistics represent the annualized performance from 7/1997 through 6/2000.

The Appraisal Model

Proposition 1 *In equilibrium, the indifference curve of the representative investor is tangent to the capital market line at point M representing the market portfolio.*

Proposition 2 *The risk aversion of the representative investor is*

$$\lambda = \frac{r_M - r_f}{2\sigma_M^2}$$

Investments	Return per year %	Volatility per year %	Sharpe Ratio $(r-r_f)/\sigma$	Utility Q %
Cash C	5.04	0.00	0.00	5.04
Lehman Aggregate Bond Index B	6.02	3.29	0.30	5.61
S&P500 Stock Index S	20.42	17.64	0.87	8.75
Market Portfolio M	15.38	11.75	0.88	10.19
60/40 Pension Fund PF	14.66	10.91	0.88	9.85
Hedge fund HF	10.31	7.40	0.71	8.26
Portfolio $P=0.8 PF+0.2 HF$	14.37	9.62	0.97	10.89

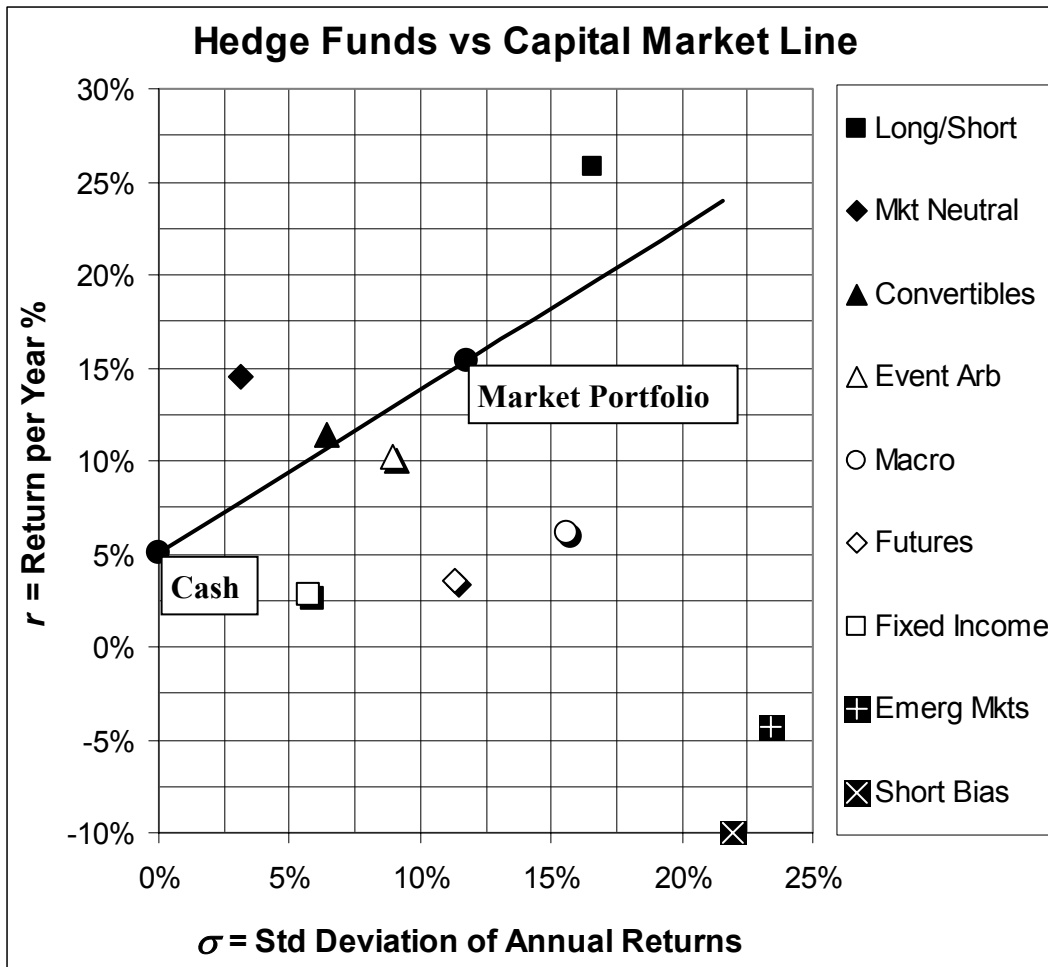
Exhibit 2. The performance of some investments from 7/1997 to 6/2000, including the annualized return, volatility and utility $Q=r-\lambda\sigma^2$ with the risk aversion $\lambda=3.75$. The utility Q ranks these investments differently than the return.

The Appraisal Model for Hedge Funds

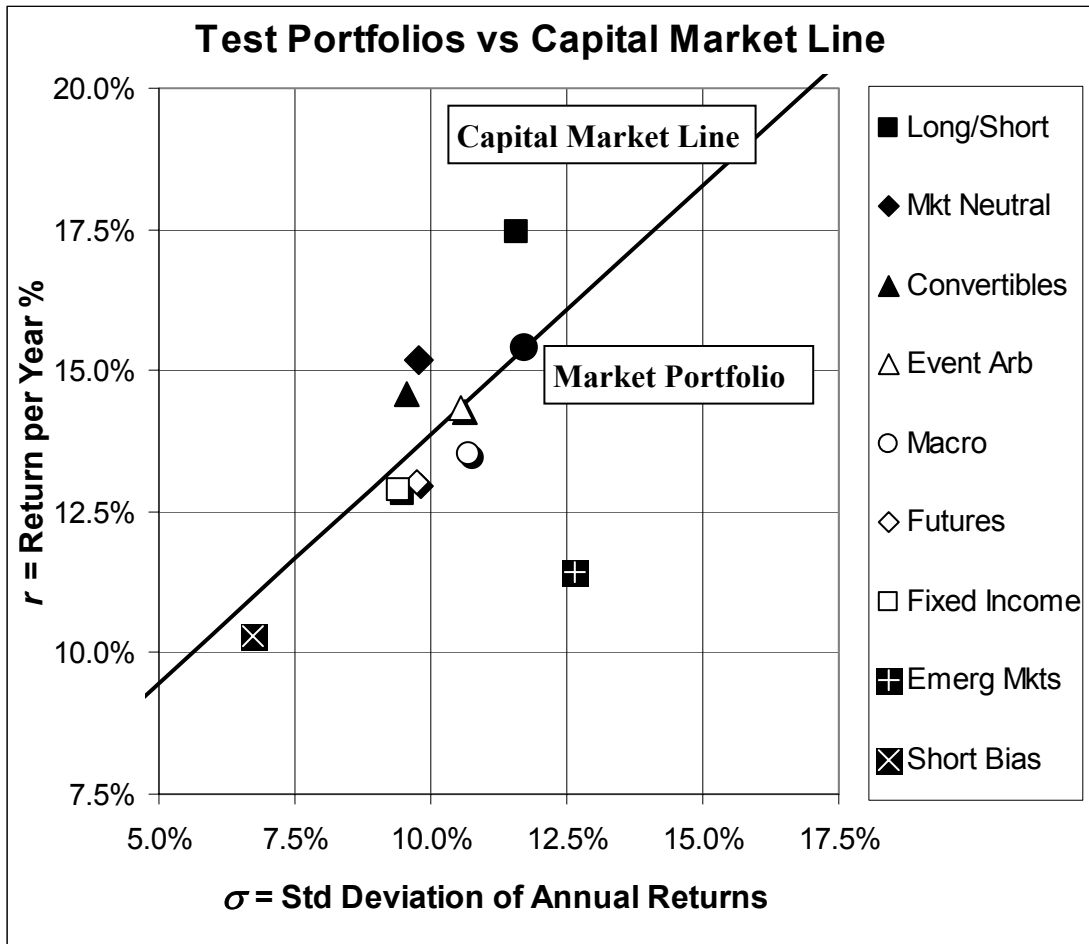
Definition *A test portfolio invests 80% in a market portfolio (65/35 stocks to bonds) and 20% in a hedge fund.*

	Return per yr %	Volatility per year %	Corr to Stocks	Corr to Bonds	Sharpe ratio	Q return per year %
Traditional Investments						
Stocks	20.42	17.64	1	0.192	0.87	8.75
Bonds	6.02	3.29	0.192	1	0.30	5.61
Cash	5.04	0.00	0	0	0.00	5.04
Market Portfolio	15.38	11.74	0.995	0.286	0.88	10.21
Hedge Funds						
Long/Short	25.80	16.60	0.561	0.107	1.25	15.47
Market Neutral	14.50	3.15	0.577	0.101	2.97	14.04
Convertible Arb	11.44	6.39	0.083	-0.126	1.00	9.91
Event Arb	10.18	8.97	0.608	-0.140	0.57	7.17
Macro	6.08	15.62	0.268	0.158	0.07	-3.07
Futures	3.60	11.31	-0.012	0.470	-0.13	-1.20
Fixed Inc Arb	2.81	5.77	-0.024	-0.149	-0.39	1.56
Emerging Mkts	-4.34	23.37	0.598	-0.144	-0.40	-24.82
Short Bias	-9.99	21.97	-0.768	-0.071	-0.68	-28.09
Test Portfolio = 0.8 Market Portfolio + 0.2 Hedge Fund						
Long/Short	17.46	11.58			1.07	12.44
Market Neutral	15.19	9.77			1.04	11.61
Convertible Arb	14.59	9.57			1.00	11.16
Event Arb	14.34	10.54			0.88	10.18
Macro	13.52	10.69			0.79	9.23
Futures	13.02	9.74			0.82	9.47
Fixed Inc Arb	12.87	9.42			0.83	9.52
Emerging Mkts	11.44	12.65			0.51	5.43
Short Bias	10.31	6.71			0.78	8.62

The Appraisal Model for Hedge Funds



The Appraisal Model for Hedge Funds



Summary

- *Appraisal of Hedge Funds = Test Portfolios + Q-return*
 - Time Horizon
 - Stock and Bonds Returns
 - Hedge fund return
 - Hedge fund volatility
 - Hedge fund correlation with stocks & bonds
 - Market Risk Aversion λ
 - Risk adjustment when computing Q
- *Standard Market Benchmark for Hedge Funds*