



6^a Jornada de Gestión de Riesgos Financieros Risk Lab

Investable Hedge Fund Indices and Funds of Hedge Funds in Optimal Passive Portfolios

by

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Outline

- **Comparing Investable HF Indices (IHF) to Funds of HF (FoHF)**
- **Motivation for Alternative Investments**
- **Selection of Investment Proxies and data Sources**
- **Data Conditioning and Performance of Portfolio Constituents**
- **Optimization Framework – Scenarios:**
 - **Historical**
 - **Market Equilibrium**
 - **Market Equilibrium + Personal Views**
- **Results & Conclusions**



IHF versus FoHF

- **Objective: Facilitate access to skills of fund managers**
- **Launch of IHF indices**
 - S&P May 2002, followed by HFR, CSFB/Tremont, MSCI
 - Composite/ Strategic
 - Transparency/ Selection criteria
 - Investment vehicles based on IHF (Index linked bonds, swaps, structured products)
 - Size: \$20 billion
- **Question: Is IHF selection more efficient/ less costly than by FoHF managers?**
 - Context of growing size and competition



Scope of Research

- **Seek position of IHF and FoHF proxies in optimal portfolios**
 - **Passive Equity + Bond holdings**
 - **Other alternative investments:**
 - **Commodity**
 - **Volatility**
- **Various Risk Adjusted Performance Measures (RAPM) to cope with 'non-normality' of returns**
- **A range of expected return scenarios**



Motivation for AI

- **Market for Alternative Investments (AI) and key features**
- **Hedge Funds**
 - High Sharpe ratios + good diversification
 - But negative skewness and high kurtosis?
[Fung & Hsieh (97), Rinaldo & Favre (2004), Kat (2005), Black (2006)]
- **Commodities (Derivatives)**
 - Good diversification; cyclical [Greer (1978), Bodie (1983), Ankrim & Hensel, (1993), Anson (1998), Gibson (1999), Akey (2005)]
- **Volatility (Derivatives)**
 - Poor returns, high volatility (of vol) but negative correlation with equities [Alexander (2004), Black (2006)]
- **Others: Private Equity, Property**



Selection of Investment Proxies

- **Equity: S&P 500**
 - US bias yet representative; match with volatility index
- **Bond: Lehman Brothers Global Aggregate Bond Index**
 - Broad (govvies, corporate, credit & MBS)
 - US\$ fully hedge (NB: Siegel's paradox)
- **Volatility: VIX**
 - 30 day vol. index on S&P 500; reference for futures, options, variance swaps
 - Liquidity only recently picked up



Selection of Investment Proxies

- **Commodity: Reuters-CRB**
 - 17 commodities, equally weighted
- **IHF: S&P**
 - Data since Sept 2002
 - Representative: similar to CSFB/Tremont, MSCI and HFRX
 - A basket would bring unwarranted diversification
- **FoHF: Homemade notional**
 - No single representative FoHF
 - Create a basket of $30 + 8 + 7 = 45$ FoHFs from Eureka database
 - Adjust for average volatility of FoHF



Data Conditioning

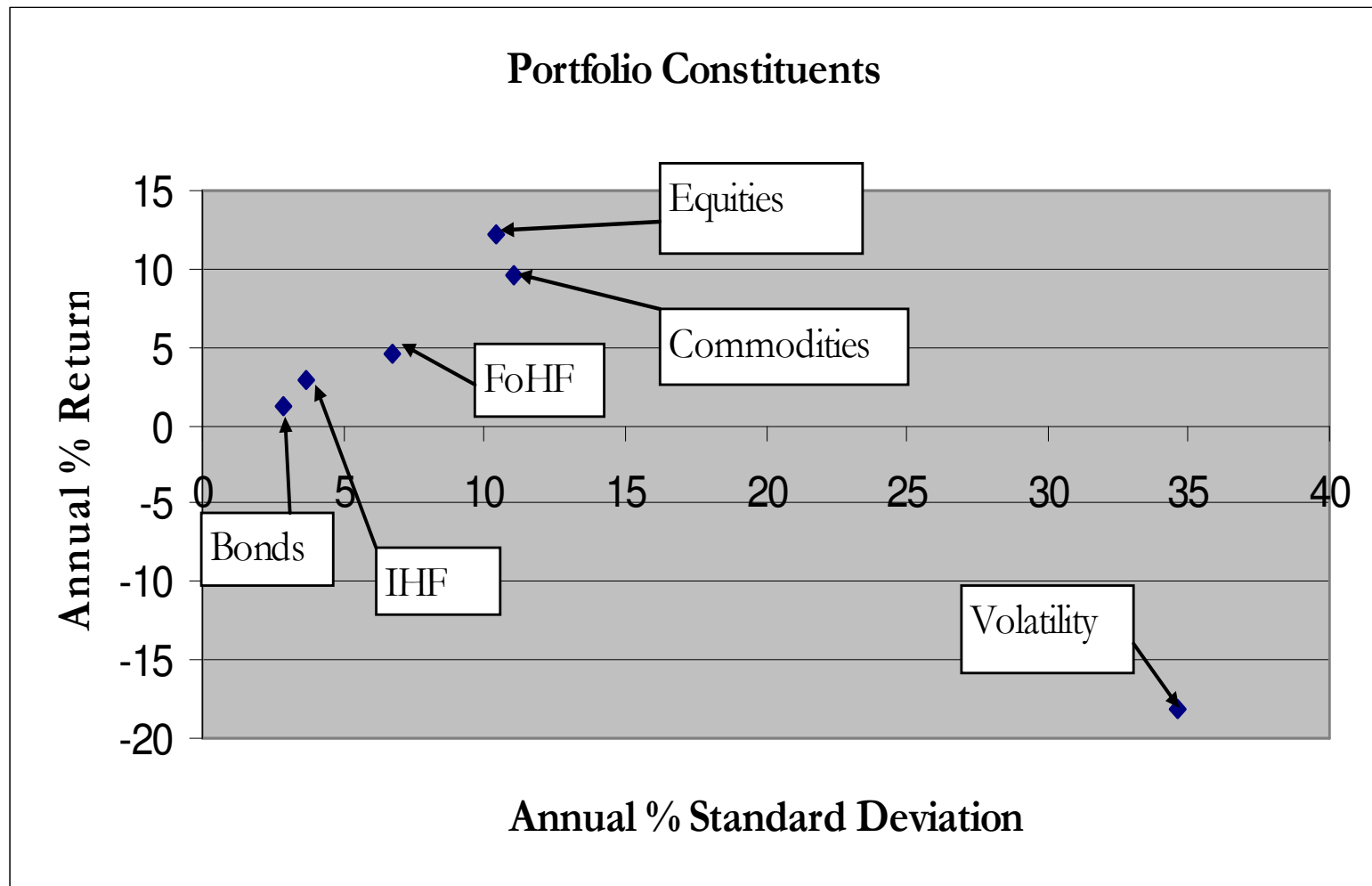
- **Trading Costs**
 - IHF investment vehicles: subscription, management & redemption fees \Rightarrow 2% p.a. over 2 years
 - FoHF: Some with redemption fees \Rightarrow 0.5% p.a. over 2 years
 - Others: Negligible transaction fees
- **Serial Correlations (monthly)**
 - IHF (+0.37), FoHF (+0.33), Volatility (-0.32)
 - Should not be significant in liquid, efficient markets
 - De-autocorrelate using Blundell-Ward filter based on AR(1) assumption for observed returns
- **Excess returns over US T-Bill**



Performance of Constituents

Excess Returns	Equity	Bond	Volatility	Commod	IHF	FoHF
Mean	12.16%	1.27%	-18.18%	9.63%	2.85%	4.64%
StDev	10.45%	2.89%	34.61%	11.10%	3.73%	6.76%
Skewness	0.11	-0.09	0.26	-0.14	-0.04	-0.17
Kurtosis	0.02	0.01	0.12	0.00	-0.06	-0.03
Sharpe R	1.16	0.44	-0.53	0.87	0.76	0.69
1m Autocorr	0.12	0.10	-0.32	-0.01	0.37	0.33

Risk Return Profiles





Correlation Matrix

	Equity	Bond	Volatility	Commodity	IHF	FoHF
Equity	1.00					
Bond	-0.15	1.00				
Volatility	-0.57	0.04	1.00			
Commodity	0.08	0.09	-0.15	1.00		
IHF	0.53	0.23	-0.41	0.50	1.00	
FoHF	0.47	0.20	-0.42	0.45	0.75	1.00



Optimization Framework

- **The Three Expected Return Scenarios**
 - Historical (45 months)
 - Market Equilibrium (Markovitz: $\Pi = \gamma.V.W$) + Determ. Scenarios
 - Market Equilibrium + Black-Litterman Scenarios
- **Why Markovitz mean-variance analysis little used?**
 - Unstable allocations
 - ‘Corner portfolios’
- **Solution:**
 - Market implied equilibrium forecasts
 - Consistent combination with personal views



Historical vs Equilibrium

Historical Scenario	Equity	Bond	Volatility	Commod	IHF	FoHF
Annual excess returns	12.16%	1.27%	-18.18%	9.61%	2.85%	4.64%
Annual volatility	10.45%	2.89%	34.61%	11.10%	3.73%	6.76%

	Equities	Bonds	Volatility	Commod	IHF	FoHF
Market Values (\$ bn)	40,460	62,767	0	16	20	426
Market Weights (%)	39.02%	60.53%	0.00%	0.02%	0.02%	0.41%

Equilibrium Scenario	Equity	Bond	Volatility	Commod	IHF	FoHF
Annual excess returns	3.65%	0.09%	-8.14%	0.27%	2.85%	4.64%
Annual volatility	15.59%	2.80%	59.35%	10.32%	3.73%	6.76%



Equilibrium + Personal Views

BL Posterior Return	Equity	Bond	Volatility	Commod	IHF	FoHF
Q1 - FoHF 5% : IHF 3%	7.24%	0.37%	-19.55%	2.57%	2.06%	3.57%
Q2 - FoHF 4% : IHF 2%	6.02%	0.27%	-15.85%	1.79%	1.53%	2.76%
Q3 - FoHF 3% : IHF 1%	4.81%	0.18%	-12.14%	1.02%	0.99%	1.94%
Q4 - FoHF 2% : IHF 0%	3.59%	0.08%	-8.44%	0.25%	0.45%	1.13%
Q6 - FoHF 1% : IHF 0%	3.22%	0.05%	-7.06%	0.01%	0.33%	0.71%
Q7 - FoHF 0% : IHF 0%	2.86%	0.02%	-5.68%	-0.22%	0.21%	0.29%

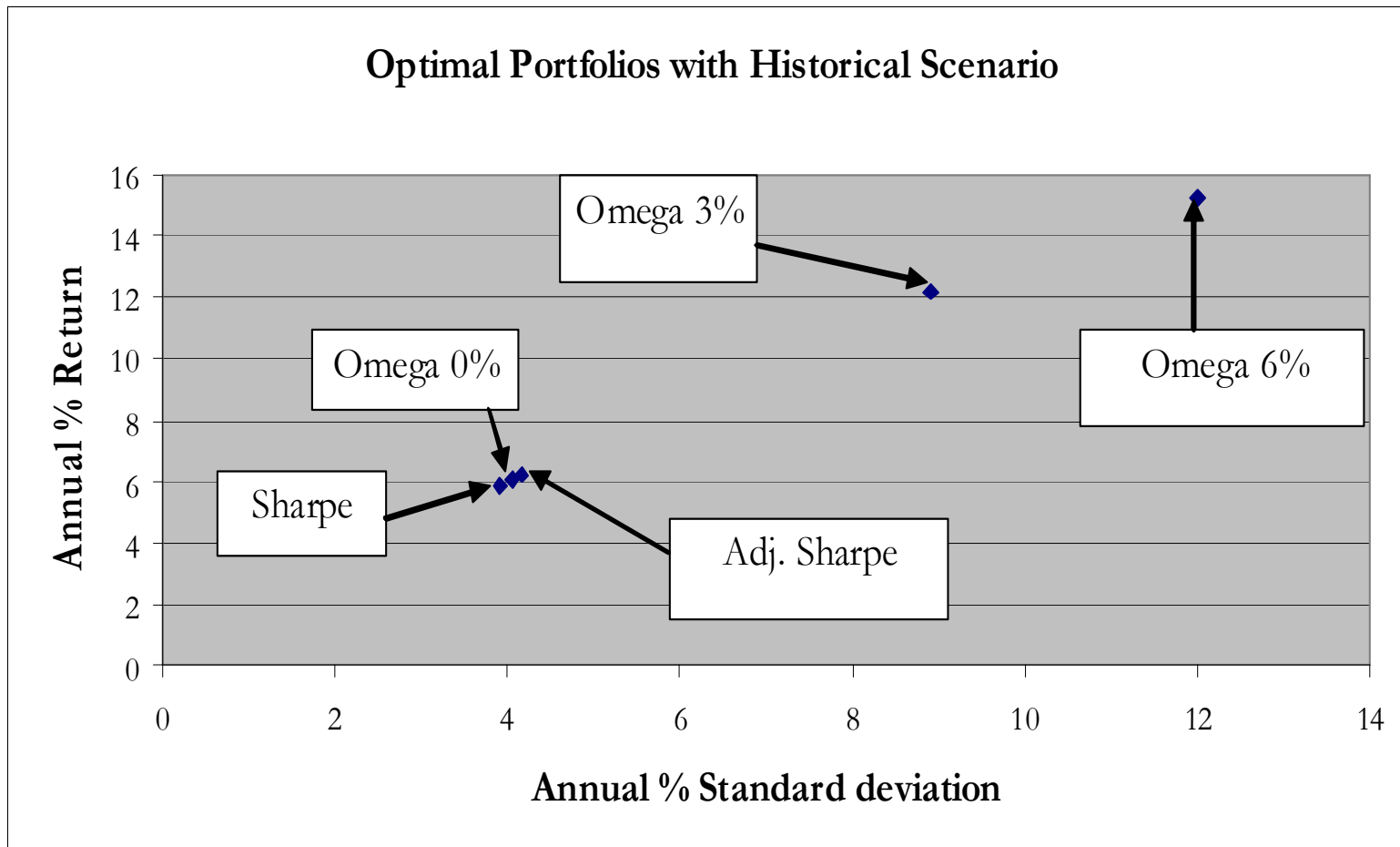
BL Parameters	Equity	Bond	Volatility	Commod	IHF	FoHF
Equilibrium returns	3.64%	0.09%	-8.13%	0.27%	0.54%	0.69%
Posterior Volatility	16.58%	3.01%	63.37%	10.98%	3.85%	6.98%



Optimal Allocations - Historical

Allocations	Equity	Bond	Volatility	Commod	IHF	FoHF
Omega (0%)	37.94%	45.52%	2.70%	13.84%	0.00%	0.00%
Omega (3%)	71.46%	-10.00%	0.33%	38.21%	0.00%	0.00%
Omega (6%)	78.39%	-10.00%	-10.00%	41.61%	0.00%	0.00%
Adj. Sharpe	37.03%	43.30%	2.44%	17.23%	0.00%	0.00%
Sharpe	34.25%	46.07%	2.70%	16.97%	0.00%	0.00%

Optimal Portfolios - Historical



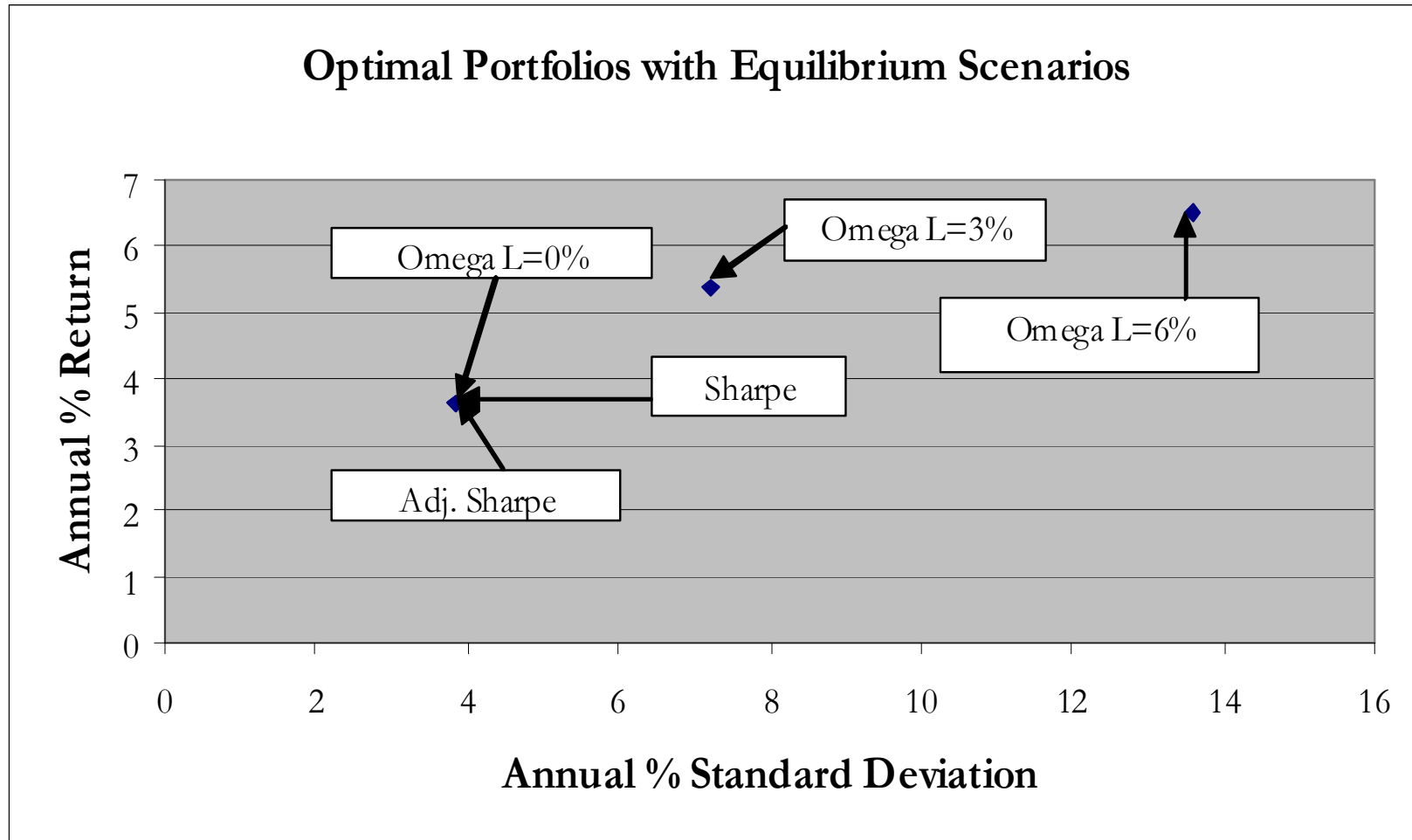


Optimal Allocations - Equilibrium

Allocations	Equity	Bond	Volatility	Commod	IHF	FoHF
Omega (0%)	-6.97%	-10.00%	1.59%	-10.00%	100.00%	25.38%
Omega (3%)	-10.00%	-10.00%	-2.58%	-10.00%	32.58%	100.00%
Omega (6%)	30.00%	-10.00%	-10.00%	-10.00%	0.00%	100.00%
Adj. Sharpe	-7.09%	-10.00%	1.61%	-10.00%	100.00%	25.48%
Sharpe	-6.74%	-10.00%	1.58%	-10.00%	100.00%	25.16%

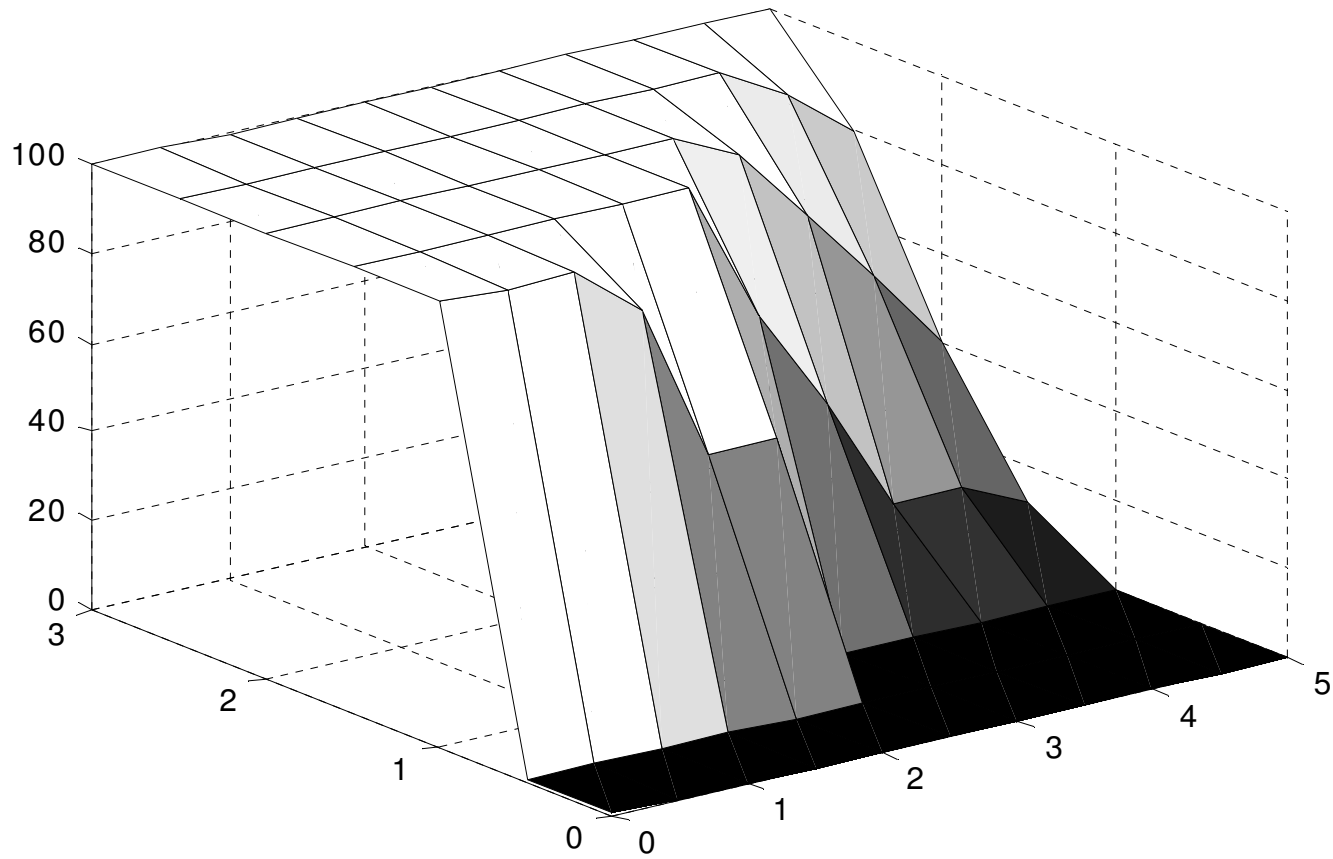


Optimal Portfolios - Equilibrium



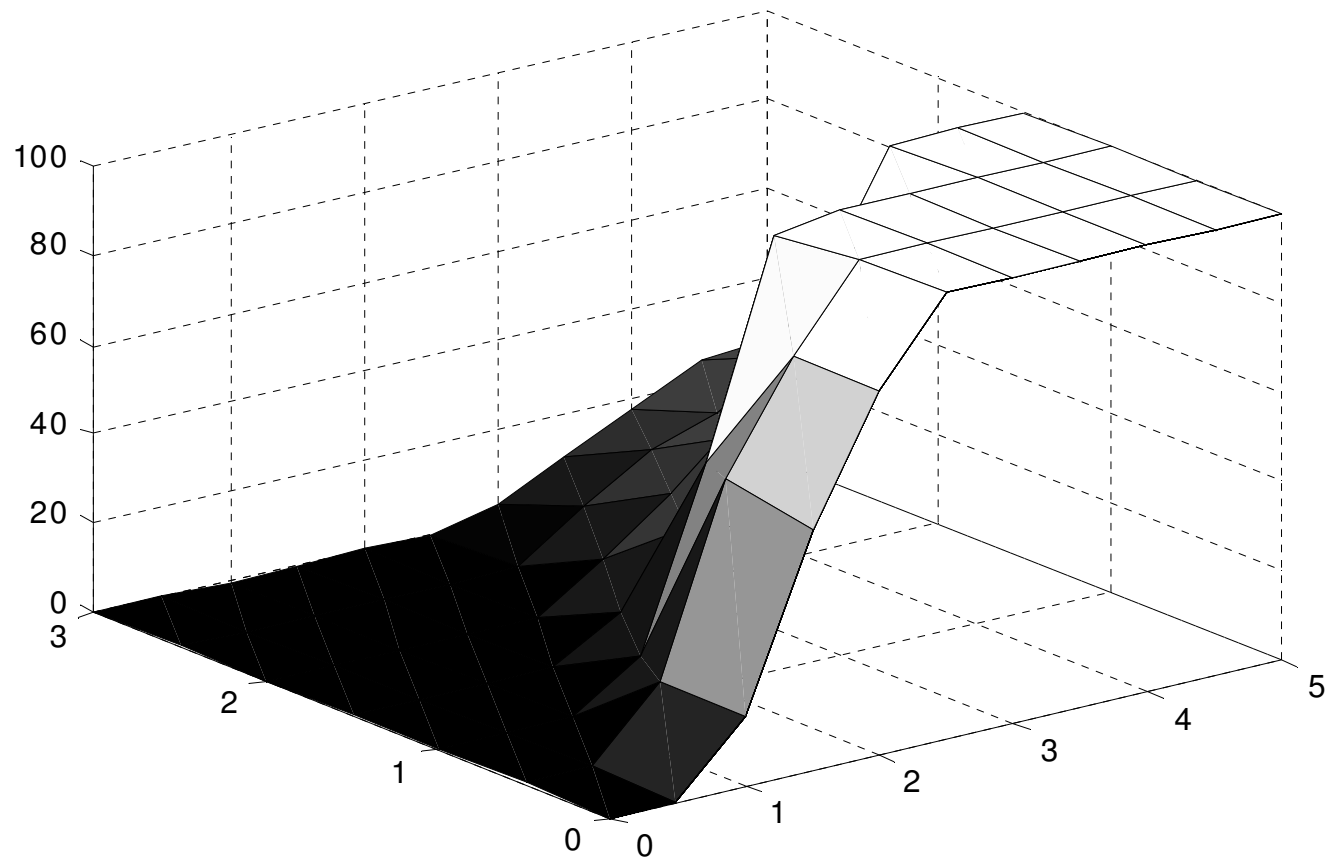


Det. Scenarios - IHF



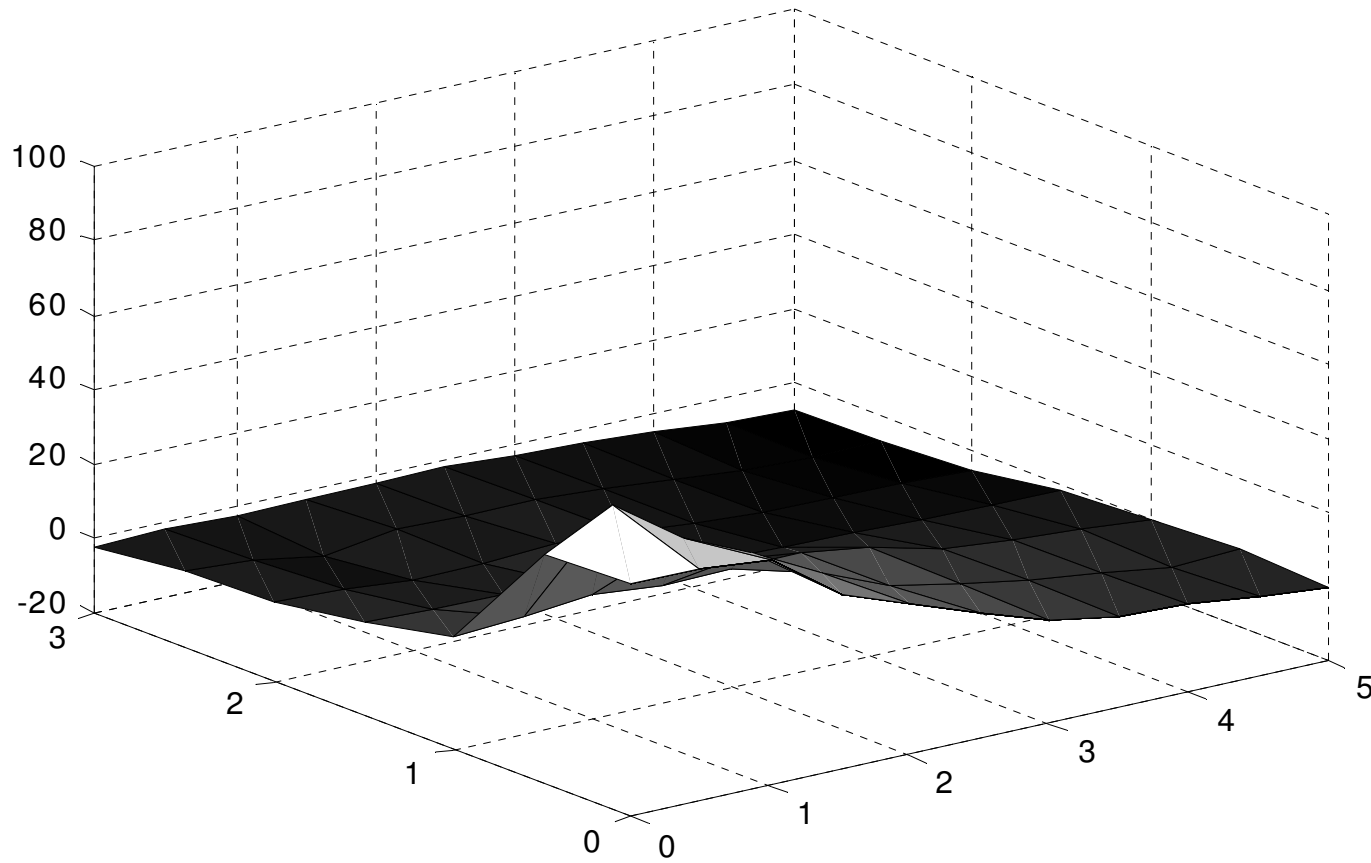


Det. Scenarios - FoHF



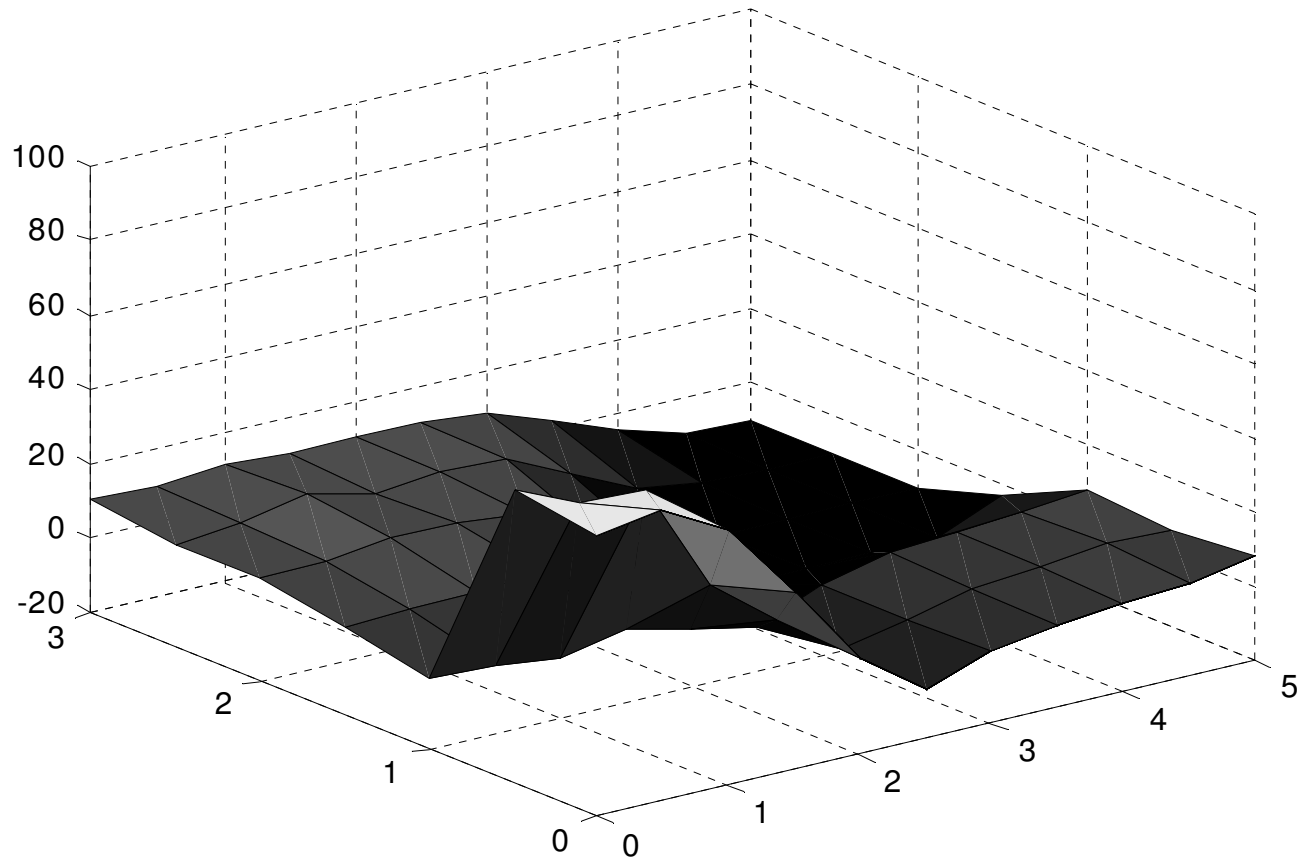


Det. Scenarios - Equity



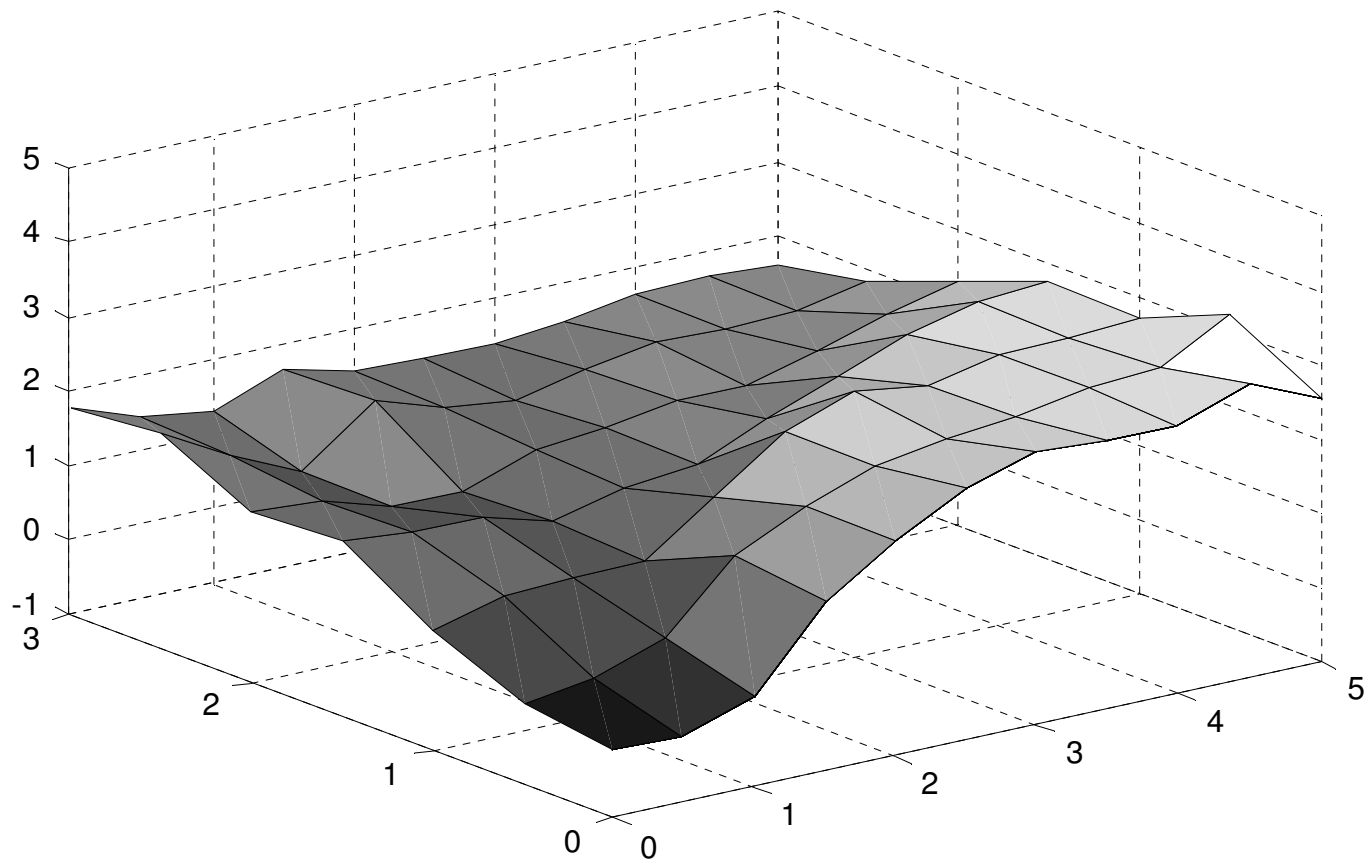


Det. Scenarios - Bonds



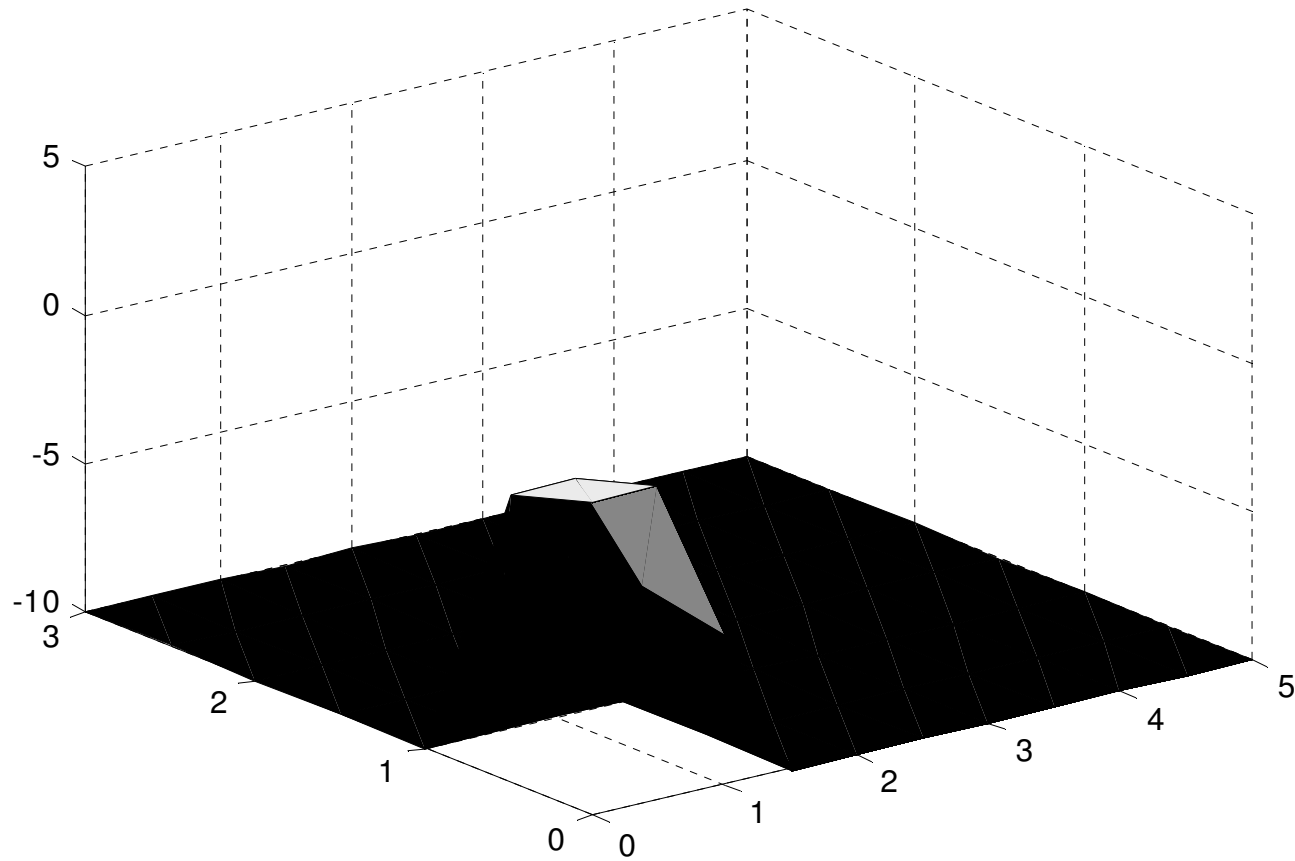


Det. Scenarios - Volatility





Det. Scenarios - Commodity

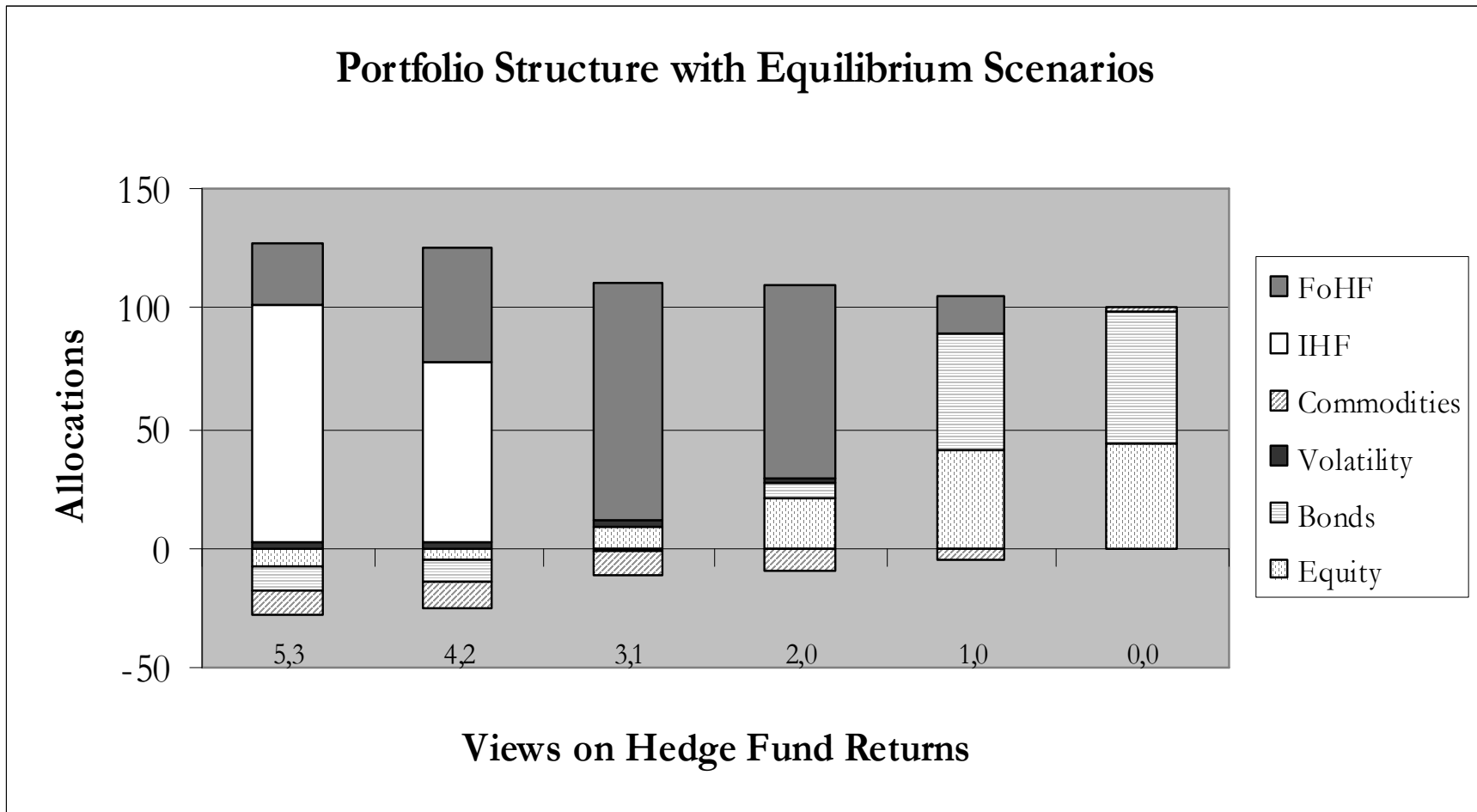




Det. Scenarios - Diagonal

Scenarios\Allocations	Equity	Bonds	Volatility	Commodities	IHF	FoHF
FoHF 5% : IHFI 3%	-7.82	-10.00	1.60	-10.00	100.00	26.2
FoHF 4% : IHFI 2%	-4.63	-10.00	1.79	-10.00	75.75	47.09
FoHF 3% : IHFI 1%	8.77	-1.35	2.57	-10.00	0.01	100.00
FoHF 2% : IHFI 0%	20.73	6.10	1.89	-9.99	0.00	81.28
FoHF 1% : IHFI 0%	40.89	48.53	0.21	-4.97	0.00	15.34
FoHF 0% : IHFI 0%	43.26	56.16	-0.05	0.63	0.00	0.00

Det. Scenarios - Diagonal

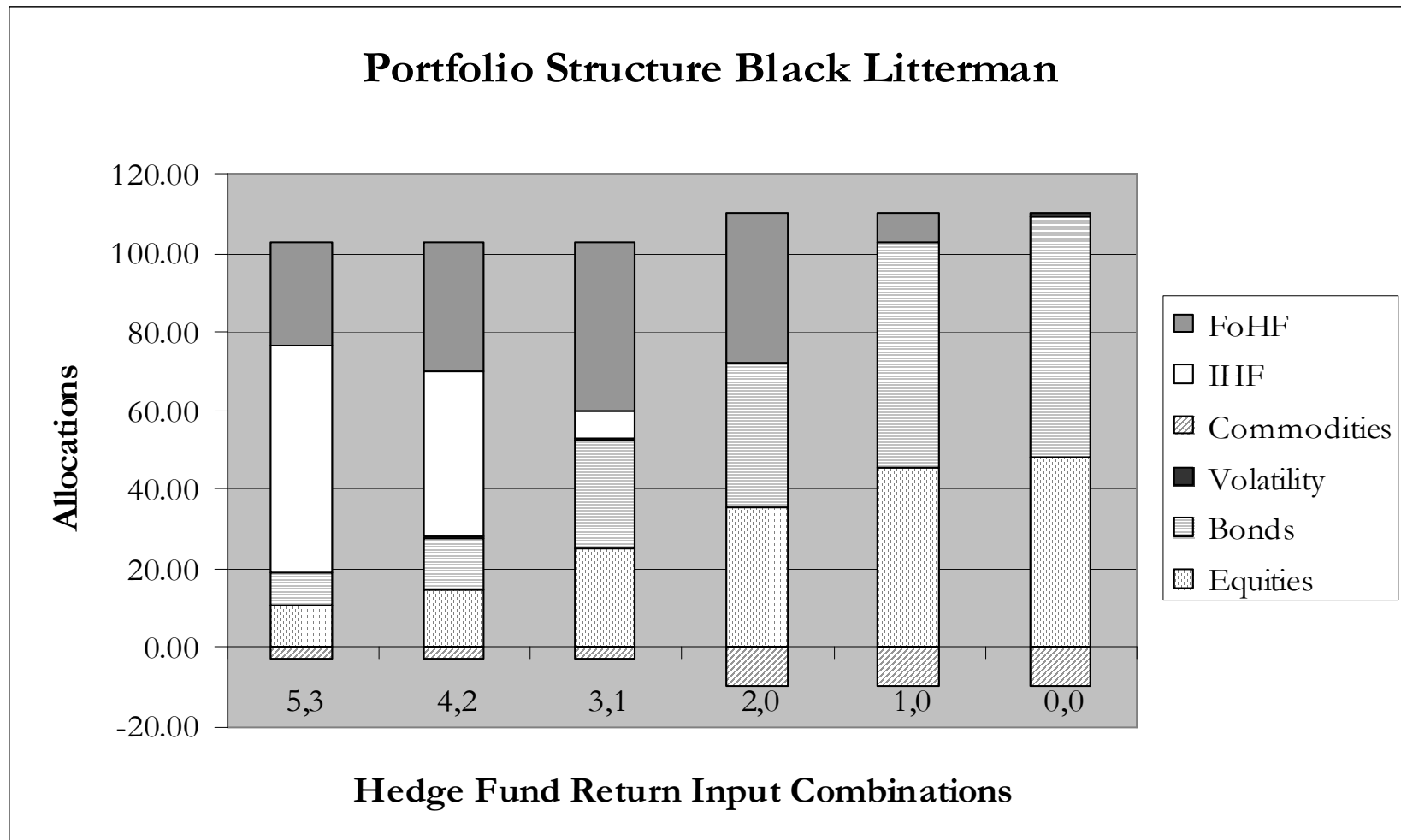




Black-Litterman Scenarios

Allocations	Equity	Bond	Volatility	Commod	IHF	FoHF
FoHF 5% : IHF 3%	10.69%	7.94%	0.16%	-2.40%	58.08%	25.53%
FoHF 4% : IHF 2%	14.85%	13.19%	0.14%	-2.43%	41.96%	32.29%
FoHF 3% : IHF 1%	25.23%	27.48%	0.30%	-2.79%	7.08%	42.70%
FoHF 2% : IHF 0%	35.47%	36.56%	0.30%	-10.00%	0.00%	37.67%
FoHF 1% : IHF 0%	45.94%	56.43%	0.11%	-10.00%	0.00%	7.52%
FoHF 0% : IHF 0%	48.17%	61.01%	0.82%	-10.00%	0.00%	0.00%

Black-Litterman Scenarios





BL Scenarios - Performance

Performance	PF. Retn	PF. Std	Skew	Xkurt.	Sharpe	ASR	Omega
FoHF 5% : IHF 3%	2.82%	4.80%	0.11	-0.14	0.59	0.62	0.19
FoHF 4% : IHF 2%	2.39%	5.23%	0.12	-0.13	0.46	0.47	0.18
FoHF 3% : IHF 1%	2.10%	6.21%	0.17	-0.07	0.34	0.35	0.21
FoHF 2% : IHF 0%	1.68%	7.19%	0.24	0.06	0.23	0.24	0.23
FoHF 1% : IHF 0%	1.55%	7.73%	0.33	0.16	0.20	0.20	0.24
FoHF 0% : IHF 0%	1.37%	7.63%	0.37	0.21	0.18	0.18	0.23



Empirical Conclusions

- **Both IHF and FoHF proxies should play an important role in enhancing passive bond/equity portfolios, if we think that their expected excess returns are of the order of 1% or more**
- **The IHF proxy has lower volatility** \Rightarrow preferred by conservative investors. **FoHF** may be preferred by investors with larger risk appetite
- **Long volatility positions are also likely to be valuable**; they are already in with unrealistically low expected returns
- **Commodities tend to be cyclical**, on the basis of current small expected returns, they should rather be shorted, but **investors must rely on their personal views**



Methodological Conclusions

- **Historical Scenarios are naïve**
 - Produce extreme allocations
 - Unstable to small changes in parameters
- **Equilibrium + Deterministic Scenarios**
 - Better starting point
 - But still instability to scenario changes
- **Black-Litterman Equilibrium + Uncertain scenarios**
 - More logical
 - More stable
 - Need to develop experience in assigning uncertainties



Key References

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Methodological Conclusions

