Presentation to QWAFAFEW

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Risk Budgeting for a Large Fund Sponsor

- High-Level Approach to Risk Budgeting
- Qualitative Emphasis versus Quantitative Details
- Practical Framework for Analysis/Decision-Making
- Large Fund Sponsor Example
- Discussion

Framework for Fund Sponsor Risk Budget

- Use of Bill Sharpe's Approach (FAJ, 2002)
- Use of Mean-Variance Procedures
- Reverse Engineering of Expected Returns
- Variance Decomposition Using Marginal Risks
- Incorporating Liabilities

Framework for Fund Sponsor Risk Budget

- Specification of Total Risk Budget
- Specification of Asset Categories
- Specification of Allocation Percentages
- Specification of Asset Category Benchmarks
- Specification of Investment Managers’ Benchmarks
- Specification of Investment Manager Allocation Policy

Specification of Total Risk Budget

- Responsibility of Fund Sponsor
- Financial Strength of Sponsoring Organization
- Asset/Liability Status of Fund
- Risk Tolerance of Fund’s Fiduciaries
- Importance of Fiduciary Risk Tolerance

Asset Categories and Allocations

- Determination of Number of Categories
- Result of Policy Asset Allocation
- Reflects Active and Passive Risk/Return
- Policy Weights Reflect Risk Weights
- Asset Category Benchmarks

Risk Budgeting and Performance Evaluation

Fund Sponsor ABC – Integrating *Policy*, Structure and Performance

Actual and Policy Asset Allocation (as of December 31, 2003)

Asset Category	Actual ($)	Actual (%)	Policy (%)	Benchmark
A. Domestic Equity	$5,061,454,145	34.94	35.00	Wilshire Investable
B. International Equity	$3,034,608,796	20.95	20.00	AC World Ex-US Free
C. Fixed Income	$3,391,297,593	23.41	25.00	75% Lehman Aggregate/ 25% Lehman High-Yield
D. Alternative Assets	$2,475,736,943	17.09	20.00	Alternative Asset
E. Short Term Cash	$14,214,861	0.10	0.00	90-Day US Treas Bills
F. Tactical Asset Allocation	$510,691,153	3.52	0.00	Custom
Total Fund	$14,488,003,491	100.00%	100.00%	

Benchmark Portfolio Functions

- Facilitate understanding of asset allocation policy / capital market risk
- Measure contribution of investment management process
- Formulate basis of accountability, responsibility and authority
- Assist implementation of investment management strategies
- Provide decision-making feedback to fund fiduciaries (quality control loop)

Risk Budgeting and Performance Evaluation

Fund Sponsor ABC – Integrating Policy, ***Structure*** and Performance

Asset Allocation Policy and Investment Structure (as of December 31, 2003)

Asset Category	Actual ($)	Actual	Policy	Benchmarks
A. Domestic Equity	$5,061,454,145	34.94%	35.00%	Wilshire Investable
Manager 1	1,218,606,452	24.08	25.00	Custom - Style Indx Comb
Manager 2	661,199,987	13.06	13.00	S & P 500 Index
Manager 3	1,518,615,434	30.00	30.00	Custom - Rtn Style
Manager 4	981,397,584	19.39	19.00	Custom - Security Based
Manager 5	681,634,689	13.47	13.00	Custom - Security Based
B. International Equity	3,034,608,796	20.95	20.00	AC World Ex-US Free
Manager 6	1,272,581,856	41.94	42.50	AC World Ex-US Free
Manager 7	1,265,097,048	41.69	42.50	EAFE
Manager 8	496,929,893	16.38	15.00	Emerging Markets - Free
C. Fixed Income	3,391,297,593	23.41	25.00	75% Leh Agg / 25% Leh Hi-Yld
Manager 9	1,008,150,232	29.73	27.00	Lehman Agg
Manager 10	635,345,588	18.73	23.00	Lehman Agg
Manager 11	856,037,397	25.24	25.00	Lehman Hi Yield Index
Manager 12	866,214,761	25.54	25.00	Custom - Mkt Indx Comb
Manager 13	25,549,616	0.75	0.00	Custom - Mkt Indx Comb
D. Alternative Assets	2,475,736,943	17.09	20.00	Alternative Assets
Managers 14-44	2,475,736,943	100.00	100.00	Custom
E. Short Term Cash	14,214,861	0.10	0.00	90 - Day US T- Bills
Manager 45	14,214,861	100.00	100.00	90 - Day US T- Bills
F. Tactical Asset Allocation	510,691,153	3.52	0.00	Custom
Manager 46	510,691,153	100.00	100.00	Custom
Total Fund	$14,488,003,491	100.00%	100.00%	

Investment Manager Structure

- Both Science and Art
- Inputs Include Both Historical Data and Expectations
- Allocations Reflect Manager Style/Value-Added
- Misfit Risk/Style Bias
- Allocation Tactics/Rebalancing Strategies

Risk Budgeting and Performance Evaluation

Fund Sponsor ABC – Integrating Policy, Structure and *Performance*

Performance Attribution - Total Fund

(January 1, 1989 to December 31, 2003)

Beginning Market Value = $2,961,167,923

	Impacts ($)	Cumulative ($)	Impacts (%)	Cumulative (%)
1. Net Contributions (Preservation of Capital)	$2,283,153,534	$5,244,321,457	0.00%	0.00%
2. Risk-Free Asset (Preservation of Purchasing Power)	4,063,661,865	9,307,983,322	4.79%	4.79%
3. Investment Policy (Real Return)	3,971,310,035	13,279,293,356	4.83%	9.85%
4. Style Bias (Mgrs Bnmks)	86,985,336	13,366,278,692	-0.10%	9.74%
5. Managers' Contribution (Value-Added)	1,130,338,131	14,496,616,823	1.31%	11.18%
6. Allocation Tactics (Rebalancing Strategy)	(8,613,331)	14,488,003,492	-0.11%	11.06%

Ending Market Value = $14,488,003,492

Payoff per Dollar ($) Mgmt Fee $2.37

Risk Budgeting and Performance Evaluation

Fund Sponsor ABC – Integrating Policy, Structure and *Performance*

Fund Sponsor ABC
Summary of Changes in Total Fund Net Assets
December 31, 2003 (180 Months)

Performance Impact ($) Within Asset Category	Investment Policy	Style Bias Mgrs Bnmks	Manager's Contribution	Total Impact
Domestic Equity	2,068,207,092	8,529,704	457,578,930	2,534,315,726
International Equity	243,491,003	36,951,301	555,880,692	836,322,996
Fixed Income	667,735,304	86,163,011	116,682,832	870,581,147
Alternative Assets	859,647,075	2,397,650	(69,021)	861,975,705
Short Term Cash	132,229,561	(47,056,330)	264,697	85,437,928
Tactical Asset Overlay	0	0	0	0
	3,971,310,035	86,985,336	1,130,338,131	5,188,633,501

Risk Budgeting and Performance Evaluation

Fund Sponsor ABC – Integrating Policy, Structure and *Performance*

Plan Sponsor ABC
Summary Of Plan Sponsor Allocation Tactics
December 31, 2003 (180 Months)

Performance Impact ($) Within Asset Category	Allocations To Asset Category	Allocations To Mgr Benchmarks	Allocations To Investment Mgrs	Total Impact
Domestic Equity	(71,151,357)	9,089,162	(1,424,500)	(63,486,694)
International Equity	61,928,712	(679,008)	(36,931,326)	24,318,378
Fixed Income	(32,908,411)	(2,083,034)	(3,697,636)	(38,689,081)
Alternative Assets	(87,997,669)	(1,584,997)	(1,311,737)	(90,894,403)
Short Term Cash	(22,263,348)	5,994,189	34,245,470	17,976,311
Tactical Asset Overlay	(124,836,626)	0	266,998,786	142,162,159
	(277,228,700)	10,736,312	257,879,058	(8,613,331)

Risk Budgeting and Performance Evaluation

Fund Sponsor ABC – Integrating Policy, Structure and *Performance*

Investment Performance - Total Returns, Value-Added Returns, Value-Added Dollar Impacts (Quarter ending December 31, 2003)

	Past Quarter			Past Year			Past 5 Years		
Asset Category	Total (%)	VAM (%)	VAM($m)	Total (%)	VAM (%)	VAM($m)	Total (%)	VAM (%)	VAM($m)
A. Domestic Equity	11.74	(0.91)	(43,693)	31.89	(0.85)	(48,233)	1.70	0.44	54,698
Manager 1	8.73	(2.36)	(29,284)	22.21	(3.64)	(50,650)	(2.08)	(1.61)	(85,276)
Manager 2	12.40	0.27	1,372	29.04	0.33	1,467	N / A	N/A	N / A
Manager 3	11.79	0.05	377	33.30	2.06	24,802	(4.12)	1.58	102,686
Manager 4	13.14	(1.32)	(11,201)	32.11	0.18	(2,803)	5.58	0.46	23,570
Manager 5	14.49	(0.58)	(3,888)	52.62	(3.94)	(19,446)	16.13	0.91	29,486
B. International Equity	15.50	(1.44)	(41,373)	37.32	(3.55)	(87,701)	6.33	3.92	344,429
Manager 6	15.48	(1.39)	(16,576)	35.34	(4.29)	(44,439)	1.59	0.04	13,169
Manager 7	15.45	(1.39)	(16,557)	33.75	(3.49)	(35,429)	8.32	8.38	312,007
Manager 8	15.70	(1.79)	(8,639)	53.62	(1.70)	(8,173)	N /A	N / A	N / A
C. Fixed Income	1.57	0.11	3,407	10.13	0.16	5,612	6.77	0.32	32,177
Manager 9	0.32	0.01	315	4.28	0.17	739	6.89	0.25	6,819
Manager 10	0.52	0.21	1,292	5.17	1.02	6,214	6.80	0.16	4,543
Manager 11	5.98	0.07	628	23.81	(4.00)	(26,969)	5.54	0.51	14,075
Manager 12	(0.42)	0.17	1,429	8.30	3.79	25,786	7.23	0.29	6,596
Manager 13	(0.54)	0	0	2.35	0	0	5.74	0	0
Total Fund	8.51	(0.59)	(80,363)	23.93	(0.99)	(129,609)	5.08	1.00	469,511

VAM = Value of Active Management

Summary/Conclusions

- Framework Facilitates Risk/Return Accountability
- Additive Dollar Impacts of Risks Taken
- Incorporates Variety of Risk Estimators
- Policy, Benchmark, and Manager Changes Easily Handled
- Measures Long-Term Success of Investment Program