
Integrating Two Diverse Styles of Investing: Quantitative and Fundamental

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Northfield's 15th Annual Conference

**May 7, 2002
Yosemite, CA**

Outline

- Introduction
- Role of Quantitative Analysis
- Building a quantitative platform
 - Alpha Generation
 - Optimization
 - Portfolio Construction
 - Performance Measurement & Monitoring Risk
 - Toolkit
- Summary

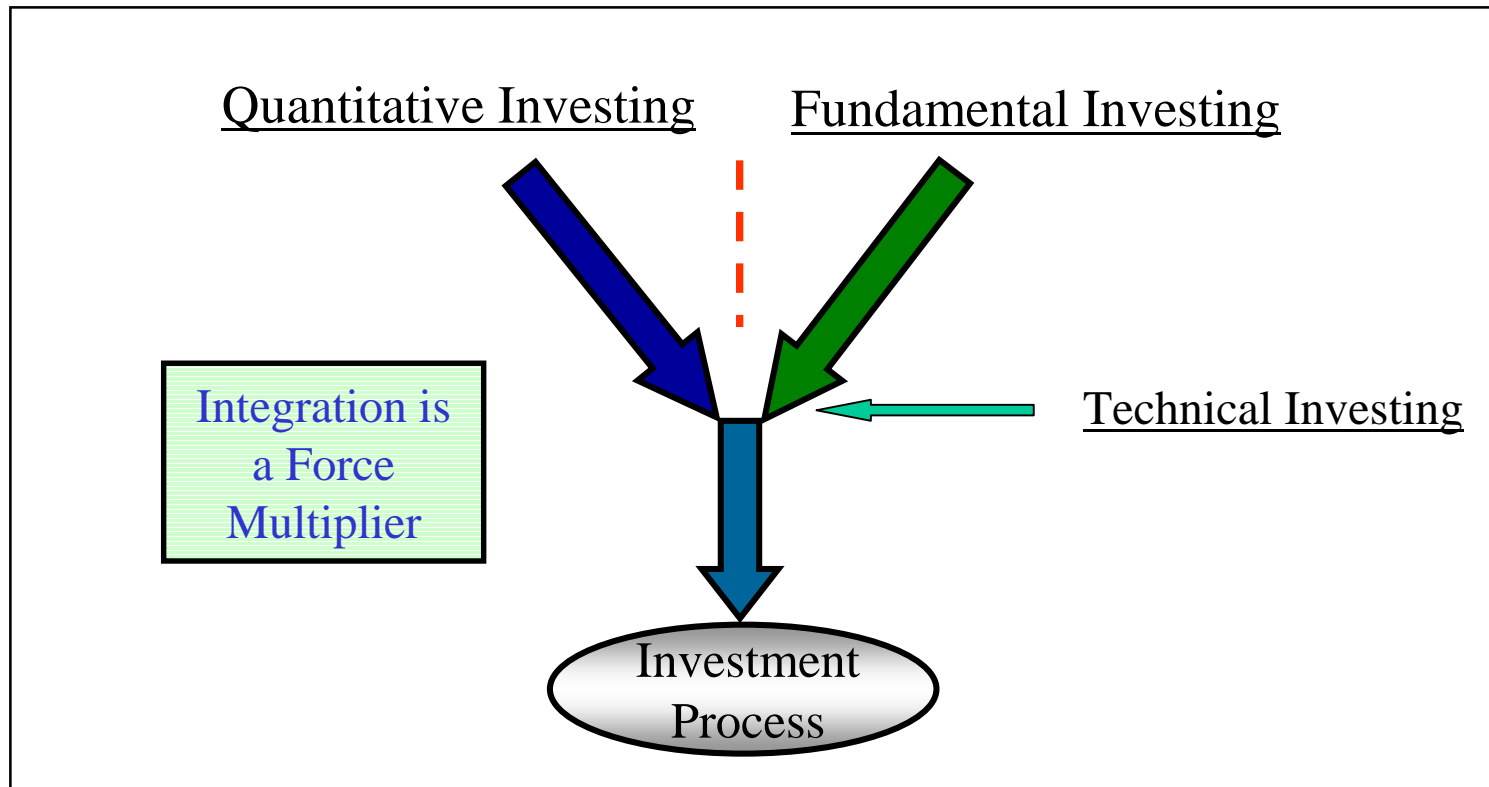
I. Introduction

Presentation draws in part from my experience in investment management as practiced in the U.S.

- Research and Engineering Models
 - Vestek Systems, San Francisco: Quantitative Analyst
- Research & Engineering Models and Communicating to Analysts & Portfolio Managers
 - Putnam Investments, Boston: Quantitative Analyst, VP
- Designing Models, Processes, & Trading
 - Gartmore Global Investments, Philadelphia-London: Director of Quantitative Investing
- Teaching and Research
 - Adjunct Finance Faculty at Golden Gate U. & Harvard University.

II. Role of Quantitative Analysis

- Harness and incorporate the power of quantitative theory into an active investment process.
- Portfolio construction and embedded alpha through the union of fundamental and quantitative processes.
- A quantitatively driven process as a marketing edge, not a hurdle.



Understanding Quantitative & Fundamental Investing

Quantitative Investing

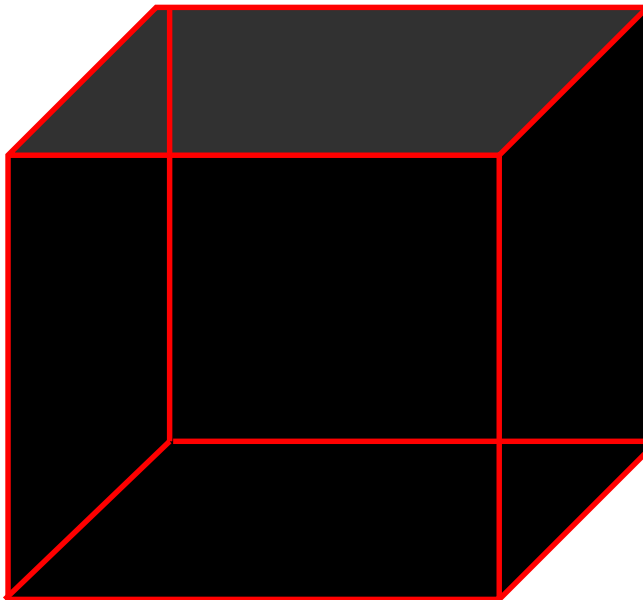
- Design model
- Engineer model
- Examine results
- Monitoring and attribution
- Risk management
- Alpha generation
- Optimization - risk and α
- Markowitz diversification
- Strategy diversification

Fundamental Investing

- Visit management
- Breakdown balance sheets
- News flow
- Industry forecasting
- Inspecting product pipeline
- Mergers and acquisitions
- Best idea focus list
- Simple diversification
- Thematic investing

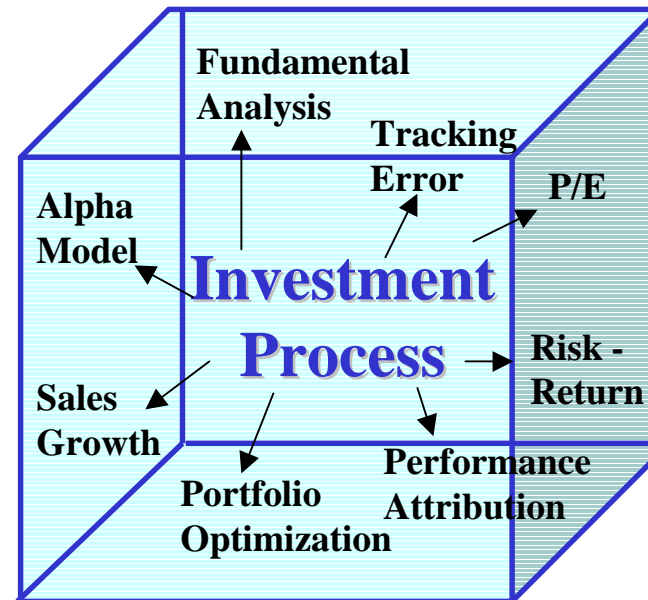
Glass Box Helps Bridge the Disciplines

BLACK BOX



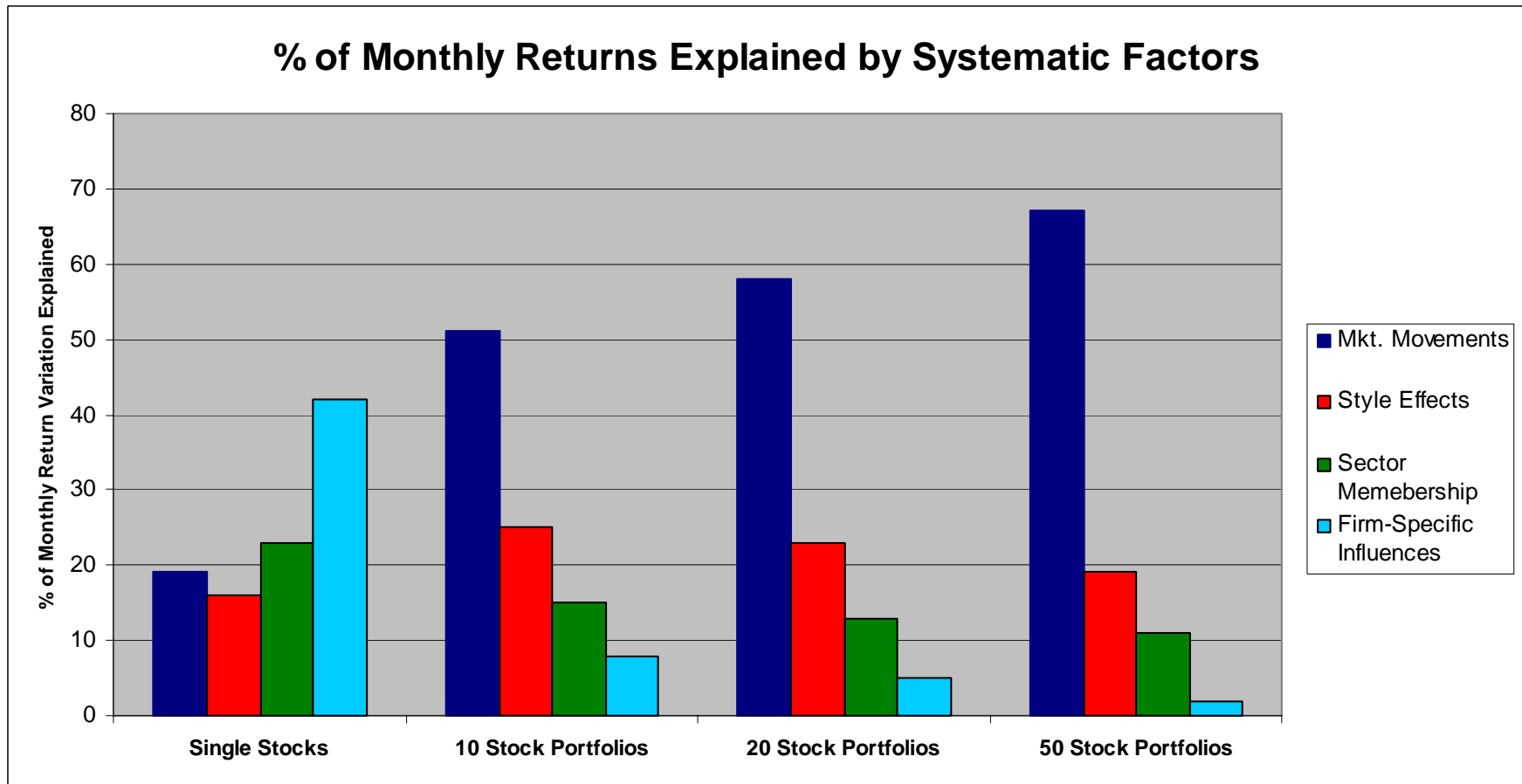
- What's going on?
- What's driving decisions?
- Is it flexible?

GLASS BOX



- Total Transparency
- Adaptive - Anticipatory
- Understandable - Reality Check

A Starting Point: Understanding High Impact Factors



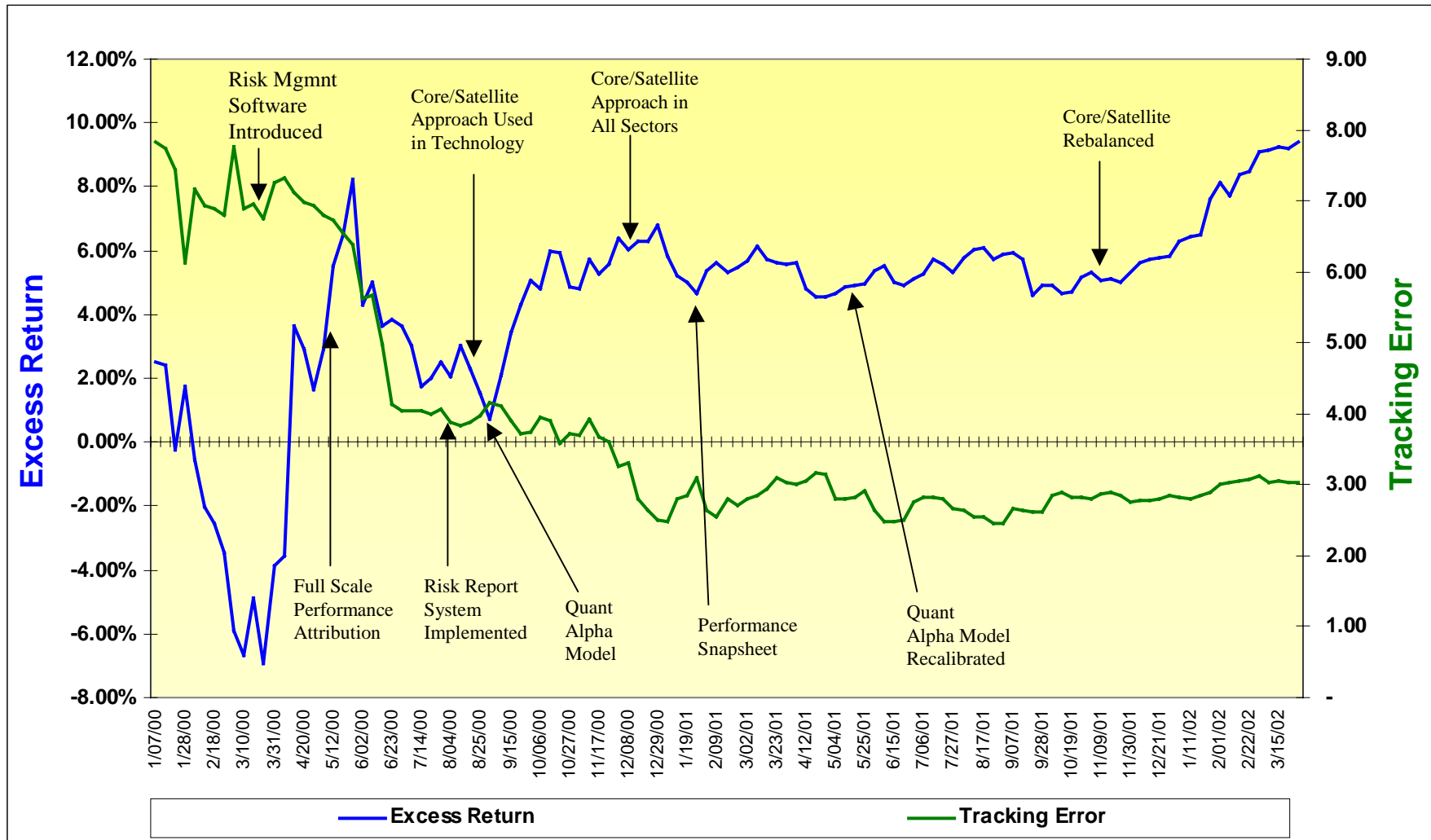
- Research and Model the High Impact Factors in the Alpha Generation and Portfolio Construction Process

- Leverage **market efficiency** to boost returns
- Model factors driving market and style returns

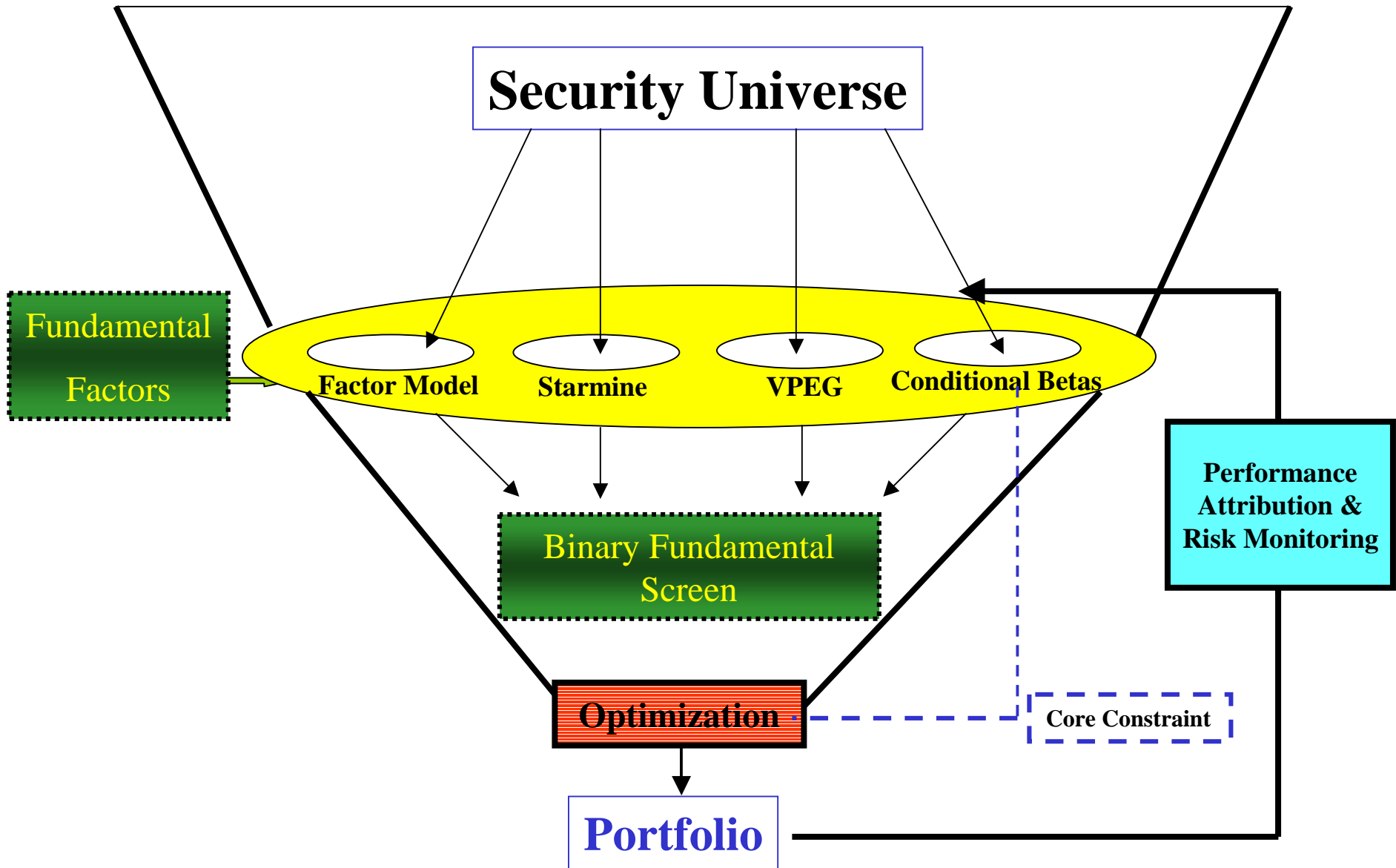
• *William Sharpe's Research*

• *CSFB Quant Research*

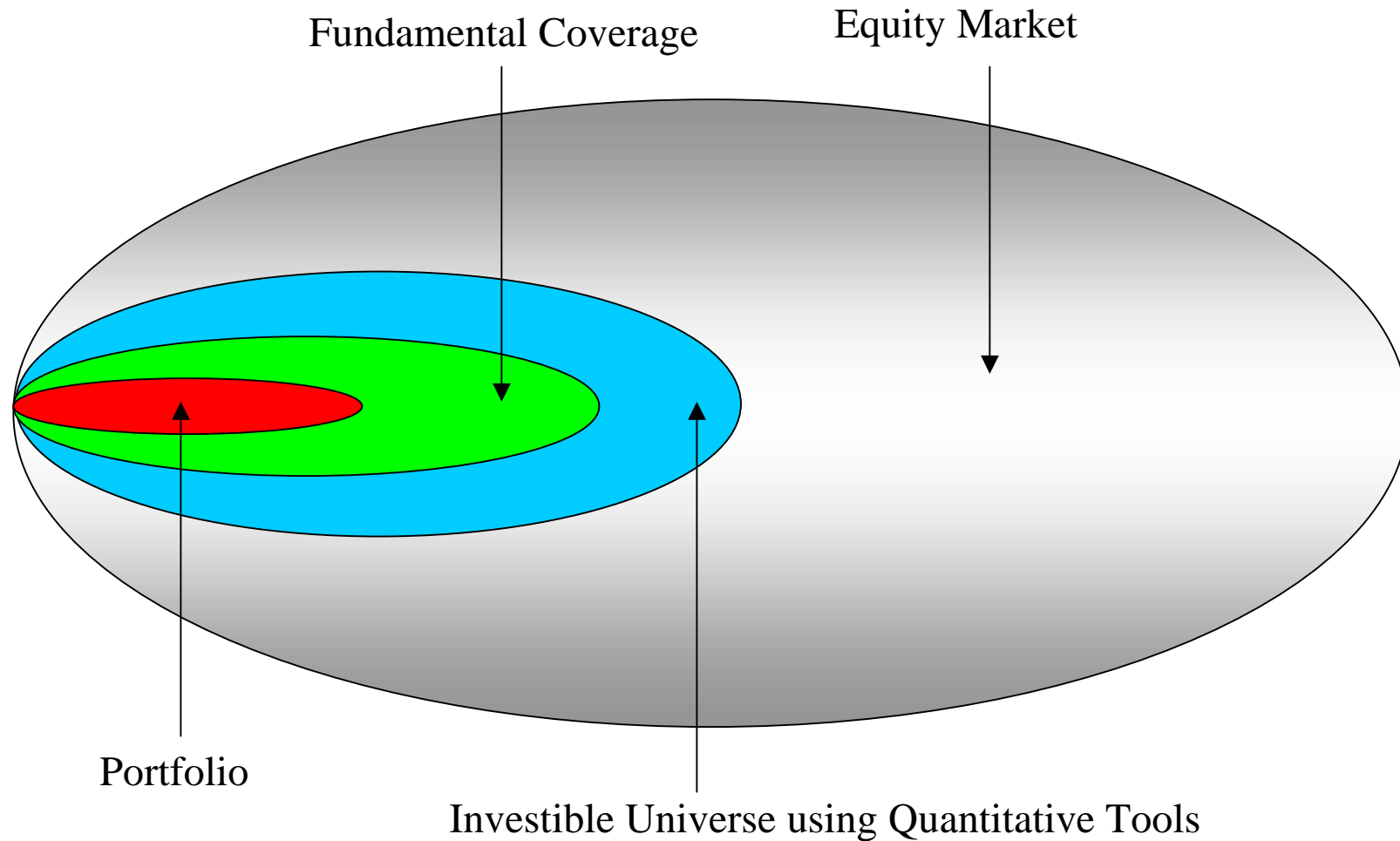
Objective of Integration: High Risk-adjusted Performance



III. Building a Quantitative Process - a Template



Alpha Modeling: Increasing the Investible Universe



Use Models/Screening to Identify Factors Driving the Market

Example of a Factor Model

- **Factor 1:** 5-year compounded earnings growth

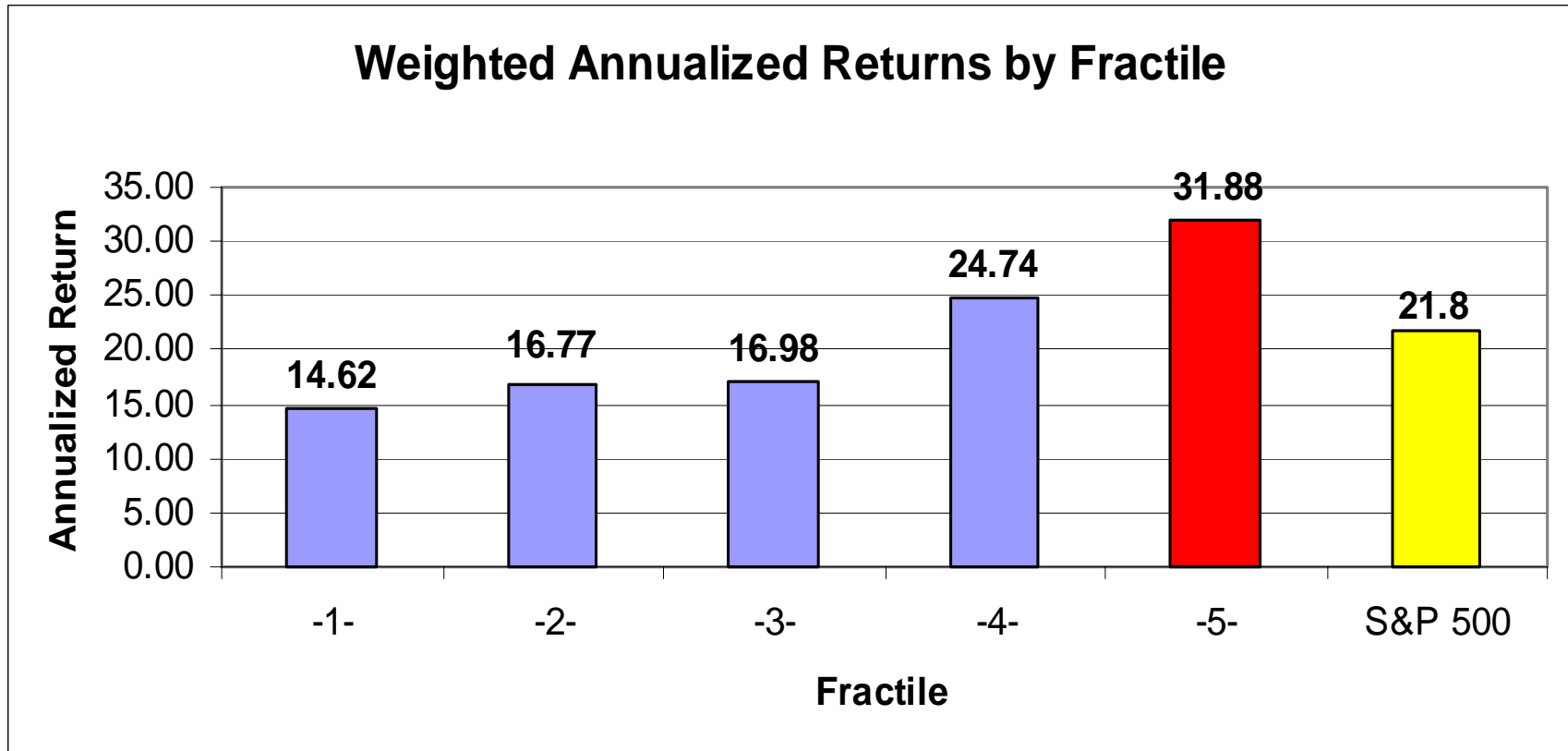
$$\left(\left(\frac{\text{ending value}}{\text{beginning value}} \right)^{1/(n-1)} - 1 \right) * 100$$

- **Factor 2:** Market Excess P/E
 - (Company Price/EPS) - (S&P 500 Price/EPS)
- **Factor 3:** The least squares long-term growth rate of quarterly sales
 - The least squares growth method in this case takes 20 sequential quarters of LTM sales.
 - The natural log of these 20 data points is taken.
 - Then, a regression is performed to fit a line through the logs.
 - The slope of this line is converted back to a base ten number by exponentiating it and then converting it into a percentage.

- **Factor 4:** Earnings Dispersion

$$s^2 = \frac{\sum_{i=1}^N \left(X_i - \frac{\sum_{j=1}^N X_j}{N} \right)^2}{N-1}$$

Model Results: Reviewing High Impact Factors



- Understanding Regime Shifts
- Identify New Opportunities

Optimization in the Investment Process

- Implementing investment objectives and constraints
- Controlling the components of portfolio risk
- Implementing the manager's investment style, philosophy, and market outlook
- Efficiently using active return information
 - Analyst forecasts
 - Quantitative models
- Two Types of Optimization
 - Alpha optimization
 - Tracking error optimization

Optimization & Time Frame

- Present Situation
 - Portfolio sensitivity to changes in a factor
 - What does the portfolio look like today?
- Forward Looking
 - Designing strategy, products, and policy (i.e. tracking error bands)
 - Produce portfolios or parts of portfolios
- Backward Looking
 - Measure the performance of an actively managed portfolio versus an optimized portfolio.
 - “Go Play Golf” metric

“Heat” Matrix

Top and Bottom Correlation to: JNJ **Sector:** Healthcare

Top Five Correlated Companies: **Sector Correlation:**
SGP **0.64** **Sector** **0.79**
BMY **0.64**
MRK **0.64**
ABT **0.68**
CRH **0.91**

Heat Matrix:
Healthcare Tolerance: 0.88
Correlation Matrix
Based on Monthly Data
(1990-April 2000)

Bottom Five Correlated Companies:

	AGN	AHP	AMGN	AZA	BAX	BCR	BDX
SBE	0.88	(0.74)	0.87	0.95	0.55	0.67	(1.00)
SBH	(1.00)	1.00	(1.00)	(1.00)	1.00	1.00	(1.00)
SGP	0.30	0.58	0.24	0.50	0.51	0.36	0.30

SBH **(1.00)**
PEB **(0.97)**
MEDI **(0.61)**
DNA **(0.56)**
SBE **(0.55)**

- Gives Most and Least Diversifying Assets
- Correlation of JNJ with Sector = 0.79
- Hot/Cold Spots in Partitioned Sector Correlation Matrix at Absolute Tolerance of 0.88

Performance & Risk Measurement

- Performance attribution
 - Transparency: Confirming the implementation of investment objectives and constraints
 - Measure the effectiveness of alpha models
 - Identify trends
- Risk Management
 - Portfolio risk decomposition
 - Stock specific
 - Factor
 - Industry
 - Controlling the components of portfolio risk
 - Marginal contribution of risk

Build Transparency: Weekly Performance SnapSheet

Weekly SnapSheet							
		Tracking Error			Beta		
		Current	Last Week		Current	Last Week	
Fund A		3.49	3.03		1.00	0.89	
Fund B		4.51	4.61		0.97	1.03	
Fund C		6.72	5.52		1.02	1.10	
% Cash Exposure							
		Current	Last Week				
Fund A		1.12	4.98				
Fund B		3.80	3.73				
Fund C		15.26	3.10				
Benchmark Relative Sector Exposure							
	Largest Overweight Sector		Weight Diff.		Largest Underweight Sector		Weight Diff.
Fund A	Consumer Cyclical		3.10		Technology		-6.89
Fund B	Communication Services		4.90		Health Care		-3.64
Fund C	Technology		4.10		Health Care		-8.86
Benchmark Relative Company Exposure							
	Largest Overweight Company		Weight Diff.		Largest Underweight Company		Weight Diff.
Fund A	Fannie Mae		3.30		General Electric Co.		-4.03
	Microsoft		1.59		AOL Time Warner Inc.		-1.68
Fund B	General Electric		3.44		Citigroup		-3.46
	Target Corp.		3.02		Wal-Mart Stores Inc.		-3.14
Fund C	Transocean Sedco Forex Ir		1.99		Harley-Davidson Inc.		-1.69
	Noble Affiliates Inc.		1.87		Allergan Inc.		-1.47
YTD Active Management Performance							
					Peer Rank	Excess Performance	
		Actual	Static	Optimized	Index	MTD	YTD
Fund A		-8.60	-14.33	-15.80	-14.24	3 of 24	0.22
Fund B		-33.89	-31.35	-28.45	-24.13	23 of 25	-0.05
Fund C		-27.65	-31.50	-28.42	-29.28	8 of 23	1.82

Measuring Active Management Decisions

Fund Name	1-yr Info. Ratio	Portfolio Returns vs. Benchmarks					* Net Assets	* MTD Net Flows	* YTD Net Flows
		1-Week	1-Month	3-Month	YTD	1-Year			
Fund A	1.16	1.33	1.88	5.02	5.63	6.97	1,945,427,250	11,771	137,357,537
Fund B	0.24	0.99	3.04	2.09	2.82	1.47	391,622,520	3,487,210	(15,665,667)
Fund C	-0.90	0.99	1.18	1.13	1.66	-10.52	987,256,000	(93,588)	1,940,065

Fund A	Portfolio			S&P 500			Top Contributors	Bottom Contributors
Economic Sector	Avg % Assets	Total Return	Percent Contrib	Avg % Assets	Total Return	Percent Contrib		
Consumer Discretionary	13.46	4.53	0.60	13.60	1.38	0.19	Brunswick Corp. 0.19	International Business Machines C -0.20
Consumer Staples	6.74	1.78	0.12	9.23	2.17	0.20	Norfolk Southern Corp 0.10	Intel Corp. -0.12
Energy	3.84	-3.41	-0.13	6.85	-3.18	-0.22	Pfizer Inc. 0.10	Fannie Mae -0.07
Financials	18.14	-0.28	-0.05	19.03	-0.18	-0.03	Maytag Corp. 0.10	Cisco Systems Inc. -0.06
Health Care	11.76	0.65	0.08	14.08	0.66	0.09	Masco Corp. 0.10	Verizon Communications -0.06
Industrials	16.25	2.81	0.45	11.18	-2.35	-0.26	Target Corp. 0.09	SBC Communications Inc. -0.06
Information Technology	16.17	-3.42	-0.57	15.46	-3.84	-0.60	Eaton Corp. 0.05	Exxon Mobil Corp. -0.06
Materials	5.75	0.58	0.03	2.89	1.05	0.03	Centex Corp. 0.05	Citigroup Inc. -0.05
Telecommunication Services	2.41	-6.86	-0.17	4.42	-7.98	-0.36	Fortune Brands Inc. 0.05	AT&T Corp. -0.04
Utilities	3.31	-0.82	-0.03	3.24	-0.76	-0.03	Leggett & Platt Inc. 0.05	Sun Microsystems Inc. -0.04
[Cash]	2.16	0.03	0.00	0.00	0.00	0.00	PepsiCo Inc. 0.04	Wyeth -0.03
Total	100.00	0.33	0.33	100.00	-1.01	-1.01	Hewlett-Packard Co. 0.04	Texas Instruments Inc. -0.03
							Wells Fargo & Co. 0.04	ChevronTexaco Corp. -0.03
							Boston Scientific Corp 0.03	Oracle Corp. -0.03

Fund B	Portfolio			Russell 1000 Growth			Top Contributors	Bottom Contributors
Economic Sector	Avg % Assets	Total Return	Percent Contrib	Avg % Assets	Total Return	Percent Contrib		
Consumer Discretionary	16.29	2.18	0.35	14.27	0.60	0.09	Pfizer Inc. 0.17	General Electric Co. -0.29
Consumer Staples	5.26	3.02	0.15	8.69	1.92	0.16	Target Corp. 0.13	Intel Corp. -0.16
Energy	2.25	-2.86	-0.07	1.84	-2.88	-0.05	King Pharmaceuticals 0.10	International Business Machines C -0.14
Financials	11.24	-1.09	-0.12	7.95	-0.13	-0.01	Wal-Mart Stores Inc. 0.07	Cisco Systems Inc. -0.12
Health Care	21.63	1.19	0.25	24.96	0.62	0.15	Home Depot Inc. 0.07	Brocade Communications System -0.11
Industrials	12.21	-0.81	-0.10	12.90	-5.05	-0.66	Lockheed Martin Corp 0.07	AOL Time Warner Inc. -0.10
Information Technology	27.20	-2.68	-0.76	27.13	-3.76	-1.03	Pharmacia Corp. 0.05	Merrill Lynch & Co. Inc. -0.09
Materials	1.21	0.11	0.00	0.40	1.81	0.01	Office Depot Inc. 0.05	WorldCom Inc.-WorldCom Group -0.08
Telecommunication Services	1.34	-10.54	-0.15	1.33	-7.37	-0.10	Royal Caribbean Cruis 0.05	Sun Microsystems Inc. -0.07
Utilities	1.42	-0.48	-0.01	0.53	-4.36	-0.02	Travelers Property Ca: 0.05	Citigroup Inc. -0.07
[Cash]	-0.04	0.03	0.00	0.00	0.00	0.00	L-3 Communications F 0.05	Nokia Corp. -0.07
Total	100.00	-0.45	-0.45	100.00	-1.47	-1.47	Rational Software Corj 0.05	Siebel Systems Inc. -0.06

Measuring Efficiency

Up/Down Performance Technology Sector			
	12/29/2000- 9/5/2001 Days	% up/down more than index	avg out/under performance on up/down day
Fund A			
Up Days	53/85	62%	0.18 bps
Down Days	64/86	74%	-0.41 bps
Fund B			
Up Days	48/86	56%	0.05 bps
Down Days	52/85	61%	-0.14 bps
Fund C			
Up Days	24/73	33%	-0.30 bps
Down Days	44/98	45%	-0.03 bps

- Up/Down portfolio performance
 - Where has the portfolio’s performance come from during differing market conditions?
 - **Are the portfolio’s beta bets correct?**
 - Based on the market outlook, is the portfolio positioned correctly for the future?

Risk Management Report

- Portfolio Risk Report
 - Benchmark relative
 - Tracking error
- Decomposes Risk
 - Risk indices
 - Industries
 - Stock specific
- Marginal Contribution to Risk by Stock

Risk Analysis

Week Ending 1/19/2001

Performance		Last Week	MTD
Fund:	Nationwide Fund	2.58	(0.19)
Benchmark:	S&P 500	3.23	1.74

Risk Decomposition	Current	Prior Week	Difference
Active Risk:	2.84	2.79	2%
Stock Specific	71%	68%	3%
Risk Indices	11%	11%	1%
Industry	18%	21%	-4%
BETA	0.91	0.90	1%

Risk Indices

	Mgd	Bmk	Act
LEVERAGE	(0.00)	(0.13)	0.12
YIELD	0.05	0.01	0.04
EARNYLD	0.08	0.05	0.03
MOMENTUM	(0.09)	(0.12)	0.03
NONESTU	0.02	0.00	0.02
EARNVAR	(0.07)	(0.08)	0.01
VALUE	(0.03)	(0.04)	0.01
CURRSEN	(0.05)	(0.02)	(0.03)
VOLTILTY	(0.11)	(0.05)	(0.06)
TRADEACT	(0.03)	0.05	(0.08)
SIZENONL	0.02	0.09	(0.08)
GROWTH	(0.18)	(0.05)	(0.13)
SIZE	0.21	0.36	(0.15)

Industry Exposures

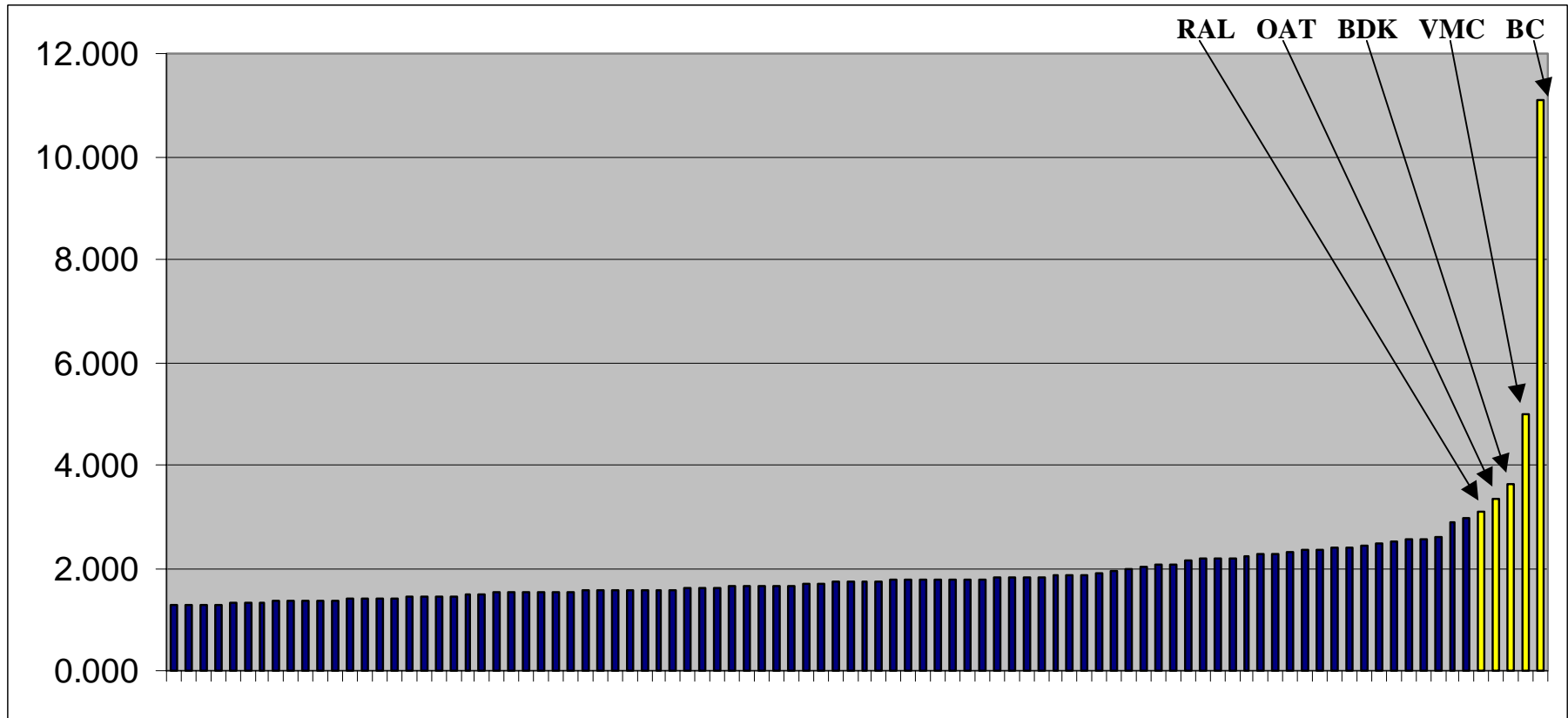
Overweighted	Mgd	Bmk	Act Underweighted	Mgd	Bmk	Act
FINSVCS	8.04	5.89	2.16 INTERNET	0.92	2.47	(1.55)
CHEMICAL	4.39	2.79	1.60 TELEPHON	3.36	4.61	(1.25)
CONSDUR	1.75	0.16	1.59 CMPTRSW	5.56	6.76	(1.21)
FOODBEV	4.66	3.40	1.26 SPLTYRET	0.80	1.98	(1.17)
CONSTRUC	1.48	0.27	1.21 SECASSET	1.37	2.51	(1.14)

Asset Marginal Contribution to Risk

Most Diversifying		Least Diversifying		
Name	MCAR	Wgt% Name	MCAR	Wgt%
BROADVISION INC	(0.24)	0.00 BRUNSWICK CORP	0.04	1.37
BROADCOM CORP	(0.18)	0.03 FEDERAL NATL MTG ASSN	0.03	3.43
EXODUS COMMUNICATIONS	(0.18)	0.17 SEMICONDUCTOR HLDRS TR	0.03	0.63
SIEBEL SYS INC	(0.15)	0.10 BROADBAND HOLDERS TR	0.01	0.48
JUNIPER NETWORKS INC	(0.14)	0.34 BLACK & DECKER CORP	0.01	1.44
CISCO SYS INC	(0.14)	1.89 CASH	0.00	3.86
MICRON TECHNOLOGY INC	(0.14)	0.03 SEALED AIR CORP NEW	0.00	0.73
MICROSOFT CORP	(0.14)	1.97 SCHERING PLOUGH CORP	(0.00)	2.27
APPLIED MATLS INC	(0.13)	0.22 DOMINION RES INC VA NE	(0.00)	1.09
MOTOROLA INC	(0.13)	0.23 RALSTON PURINA CO	(0.00)	0.95

Measure of Risk: 3-Dimensional View of Risk (3DL)

- Risk Loss function integrates Residual Variance, Trading Impact and Active exposure (fundamental conviction most visible here)



$$3DL = F(x, y, z)$$

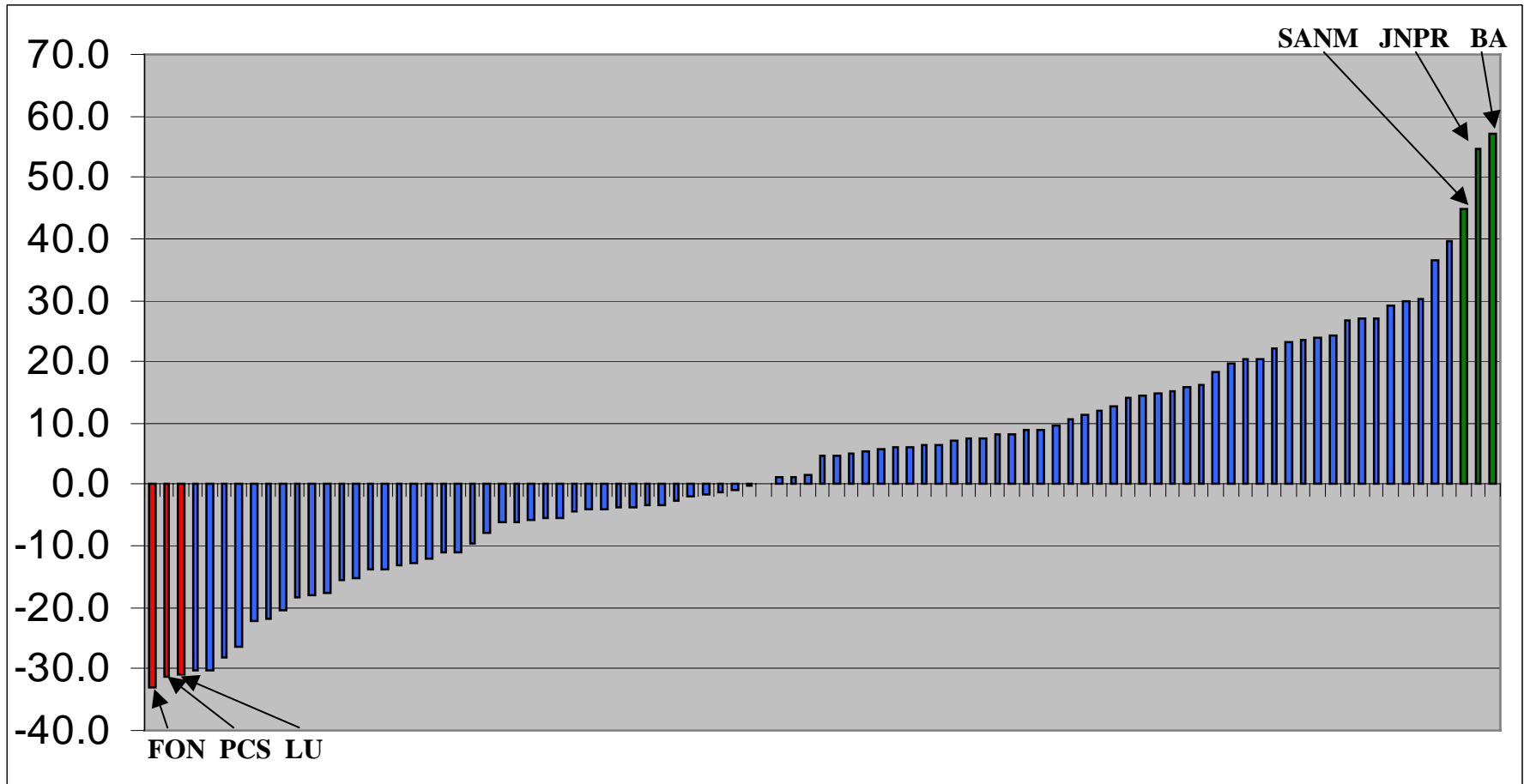
where:

x=a stock's illiquidity (The > the number the more illiquid the stock.)

y=active weight in the portfolio

z=stock specific risk (According to BARRA's U3 Equity model.)

AD Risk to Return Ratio



$$\text{AD Ratio} = (x/y)$$

where:

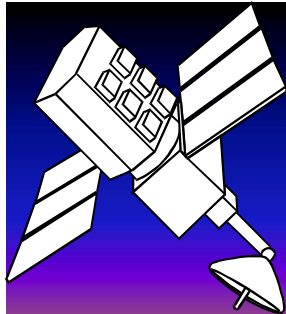
x=a stock's excess return

y=a stock's 3DL

AD Ratio -- the Numbers

AD Ratio Report							
Company			Active	Specific		6 mth.	AD
Symbol	Company Name	Illiquidity	Weight	Risk	3DL	Excess	Ratio
				US-E3		Return	
FON	SPRINT FON GROUP	0.022	0.040	47.8	1.614	-53.2	-33.0
PCS	SPRINT PCS GROUP	0.017	0.040	44.2	1.557	-48.7	-31.3
LU	LUCENT TECHNOLOGIES INC	0.027	0.110	55.6	1.747	-53.9	-30.8
SANM	SANMINA CORP	0.005	-0.024	58.7	1.798	80.5	44.7
JNPR	JUNIPER NETWORKS INC	0.004	0.196	84.7	2.334	127.4	54.6
BA	BOEING CO	0.018	-0.220	28.8	1.338	76.1	56.9

Portfolio Construction & Implementation



Manager Selection
Securities that the manager has researched extensively and offer very good prospects for outperformance.

Alpha Model
Securities that rank high on a multi-factor quantitative alpha model.

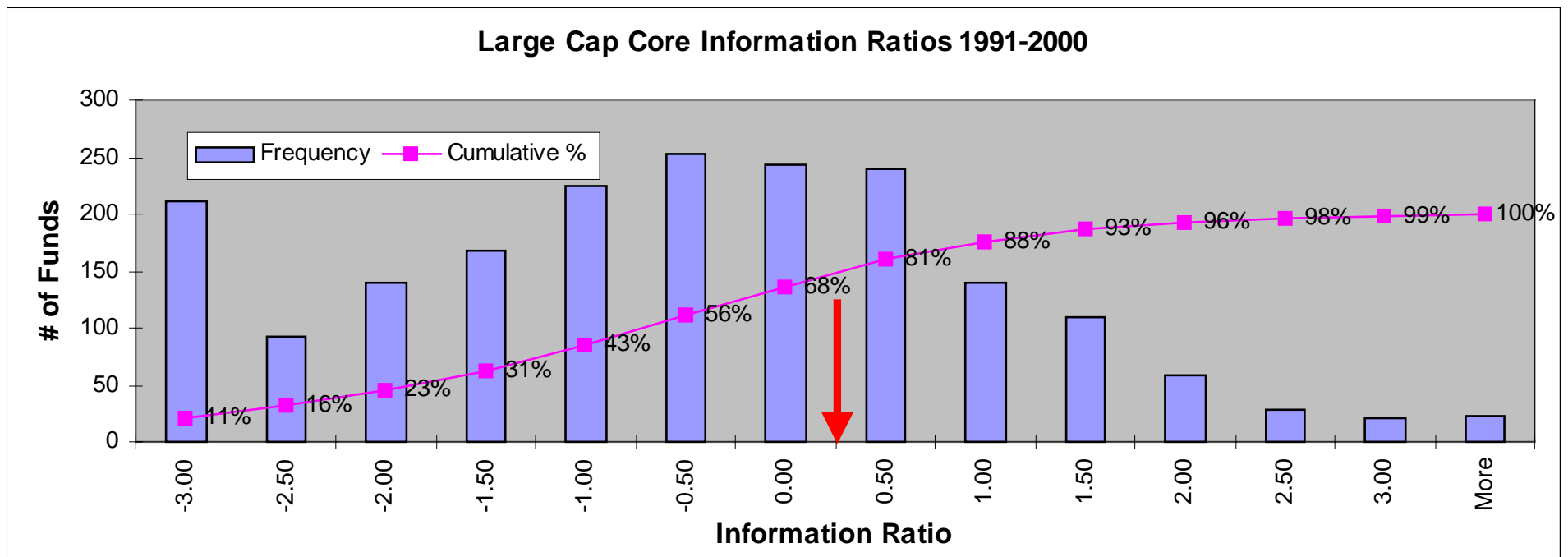


Smart Estimates
Companies that are highly likely to beat the consensus earnings estimate.

Other Alpha Satellites
Other strategies that develop which increase the fund's probability of outperforming (i.e. technical analysis)

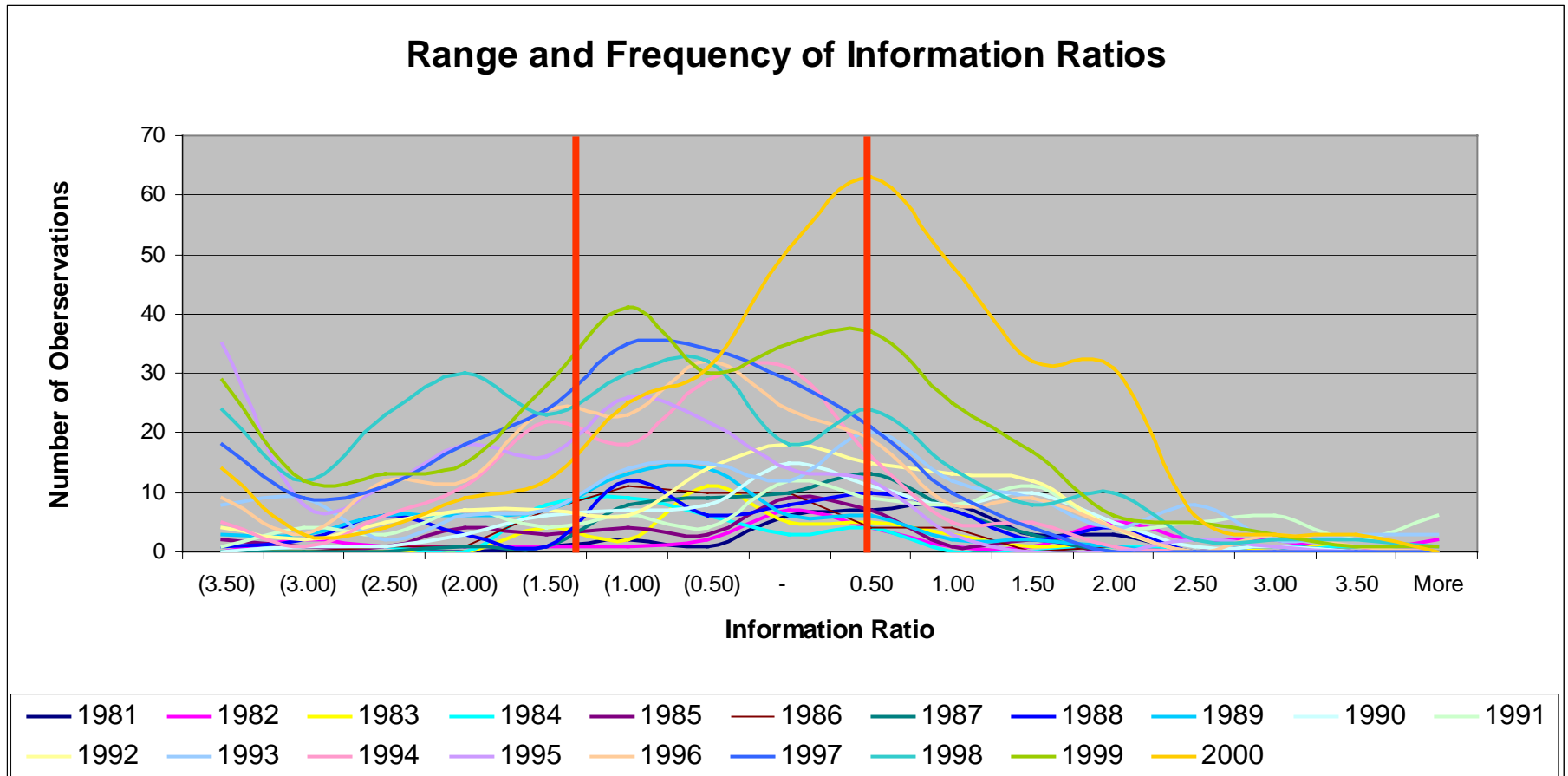
Measuring the Interaction of Risk and Performance

- Use incentives to incorporate quantitative processes and tools into investment products.
- Example:
 - Compensate PMs on Information Ratio = α / TE
 - The measure incorporates both return & risk



Source: Zephyr Style Advisor

Information Ratio -- Calendar Year Consistency



Source: Zephyry Style Advisor

Information Ratio -- Annualized Consistency

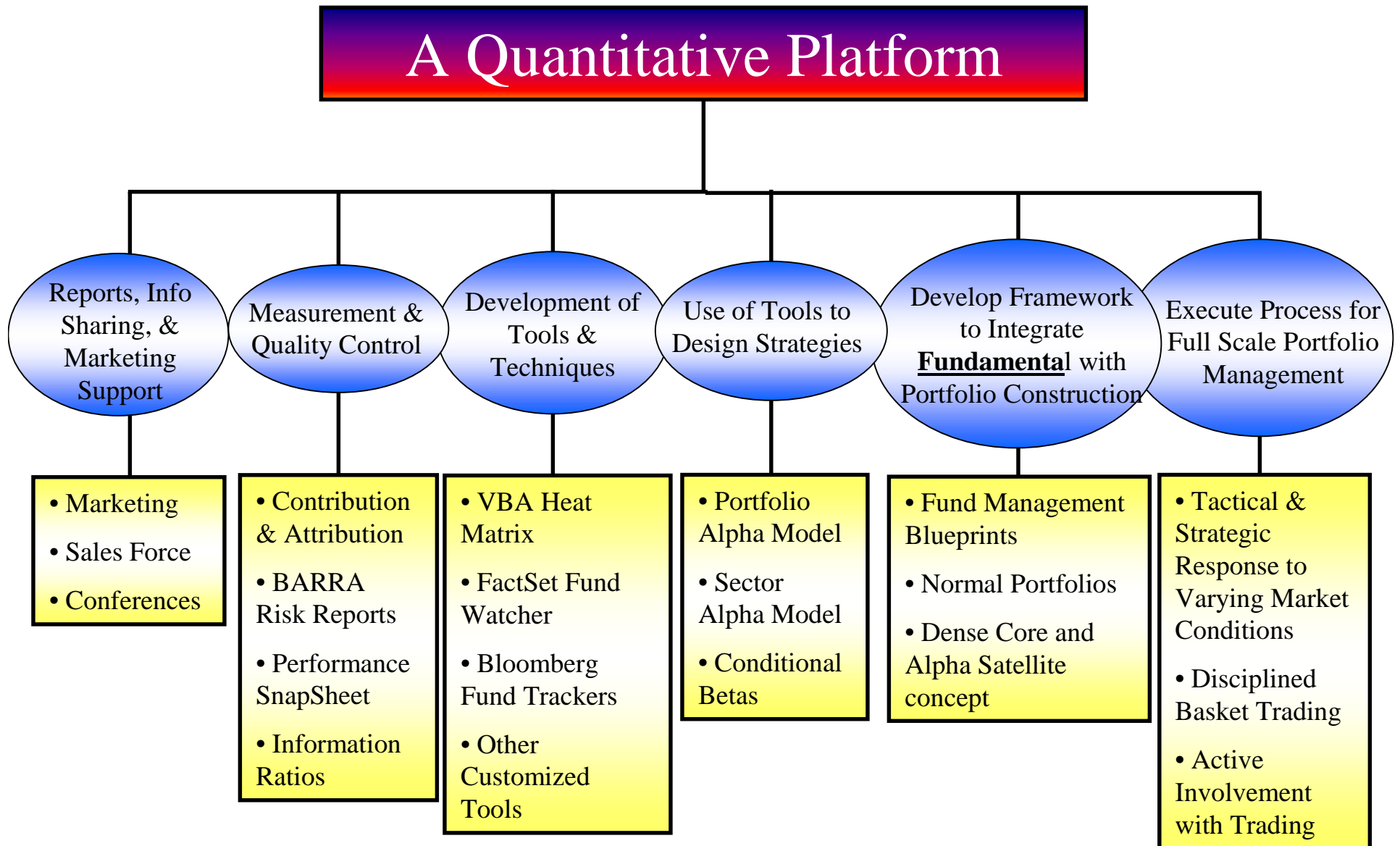
Average IR on an Annual Basis

Ending 12/31/2000

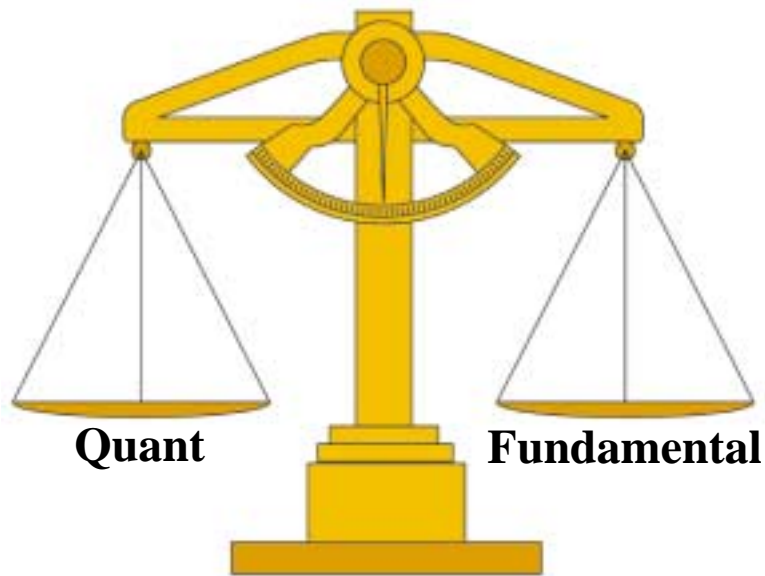
IR	3 yr	5 yr	7 yr	10 yr	20 yr
(3.50)	7.77%	7.34%	8.68%	7.15%	6.36%
(3.00)	3.21%	3.10%	2.98%	3.38%	3.40%
(2.50)	4.86%	5.26%	5.26%	4.62%	4.50%
(2.00)	6.49%	6.90%	7.50%	7.11%	5.89%
(1.50)	7.33%	9.28%	10.07%	8.66%	8.58%
(1.00)	11.00%	12.40%	12.77%	11.19%	12.45%
(0.50)	10.62%	13.06%	13.95%	12.63%	13.57%
0.00	11.34%	12.15%	12.82%	12.85%	14.85%
0.50	13.54%	12.18%	11.23%	11.74%	13.44%
1.00	9.40%	7.45%	6.05%	7.22%	7.90%
1.50	6.13%	5.04%	4.07%	5.84%	5.20%
2.00	5.06%	3.47%	2.58%	2.91%	3.82%
2.50	1.42%	0.85%	0.78%	1.68%	1.22%
3.00	0.90%	0.87%	0.70%	1.29%	1.37%
3.50	0.67%	0.51%	0.37%	0.70%	0.80%
More	0.24%	0.15%	0.19%	1.01%	0.86%

	3 yr	5 yr	7 yr	10 yr	20 yr
Percentage Less than -2	22.34%	22.59%	24.42%	22.27%	20.16%
Percentage Less than -1	29.67%	31.87%	34.49%	30.93%	28.74%
Percentage Less than 0	62.63%	69.48%	74.02%	67.61%	69.61%
Percentage Greater than 0	37.37%	30.52%	25.98%	32.39%	34.61%
Percentage Greater than 1	14.18%	10.74%	8.50%	12.43%	12.41%

IV. Summary

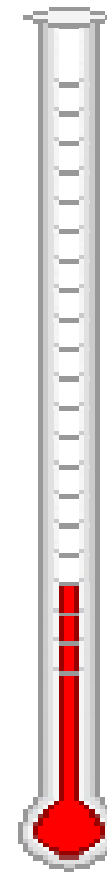


Balancing Quant & Fundamental



Scale Can Tilt Depending on:

- IC of the process
- Design of the product
- Acceptance level



High Quant Involvement

Where are you?

Low Quant Involvement

Takeaway

Successful investing is a blend of rigorous science and beautiful art, in that order.