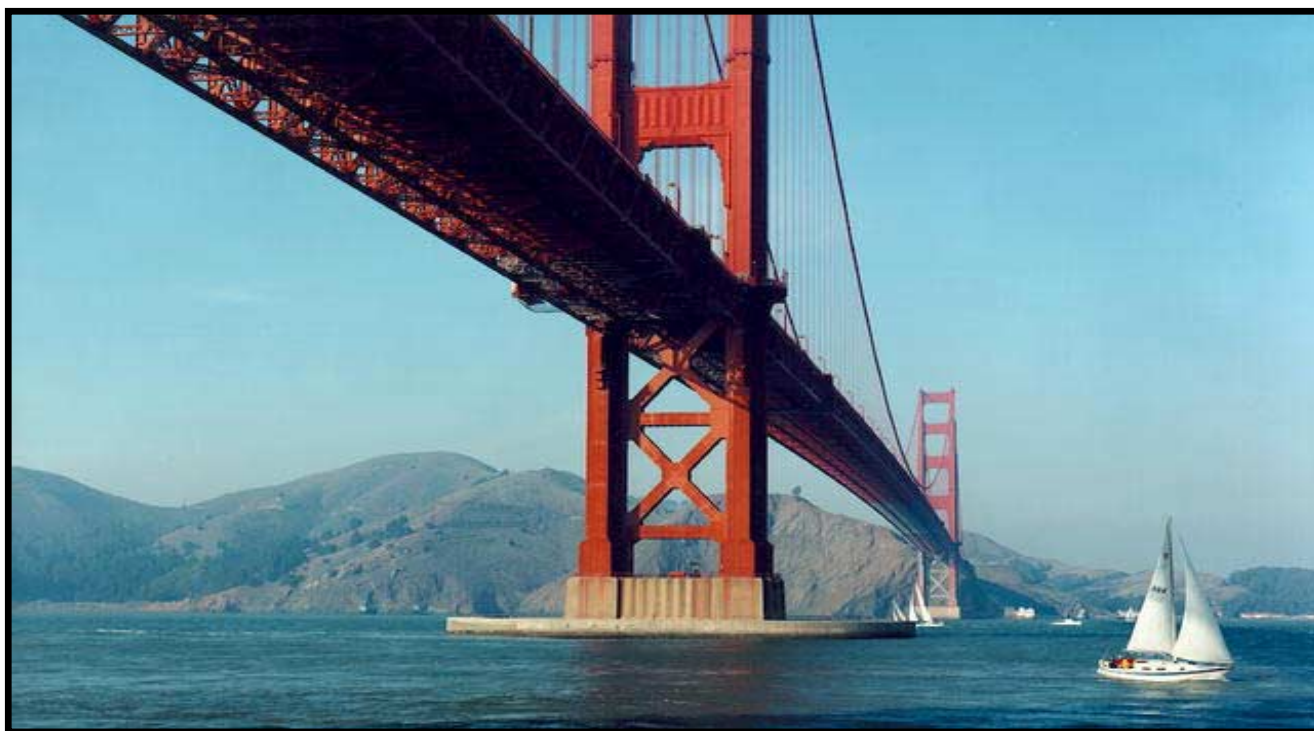

Bridging the Gap between Quantitative and Fundamental Analysis

(Chicago Quantitative Alliance, Apr 18-19, 2001, Las Vegas)



Pankaj Agrawal, Ph.D.
Villanova Capital
Director of Quantitative Investing

Outline

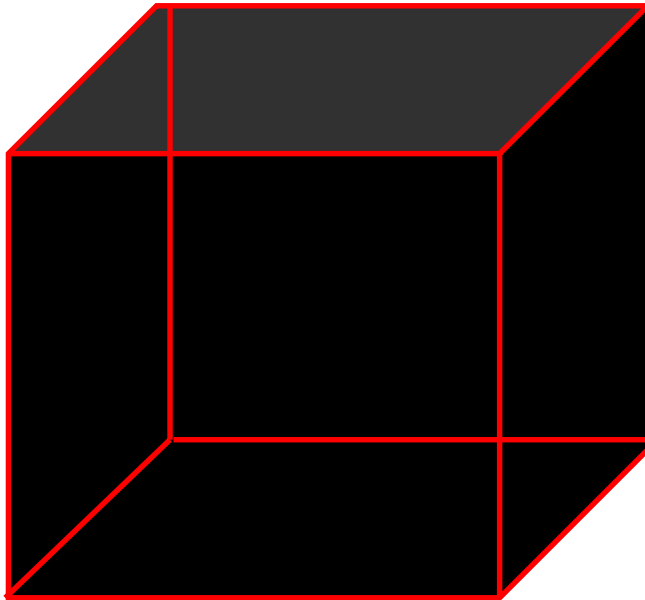
- Introduction
- What is quantitative analysis? What is fundamental analysis?
- Perception of quantitative analysis
- Philosophical underpinnings
- Building a quant platform in a fundamental environment
 - Benefits
 - Challenges
 - Overcoming challenges
 - Toolkit
- Summary

Introduction

- Presentation draws in part from my experience in investment management as practiced in the U.S.
 - Vestek Systems, San Francisco: Quantitative Analyst
 - Putnam Investments, Boston: Quantitative Analyst, VP
 - Villanova Capital, Philadelphia: Director of Quantitative Investing
 - Adjunct Finance Faculty at Golden Gate U. & Harvard University
- Motivation
 - Harness and incorporate the power of quantitative theory and applications 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.

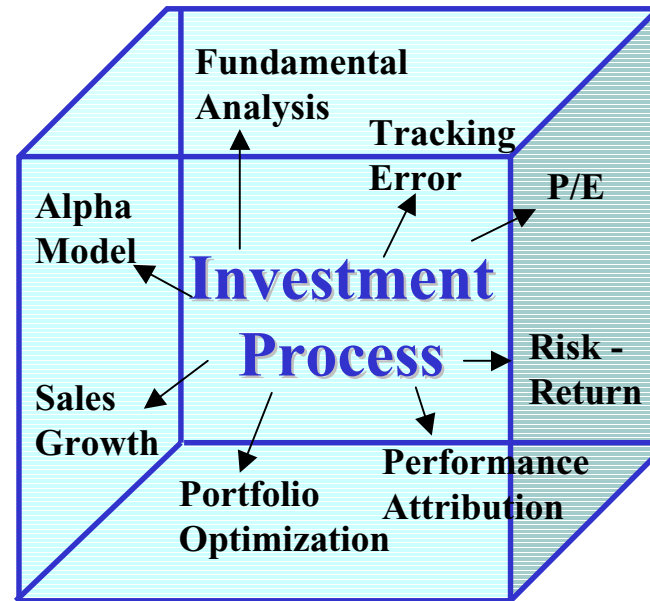
Glass Box Helps Bridge the Gap

BLACK BOX



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

GLASS BOX



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

Quantitative & Fundamental Investing

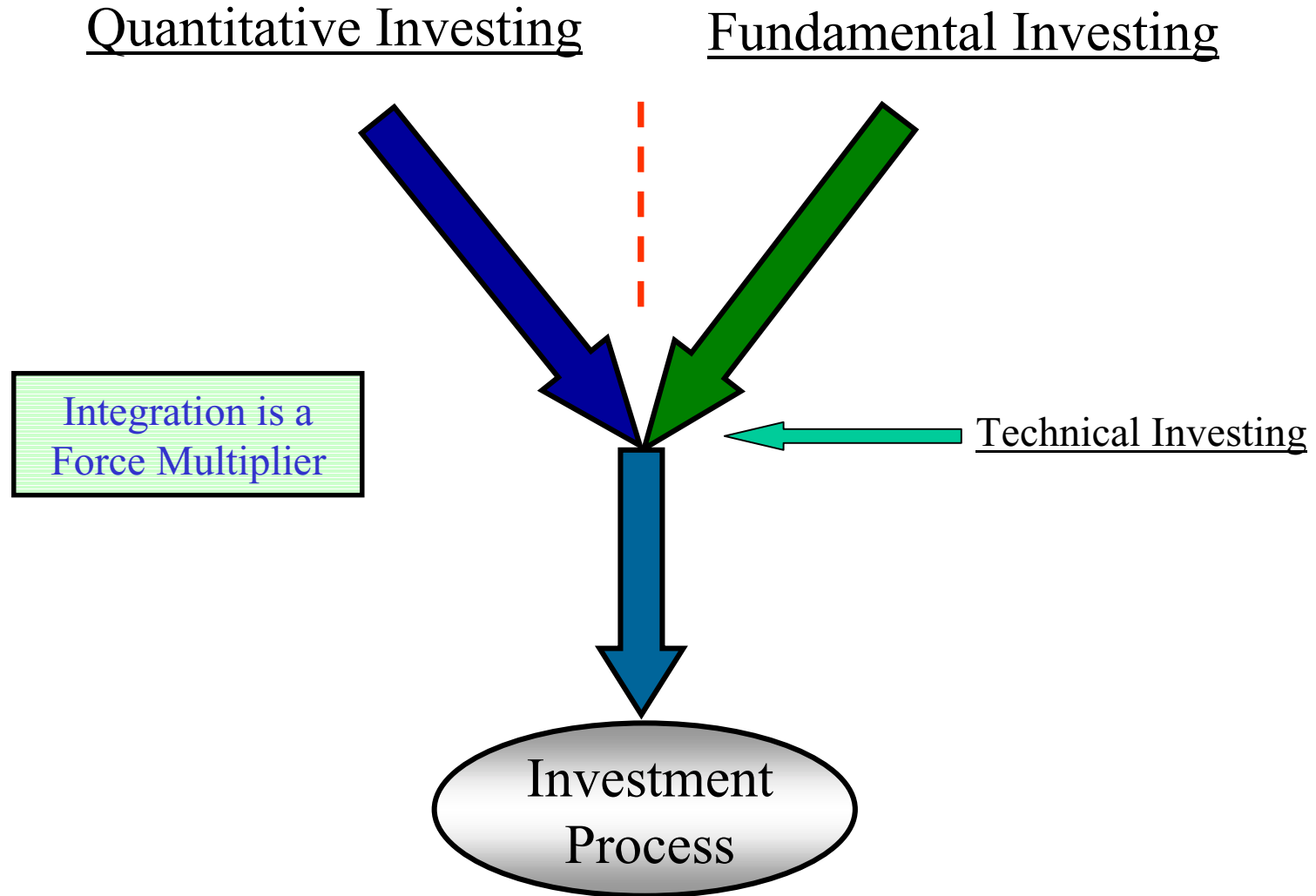
Quantitative Investing

- Design model
- Engineer model
- Examine results
- Monitoring and Attribution
- Risk Management
- Alpha Generation
- Optimization - Risk and α
- Markowitz Diversification
- Strategy Diversification

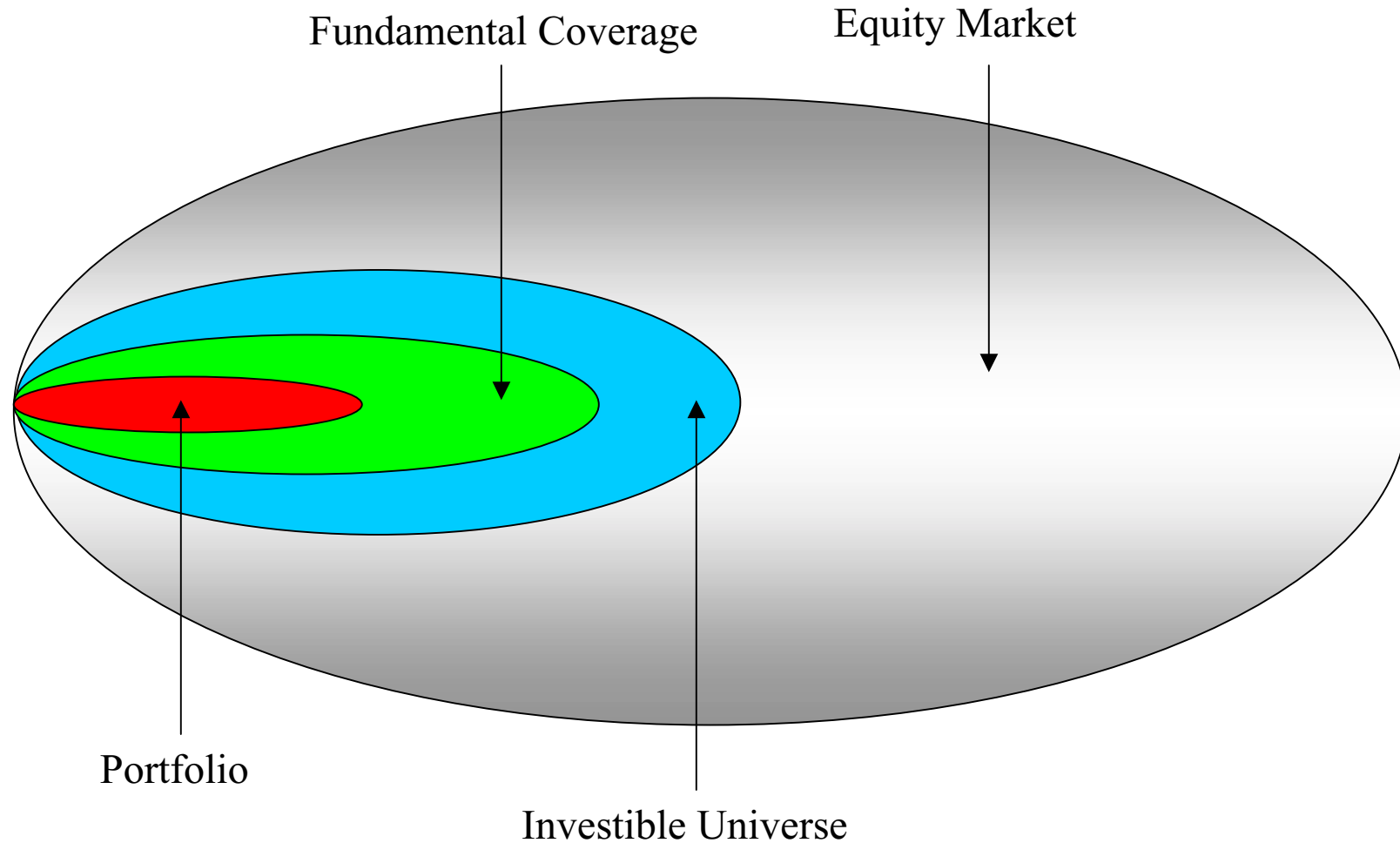
Fundamental Investing

- Visit management
- Breakdown balance sheets
- News flow
- Industry forecasting
- Inspecting product pipeline
- Mergers & Acquisitions
- Best idea focus list
- Simple Diversification
- Thematic investing

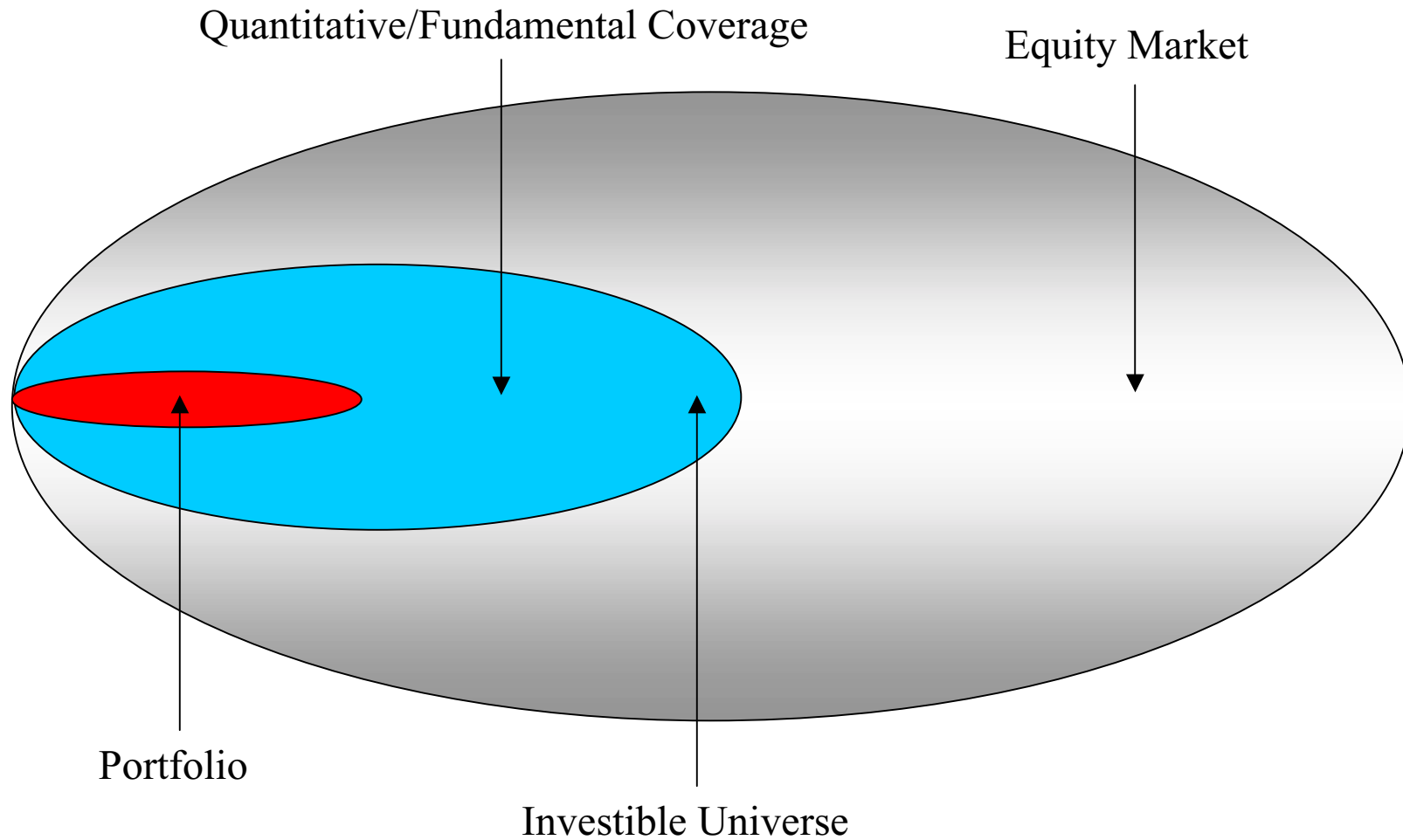
Integrating Investing Styles



Pure Fundamental Investing Style



Integrated Investing Style (Quantitative + Fundamental Approach)



Quant May Be Perceived As . . .

- Risk Minimization
- Passive Management - Indexing
- “Portfolio Police”
- Report Writing
- Marketing Challenge
- “Black Box” Investing
- “Is it hot in here, or is it just all the radiation coming out of the quants?”

. . . But Quant Can Deliver. . .

Systematic Active Management

- Applicable to all investment objectives
- *Integrates* quantitative and fundamental research
- Efficient portfolio construction to deliver risk-return goals
- Thorough quality control and attribution
- Ability to produce both low and high risk products

Philosophical Underpinnings

- Utilize risk to drive returns [risk-return mapping is theoretically and intuitively justified -- kill two birds with one stone - CAPM-APT -linear/non-linear but positive].
- Balance discipline and conviction [high price on wrong conviction - massive sector/style/country bets - use tilts].
- Empirical observations show the security price path is fairly mean-reverting, but the price path of a security is also a random walk with drift.
- Expect the unexpected and be equipped with a plan to handle it (impact of residual term can be high - political, currency, FED).
- There is volatility clustering; there is a volatility drift - and asset prices are negatively correlated to volatility ~ increase portfolio beta in high-volatility periods (not easy).

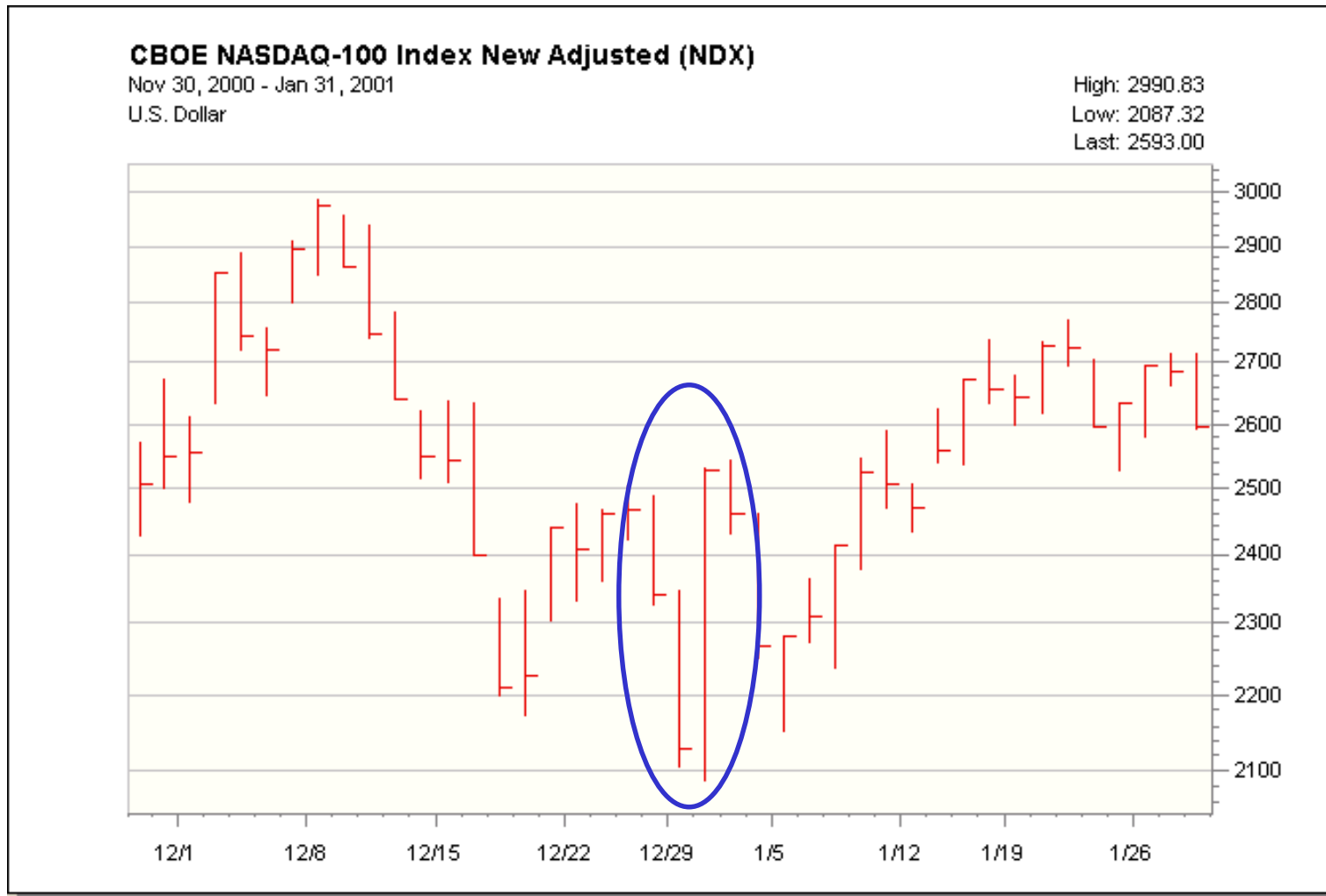
Mean Reversion

- Empirical observations show the security price path is fairly mean-reverting, but the price path of a security is also a random walk.



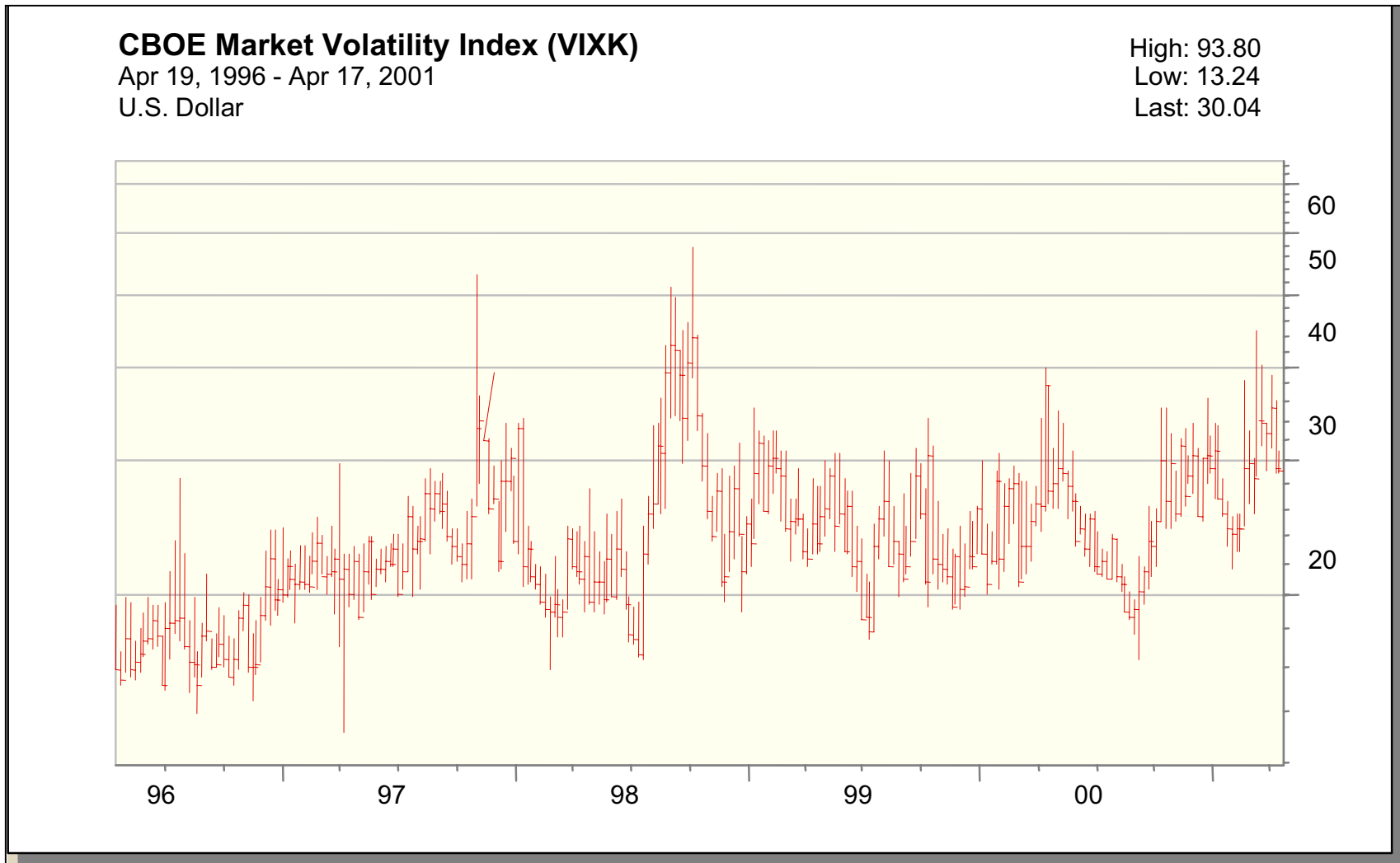
Unexpected Happens

- Expect the unexpected and be equipped with a plan to handle it (impact of residual term can be high - political, currency, FED).




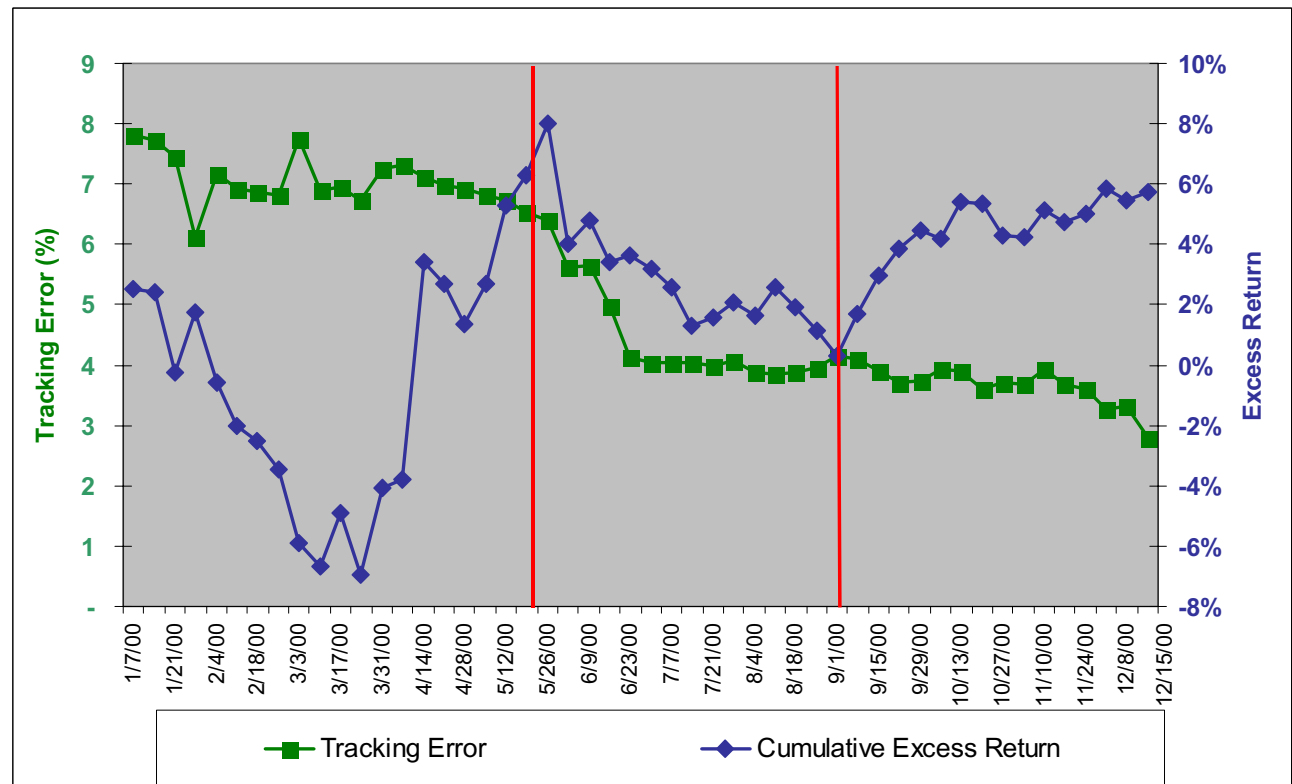
Volatility Clustering / Drift

- There is volatility clustering; there is a volatility drift - and asset prices are negatively correlated to volatility ~ increase portfolio beta in high-volatility periods (not easy).



Challenges of Integrating Quantitative Applications in a Fundamental Environment

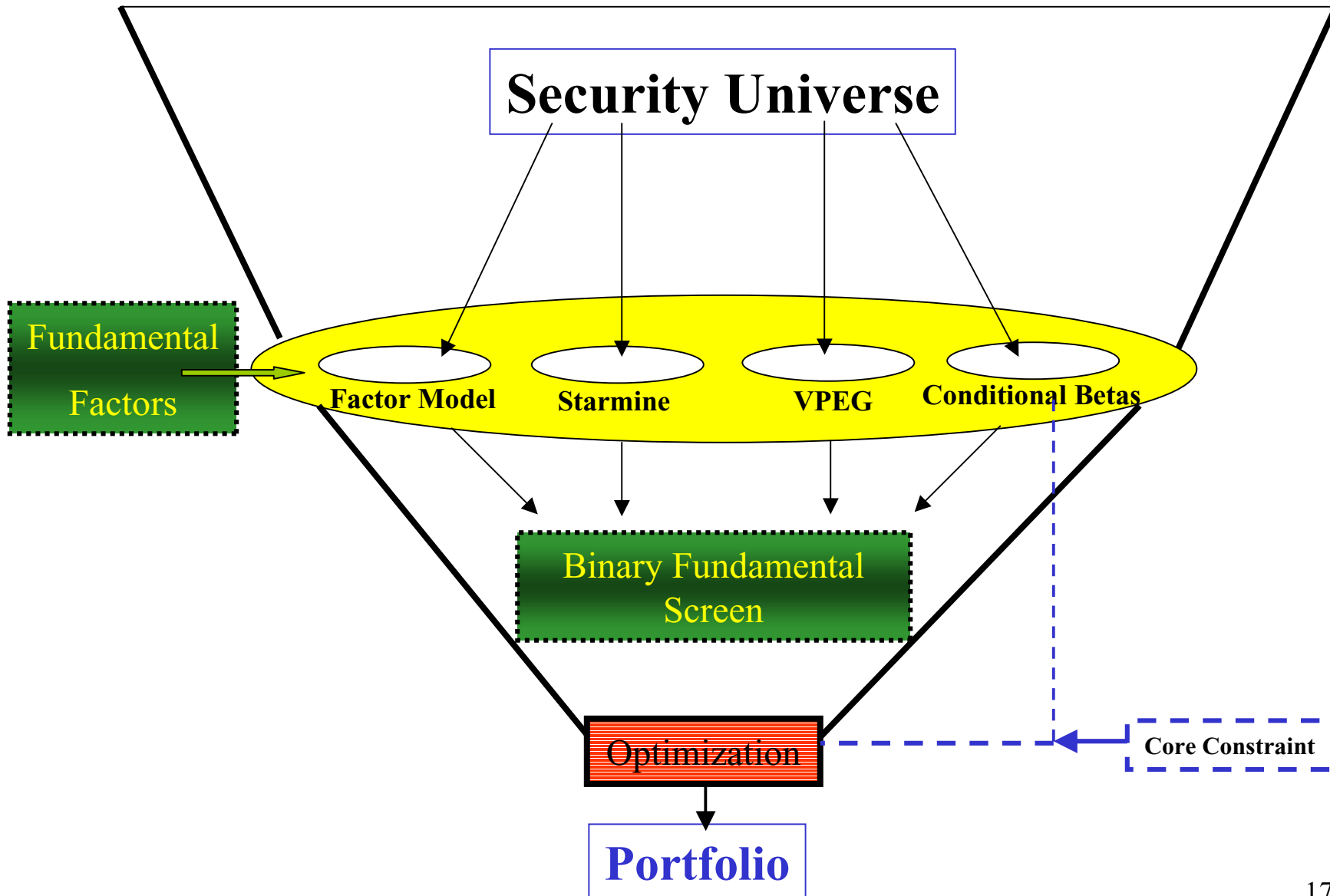
- “Pushback” -- Ideological, Intellectual, Cultural
- Dispelling Stereotypical Perceptions
- Language Differences - communication hurdle
- Marketing Hurdle
- End Goal 



Overcoming the Challenges

- Strong belief in philosophy and process
- Facilitate knowledge sharing
- Build transparent investment processes /techniques
- Develop easy to use tools
- Translate risk into explainable terms
- Incorporate risk in manager compensation: $IR = \alpha / TE$
- Showcase performance - it speaks for itself

Integrating Fundamental Research - Knowledge Sharing



Build Transparency: Ultimate Fund Watcher

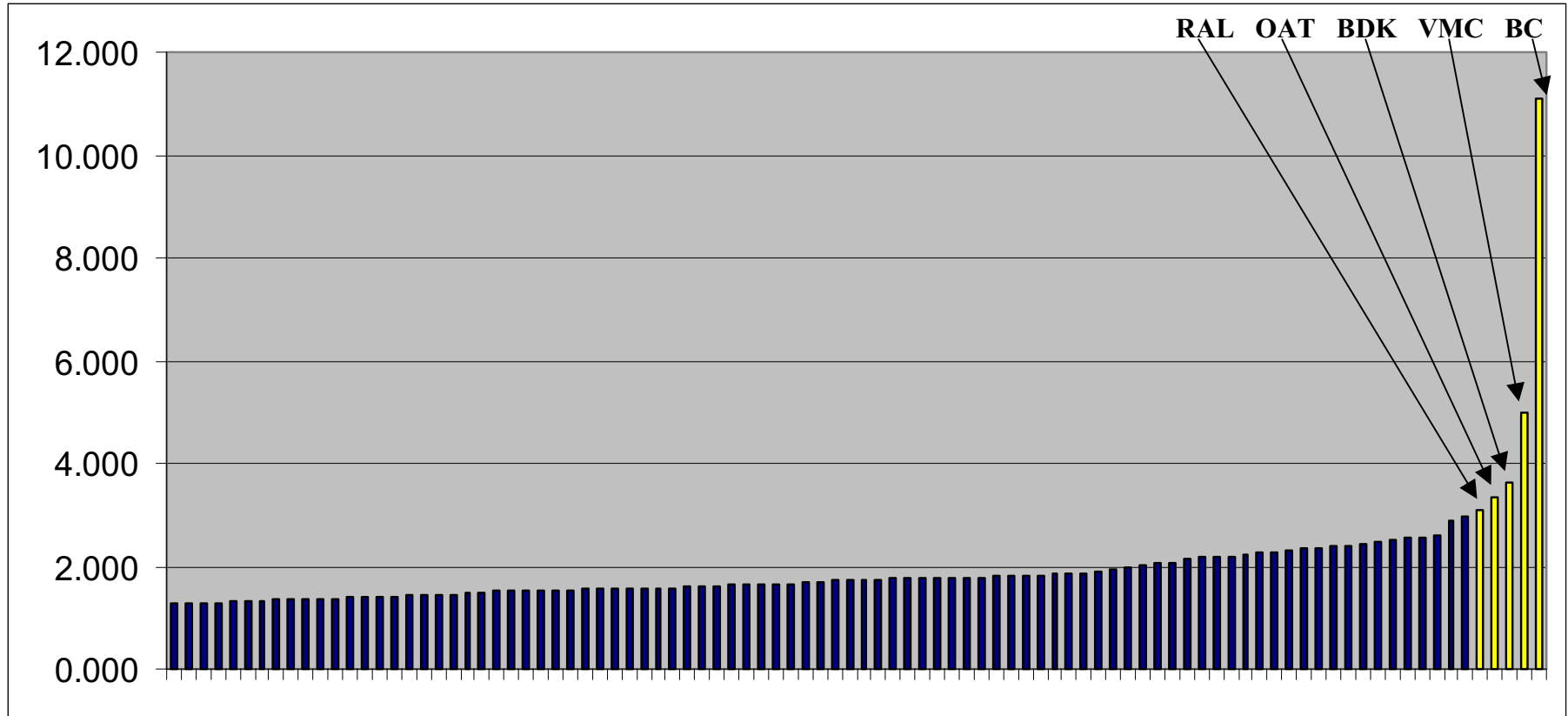
Fund Watcher		Report Date: 12/20/2000									
		NW Weight	SP500 Weight	Difference	Stnd. Williams % R	Illiquidity	Sector Correlation	Stzd. Stock Sp. Risk	Custom PEG	AD Ratio	
Basic Material		0.03%	0.02%	0.00%	21.15						
VMC	VULCAN MATLS CO COM	0.56%	0.04%	0.52%	42.81	1.60	59.78%	0.47	5.89	8.19	
ECL	ECOLAB INC COM	0.52%	0.04%	0.47%	-48.25	0.50	62.22%	1.11	11.08	13.62	
WY	WEYERHAEUSER CO COM	0.14%	0.09%	0.05%	13.71	0.06	68.20%	0.68	0.62	12.95	
AL	ALCAN ALUMINIUM LTD NEW COM	0.14%	0.09%	0.05%	27.42	0.07	68.90%	0.53	2.80		
ADM	ARCHER DANIELS MIDLAND CO CC	0.11%	0.07%	0.04%	46.55	0.09	43.59%	1.47	-1.69	37.95	
N	INCO LTD COM	0.04%	0.03%	0.02%	30.10	0.14	54.32%	2.07	0.32		
DOW	DOW CHEM CO COM	0.20%	0.20%	0.00%	6.56	0.04	80.85%	0.81	0.40	10.01	
IP	INTL PAPER CO COM	0.16%	0.16%	0.00%	41.53	0.03	72.95%	1.20	0.80	26.74	
DD	DU PONT E I DE NEMOURS & CO C	0.39%	0.41%	-0.02%	36.81	0.06	81.38%	0.25	0.54	8.38	
AA	ALCOA INC COM	0.20%	0.25%	-0.05%	41.96	0.03	88.20%	1.14	0.30	17.38	
GGC	GEORGIA GULF CORP COM PAR \$	0.02%			-6.52	0.15	46.71%	3.96	0.47	-19.29	
Capital Goods		0.08%	0.09%	-0.01%	-9.16						
ETN	EATON CORP COM	0.91%	0.04%	0.87%	-30.14	0.84	24.99%	0.98	3.34	4.45	
ITW	ILLINOIS TOOL WKS INC COM	0.98%	0.15%	0.83%	-18.70	0.35	43.01%	0.57	1.43	4.64	
MMM	MINNESOTA MNG & MFG CO COM	1.08%	0.39%	0.69%	24.55	0.06	51.71%	0.00	3.79	38.65	
SEE	SEALED AIR CORP NEW COM	0.61%	0.02%	0.59%	-45.35	0.23	53.65%	3.33	8.37	-20.51	
MIL	MILLIPORE CORP COM	0.24%	0.02%	0.22%	26.06	0.17	-2.66%	3.20	10.93	-5.26	
ROK	ROCKWELL INTL CORP NEW COM	0.10%	0.06%	0.03%	-21.60	0.08	25.08%	1.71	21.34	18.22	
LMT	LOCKHEED MARTIN CORP COM	0.13%	0.12%	0.02%	-20.11	0.08	4.72%	1.23	-2.91	28.58	
DE	DEERE & CO COM	0.10%	0.09%	0.01%	16.67	0.04	17.57%	0.85	2.91	14.91	
EMR	EMERSON ELEC CO COM	0.18%	0.27%	-0.09%	-23.68	0.03	42.43%	0.31	2.59	29.95	
BA	BOEING CO COM	0.41%	0.51%	-0.09%	-12.93	0.03	1.60%	0.68	-0.92	62.63	
SLR	SOLETRON CORP COM	0.08%	0.17%	-0.10%	39.57	0.01	61.07%	3.63	0.48	-6.88	
UTX	UNITED TECHNOLOGIES CORP CO	0.18%	0.30%	-0.13%	20.68	0.02	61.83%	0.56	1.69	32.79	
HON	HONEYWELL INTL INC COM	0.15%	0.34%	-0.19%	-28.42	0.01	32.24%	1.94	0.63	23.59	
TYC	TYCO INTL LTD NEW COM	0.30%	0.79%	-0.49%	-40.43	0.02	25.38%	0.88	0.32		
GE	GENERAL ELEC CO COM	2.46%	4.29%	-1.83%	-23.48	0.06	90.65%	0.00	0.10	3.62	

Build Transparency: Weekly Performance SnapSheet

<u>Weekly SnapSheet</u>							
		<u>Tracking Error</u>			<u>Beta</u>		
		<u>Current</u>	<u>Last Week</u>		<u>Current</u>	<u>Last Week</u>	
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	
<u>% Cash Exposure</u>							
		<u>Current</u>	<u>Last Week</u>				
Fund A		1.12	4.98				
Fund B		3.80	3.73				
Fund C		15.26	3.10				
<u>Benchmark Relative Sector Exposure</u>							
		<u>Largest Overweight Sector</u>	<u>Weight Diff.</u>			<u>Largest Underweight Sector</u>	<u>Weight Diff.</u>
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
<u>Benchmark Relative Company Exposure</u>							
		<u>Largest Overweight Company</u>	<u>Weight Diff.</u>			<u>Largest Underweight Company</u>	<u>Weight Diff.</u>
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
<u>YTD Active Management Performance</u>							
					<u>Peer Rank</u>	<u>Excess Performance</u>	
		<u>Actual</u>	<u>Static</u>	<u>Optimized</u>	<u>Index</u>	<u>MTD</u>	<u>YTD</u>
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

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:

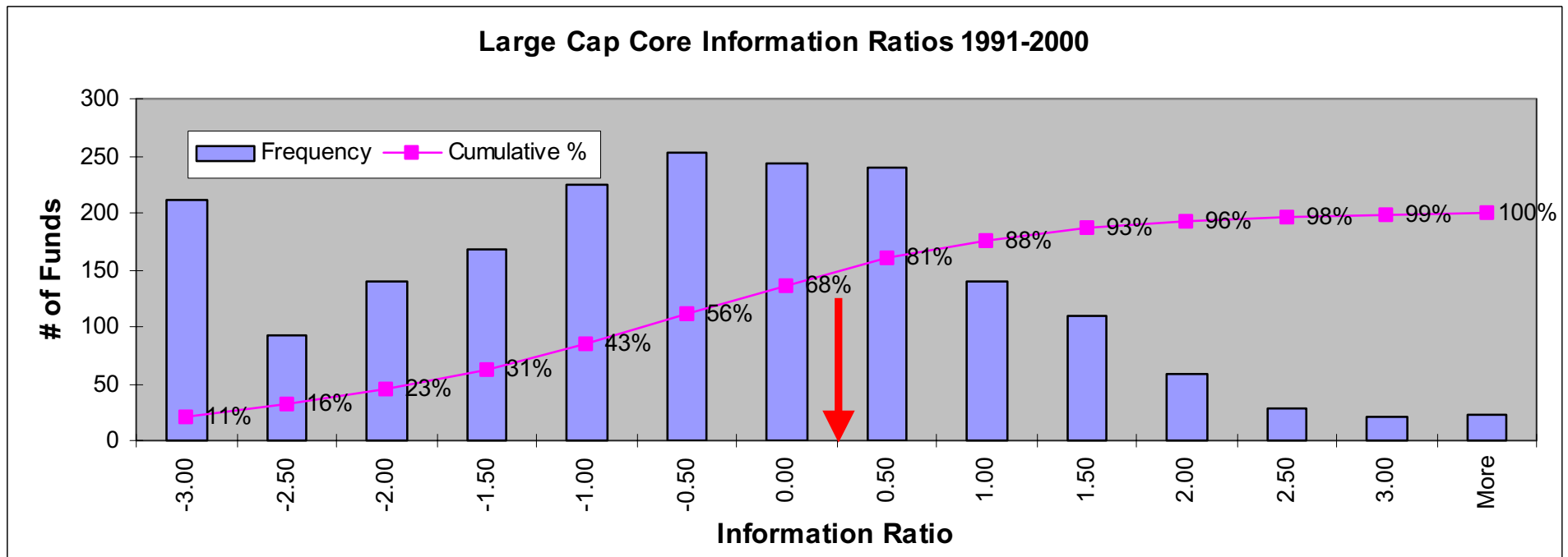
x=a stock's illiquidity (The > the number the more illiquid the stock.)

y=active weight in the portfolio

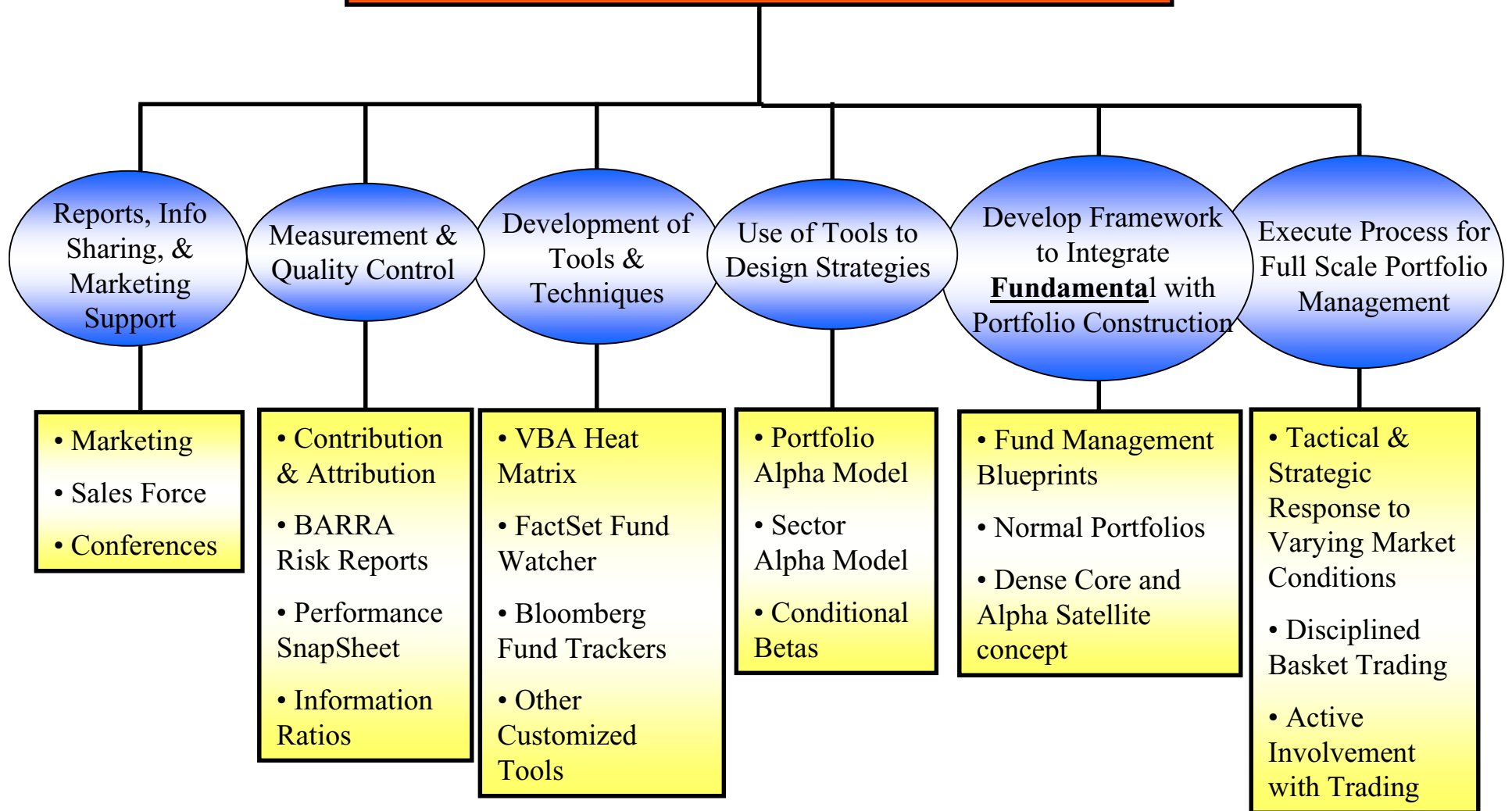
z=stock specific risk (According to BARRA's U3 Equity model.)

Using the IR to Incorporate Quant into a Fundamental Investment Process

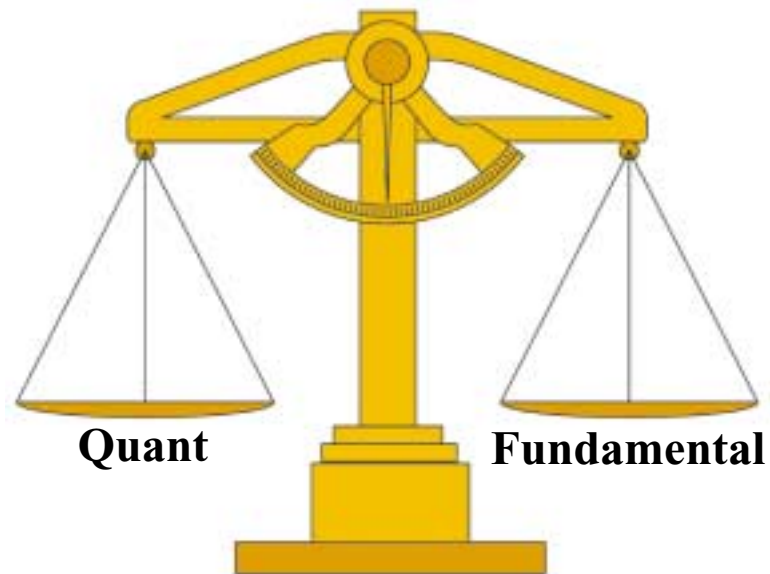
- Use incentives to incorporate quantitative processes and tools into investment products.
- Example:
 - Compensate PMs on Information Ratio = α / TE
 - The measure incorporates both return & risk



A Quantitative Platform

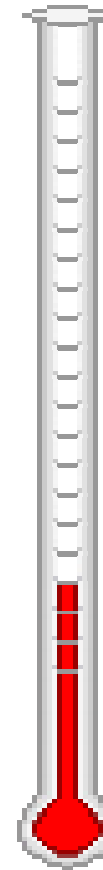


Balancing Quant & Fundamental



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.

Creating and Delivering Dreams



Pankaj Agrawal, Ph.D.
Villanova Capital
Director of Quantitative Investing