

“Exploring Capacity Issues:”

Building a Fund from \$30 bn to \$324 bn
While Keeping the Alpha Capability

The Q-Group Spring 2007 Seminar,
Georgia, 28 March

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Norges Bank Investment Management

Agenda

- Background and Facts
- Transition in Two Dimensions:
Strategic: From Oil to International Securities
Financial: From Cash to Equities
- The Alpha Challenge
- Results
- Discussion
The Advantage of Size
Capacity Constraints

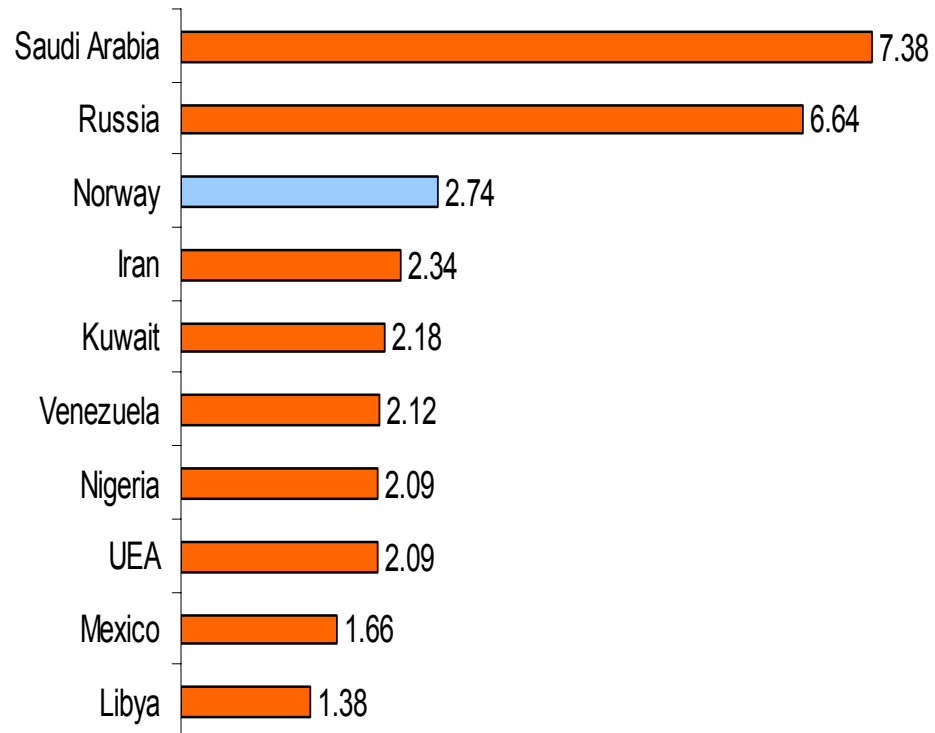
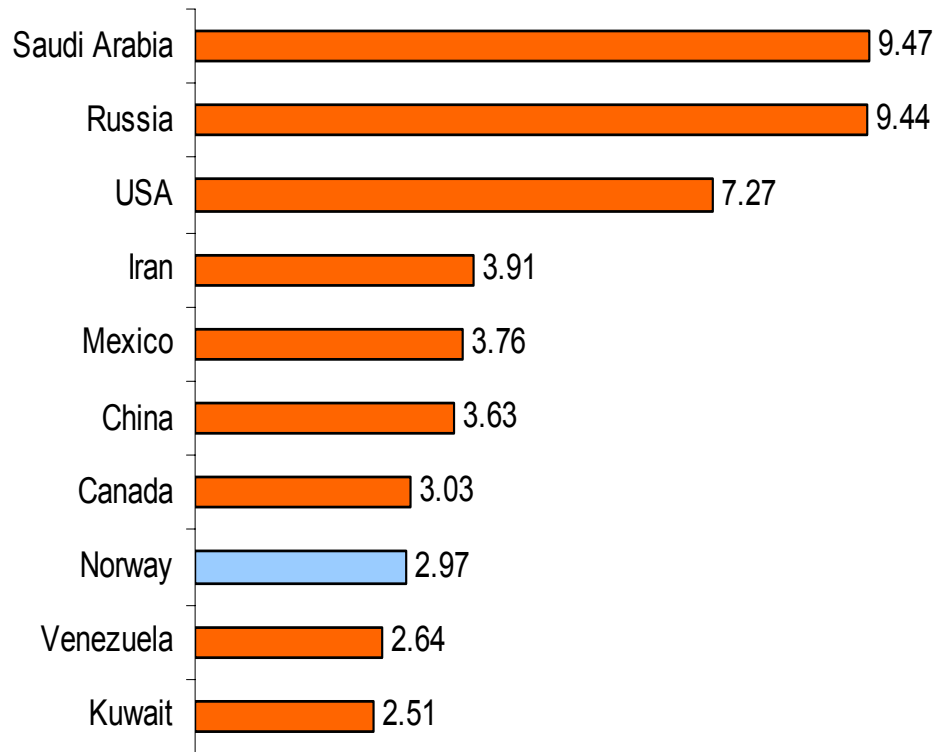
Background and Facts

The Ranking of Oil Producers 2005

(mill b/d)

Production

Net export

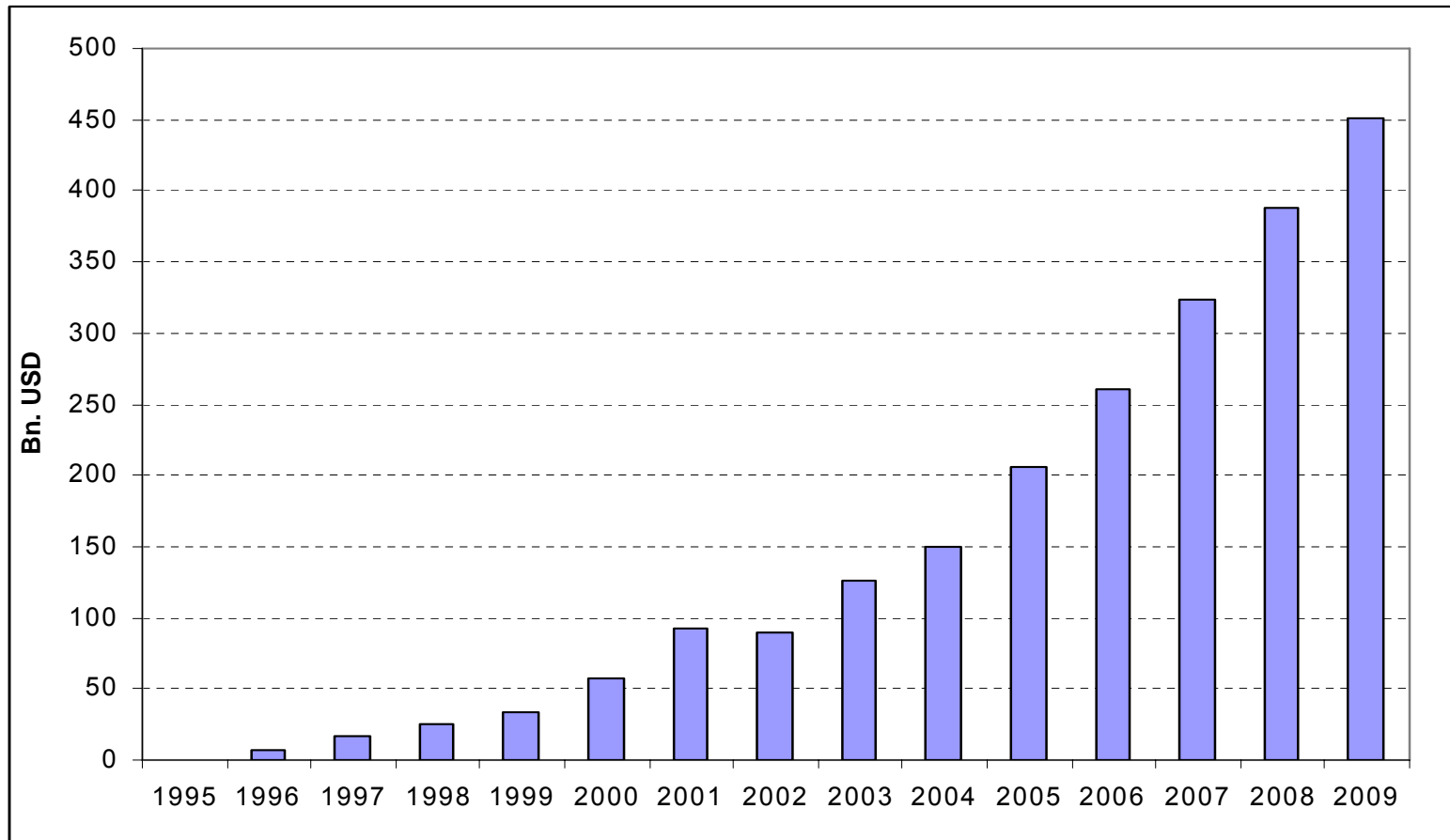


Source: Fact sheet 2006

The Norwegian Oil Fund and NBIM

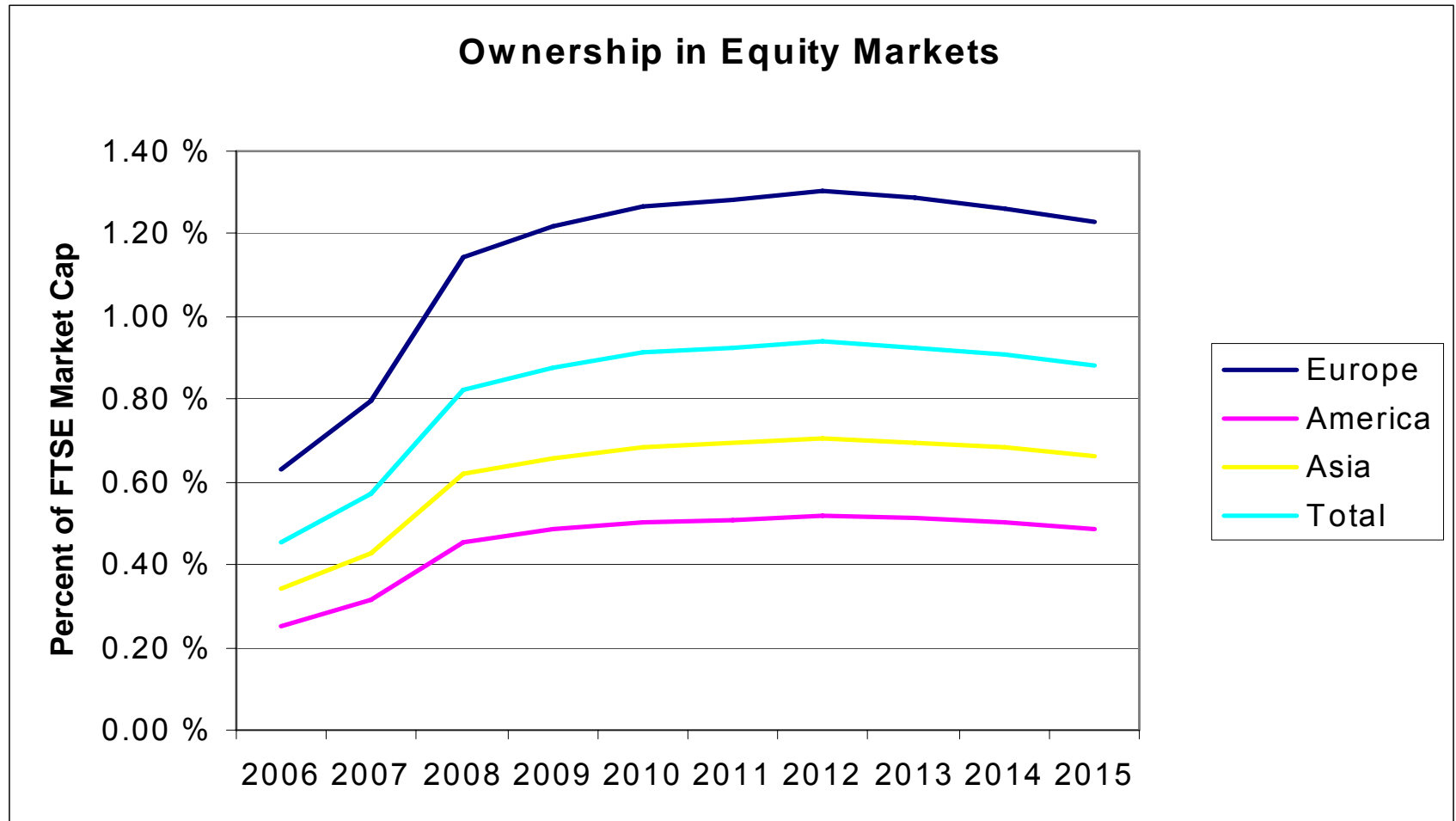
- Norway is the world's 3rd largest exporter of oil
- Since the late 1990's the bulk of oil revenue has been saved to the Oil Fund for future generations
- NBIM was established in 1998 and manages the Oil Fund and the bulk of the Central Bank's currency reserves
- The Ministry of Finance owns the Fund and sets the benchmark
- Asset under management in NBIM increased from USD 30 bn at inception in 1998 to USD 324 bn at year end 2006

Projected Growth of the Government Pension Fund - Global



Source: National Budget 2007, October 2006

A Possible Scenario



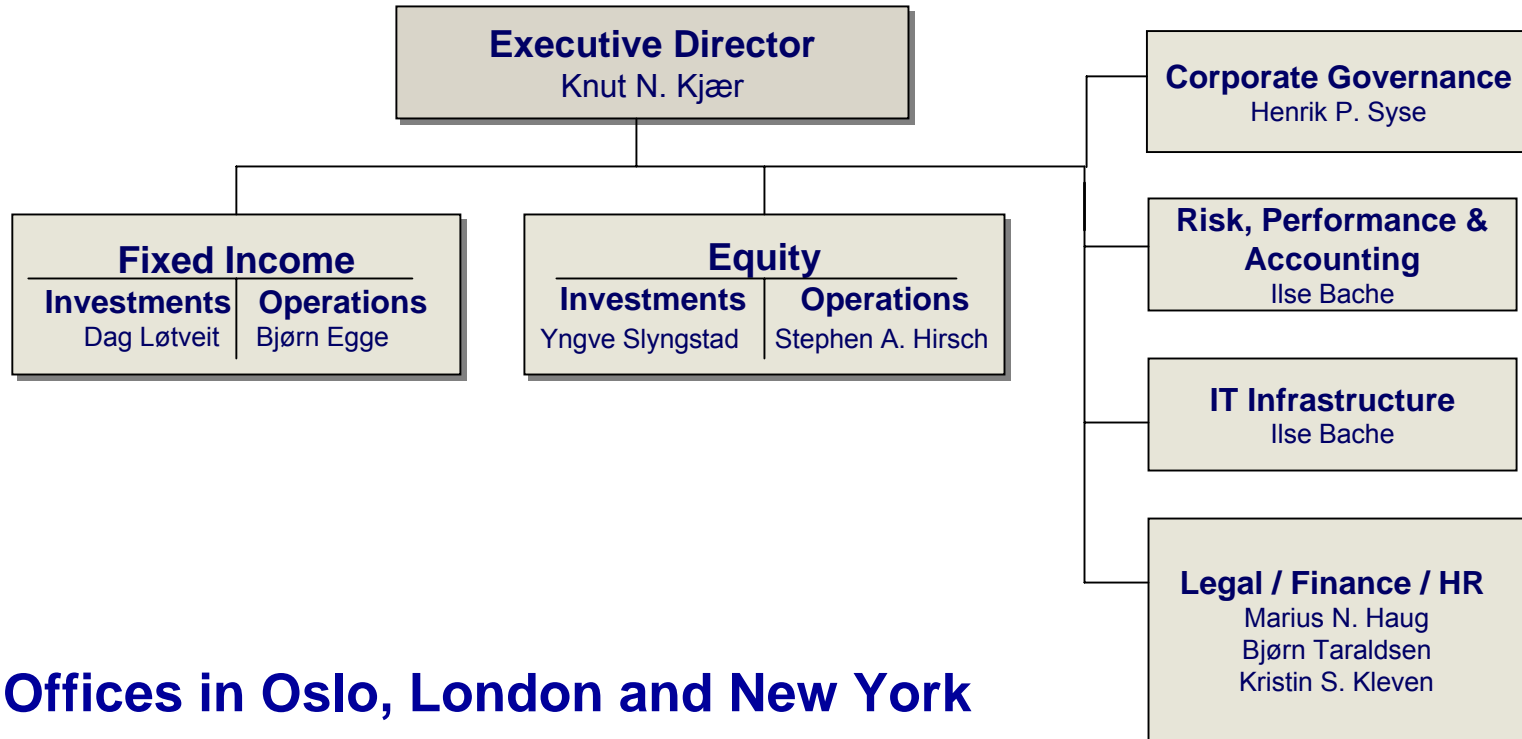
Norges Bank Investment Management (NBIM)

- **NBIM was established in 1998 as a separate wing of Norges Bank. NBIM is organised as a business unit. Offices in Oslo, London and New York**

- **Funds managed by NBIM as of 31 Dec 2006 (billion USD):**

The Pension Fund - Global	286
The Foreign Exchange Reserves	36
The Petroleum Insurance Fund	2
Total	324

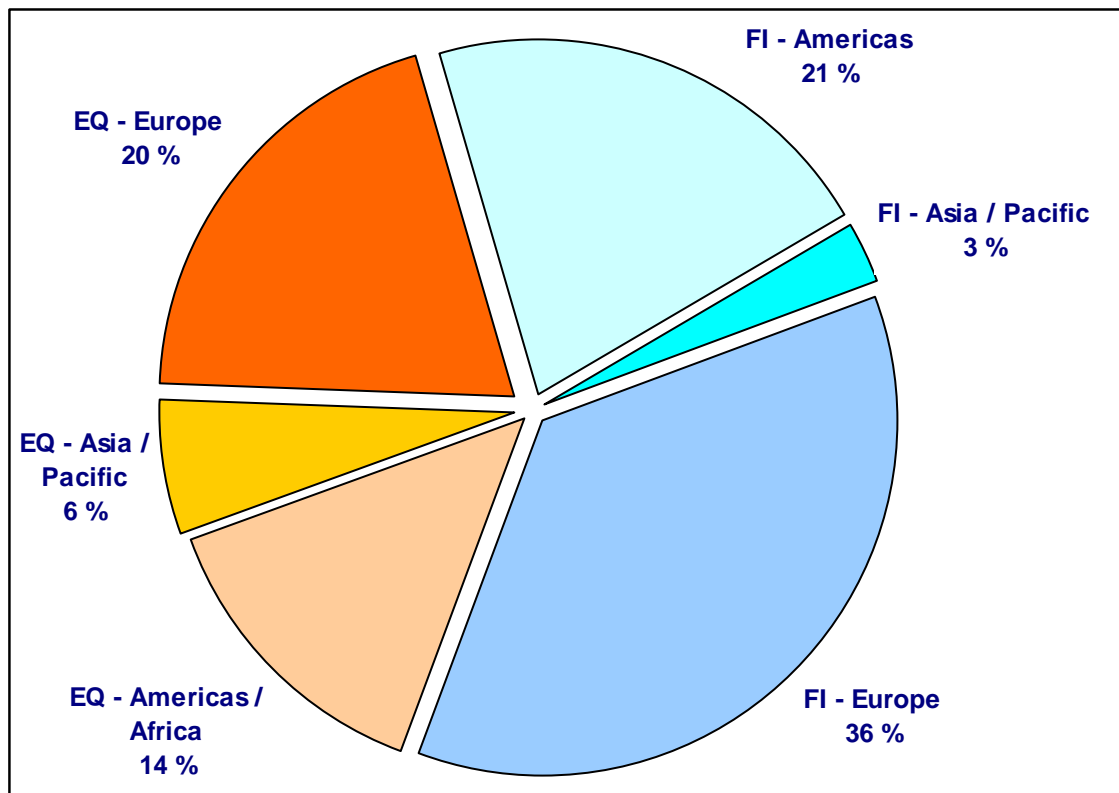
NBIM / Organisation Chart



Offices in Oslo, London and New York

Number of Employees as of 31.12.2006: 132

Benchmark for the Pension Fund-Global



Strategic benchmark:

60 % Fixed Income

40 % Equities

“Smart” rebalancing:

- Monthly inflows
- Asset class / region with largest negative deviation from benchmark

Equity index:

**FTSE All World Index
Large & Mid Cap
Approx. 2 400 equities**

Fixed income index:

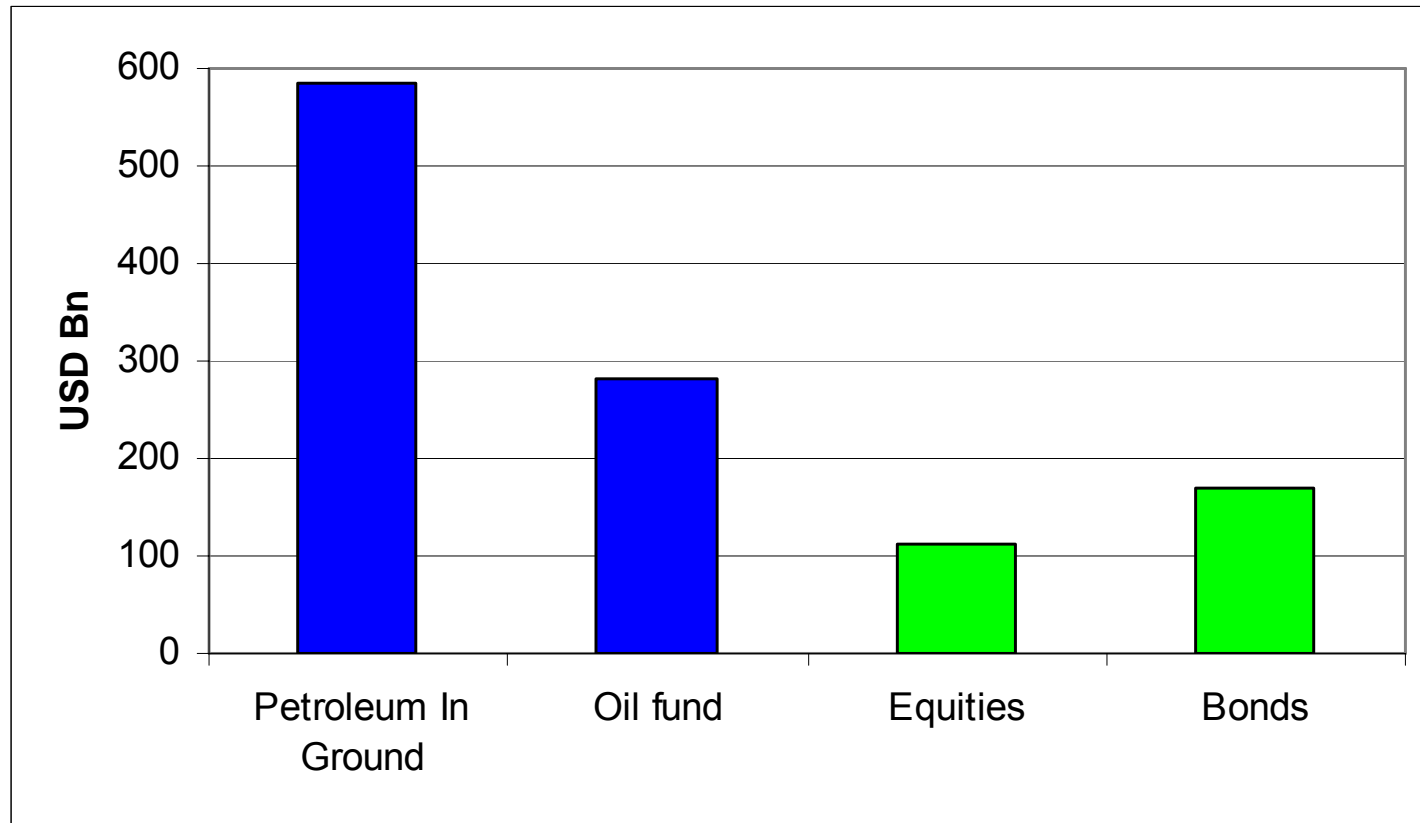
**Lehman Brothers Global Aggregate
Government / Agency / Corporate / Securitized
Approx. 9 300 bonds**

Transition in Two Dimensions:

Strategic: Oil to International
Financial Securities

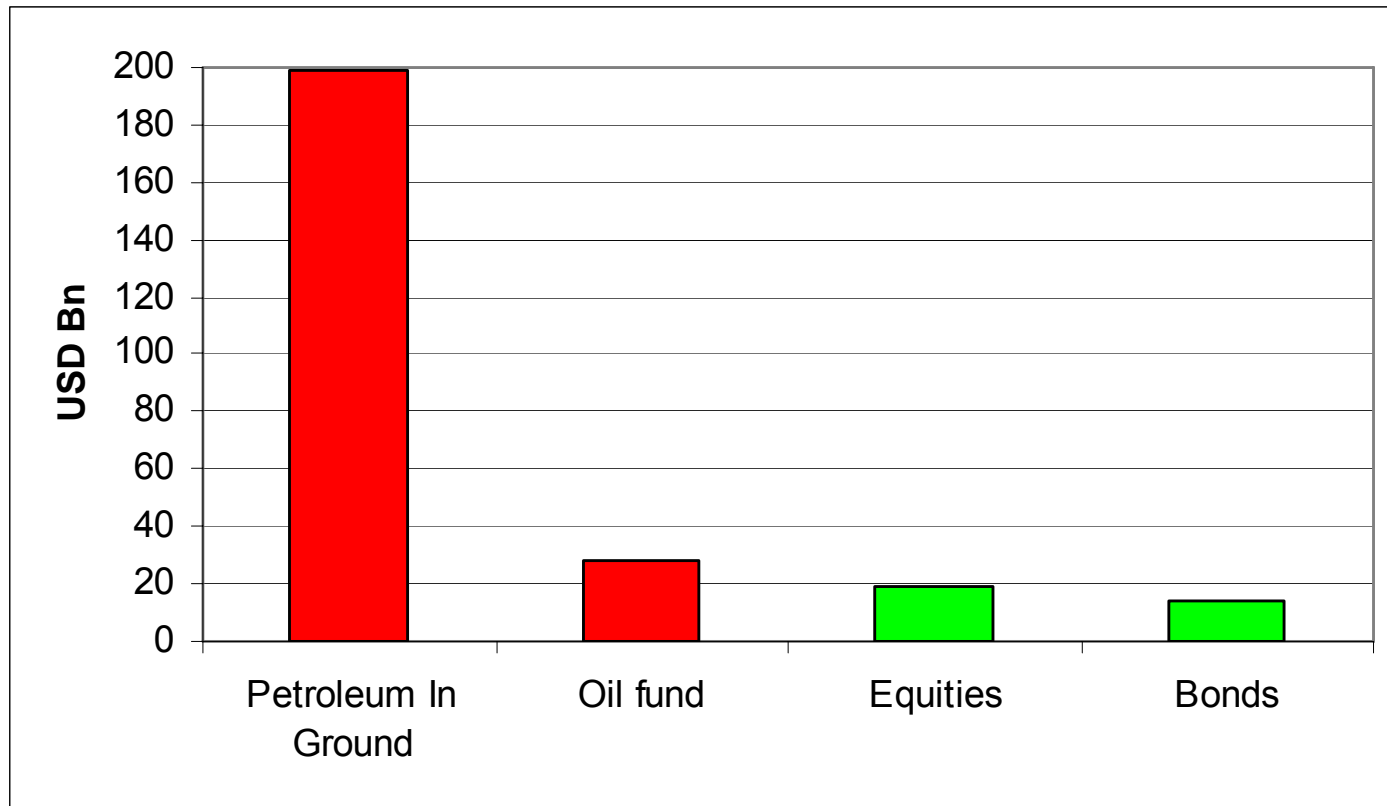
Financial: Cash to Equities
and Fixed Income Securities

Petroleum Wealth - Autumn 2006



Petroleum in the ground: Net present value of the government's future cash flows from oil activities. Estimated at NOK 3660 billion at constant 2007 values (Source: National Budget 2007)

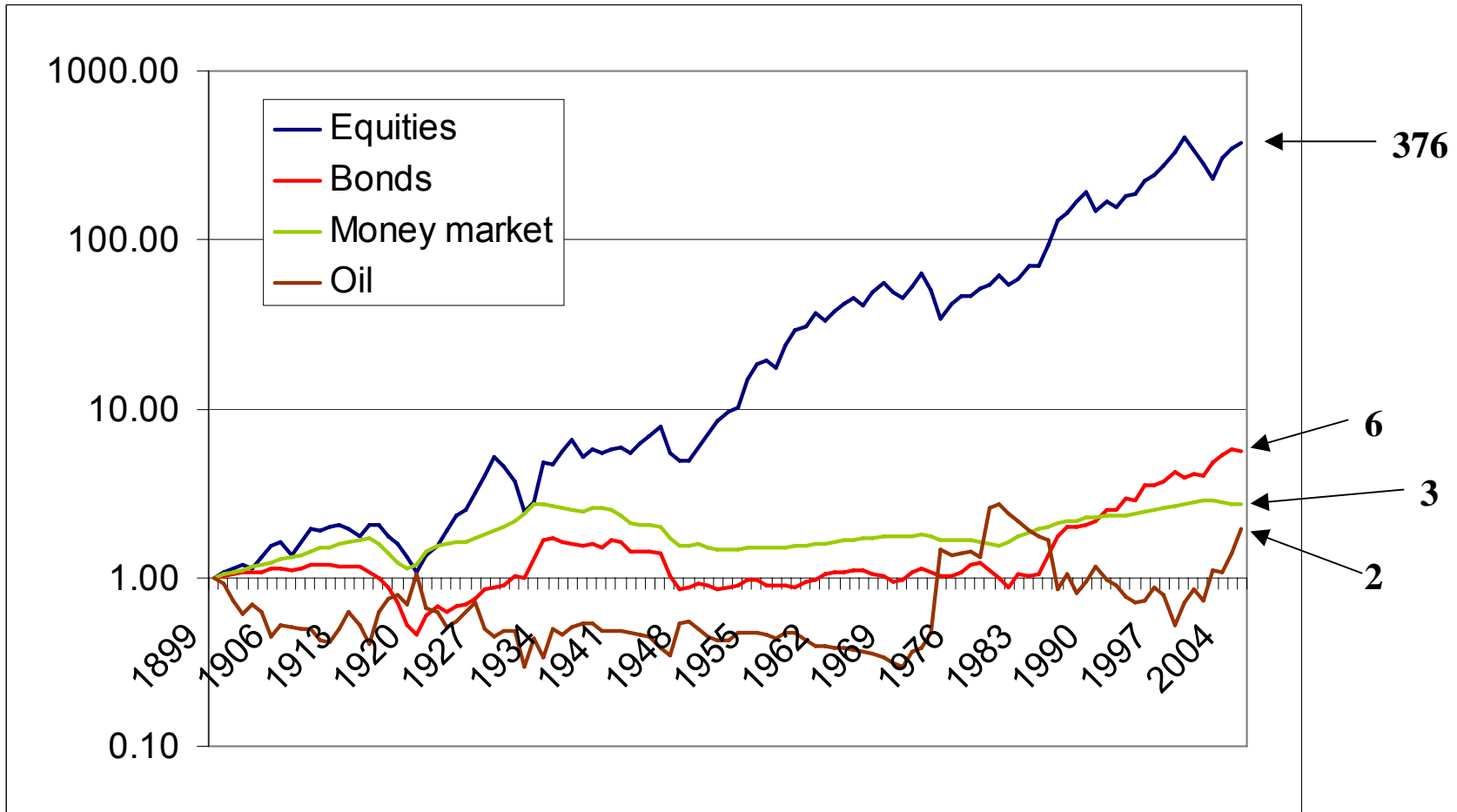
Petroleum Wealth - Value at Risk



Value at Risk is defined as one standard deviation in this context.

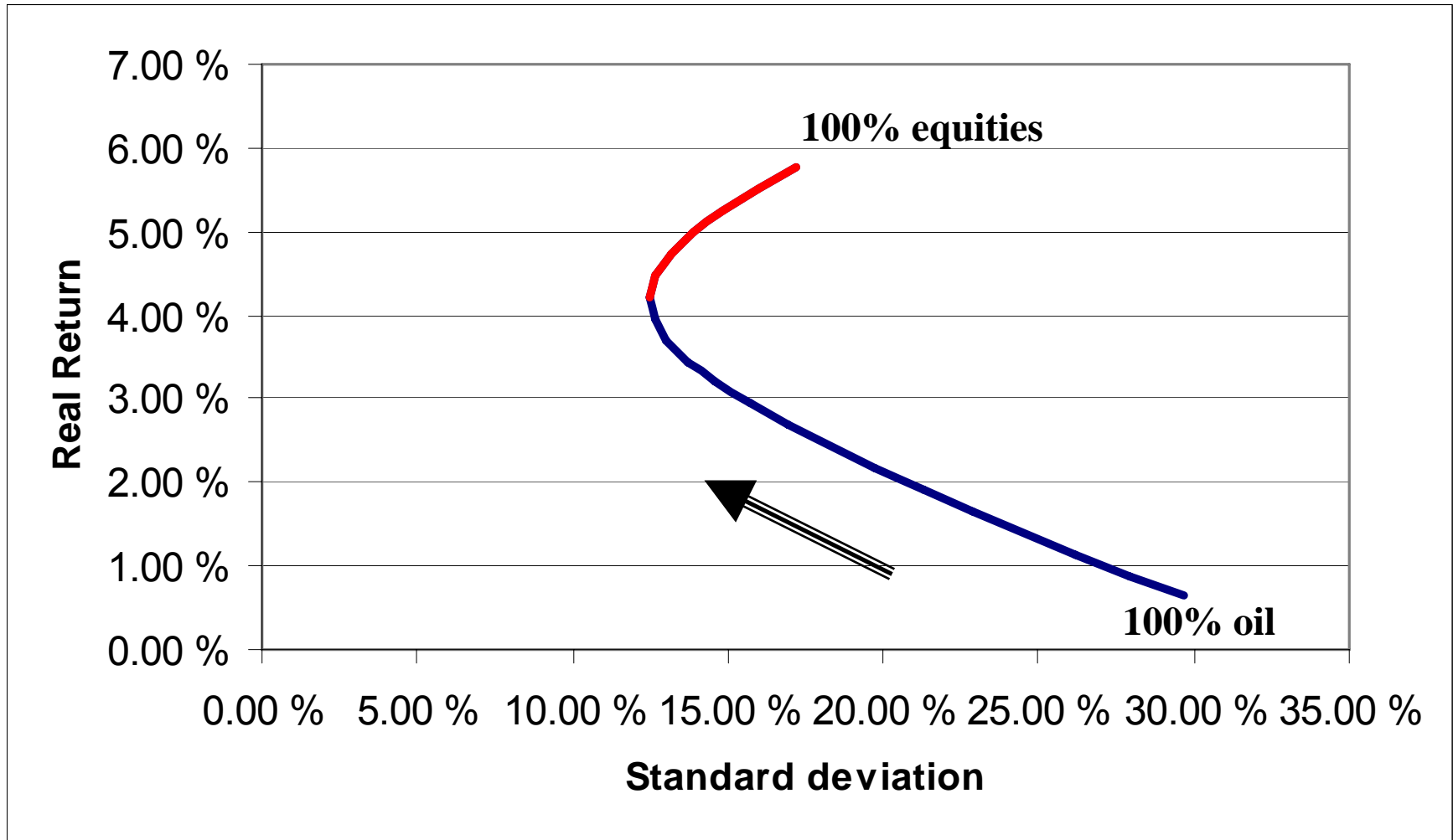
The actual values will fluctuate outside the bands in one out of three years

Real Global Market Returns 1900 – 2005

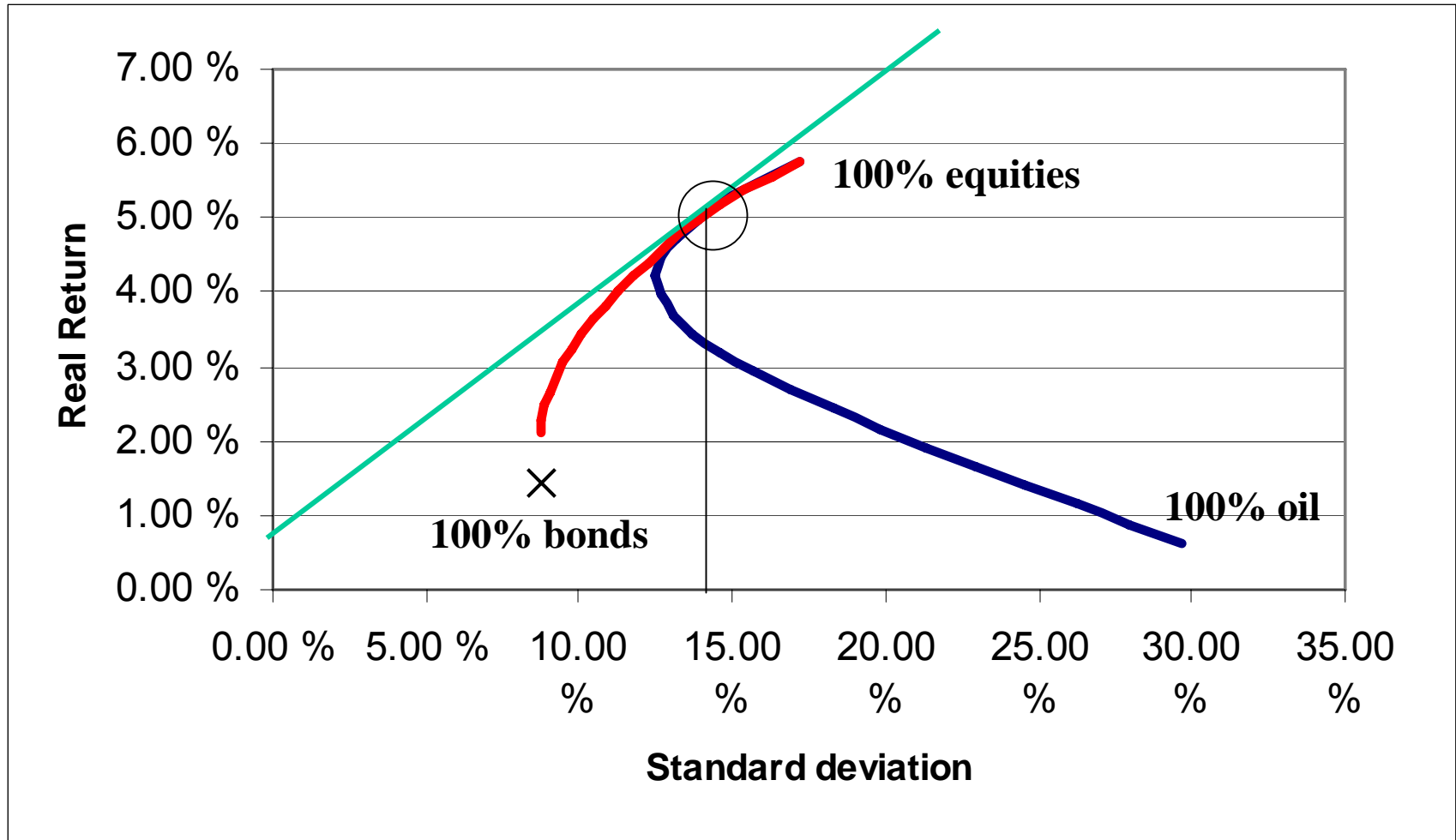


Source: Dimson, Marsh & Staunton, Triumph of the Optimists, 2002, with updates

Portfolios of Oil and Equities



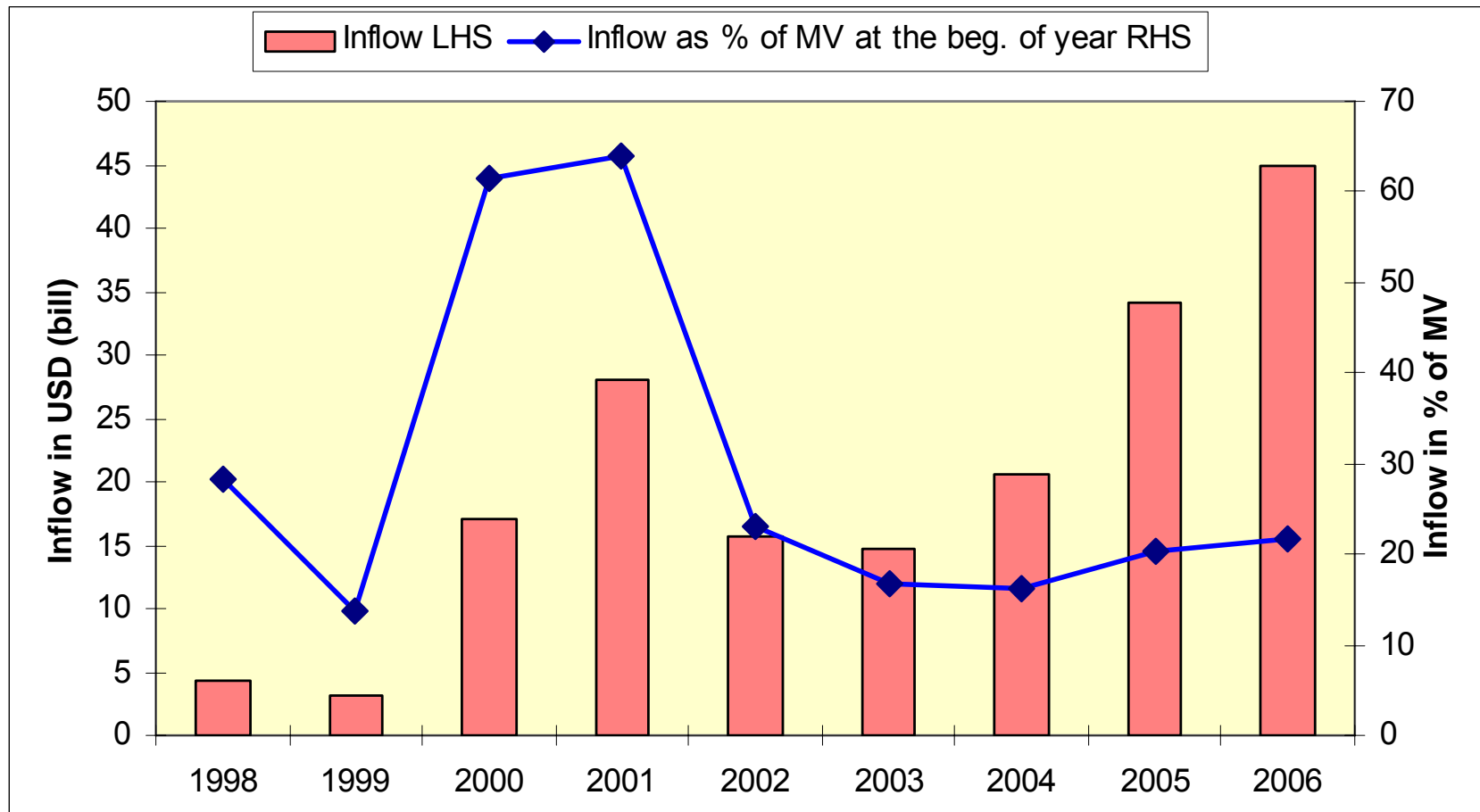
Portfolios of Equities, Oil and Bonds



Strategy: Transition From Petroleum

- The Oil Fund's key function is to diversify the Petroleum Wealth into a broad portfolio of international securities
- The transition takes down the expected risk significantly and increases the expected return
- The Fund makes the income stream from the non-renewable resources permanent
- The intention is to spend only the (expected) real return at the annual public budgets, thus preserving the capital of the fund for all future generations

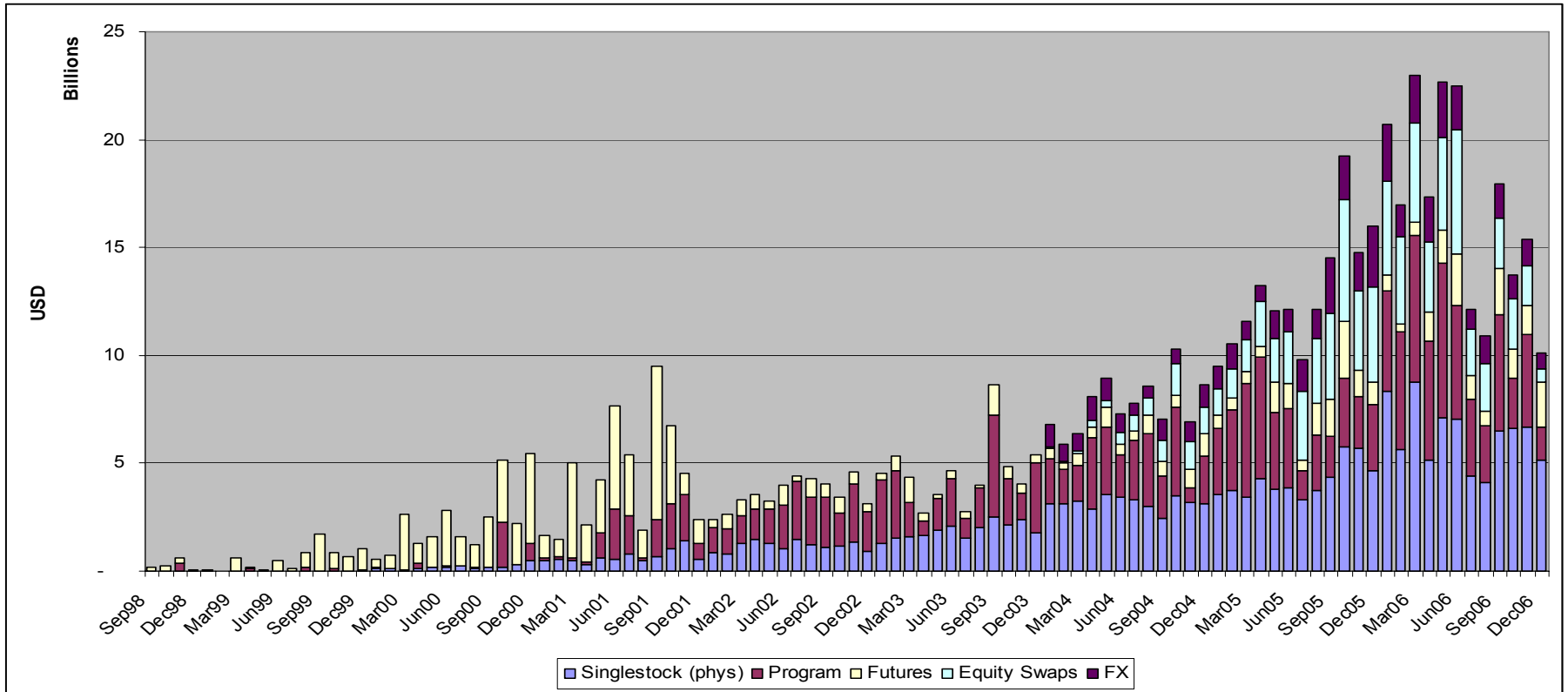
Implementation: Transition From Cash



Trading Efficiency

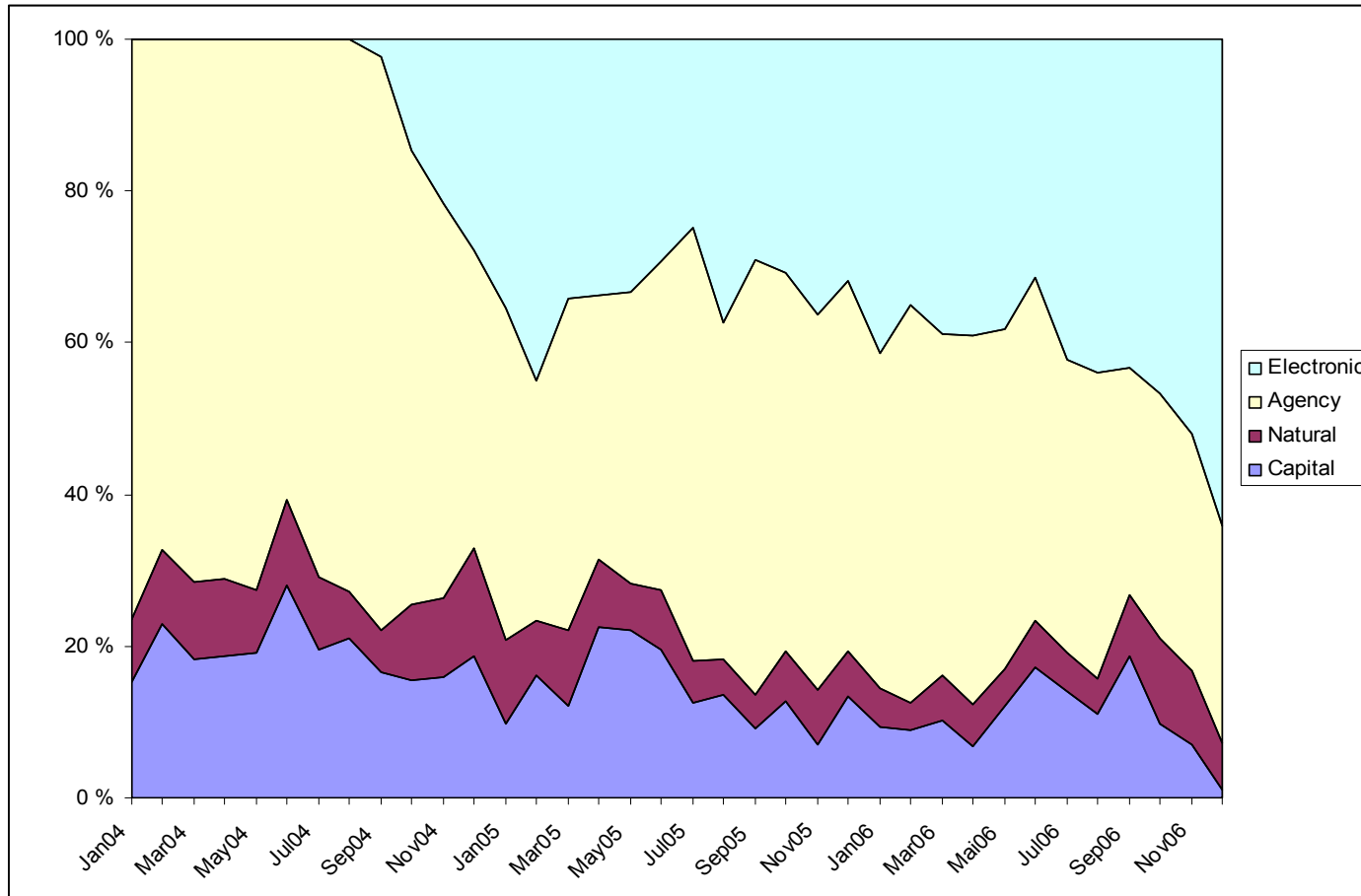
- Given the expected large inflows and expected large size, NBIM knew early on that efficient trading was critical to success
- If trading was not efficient, NBIM would easily spend any alpha generated and more
- System advances over the last 9 years along with management willing to focus on trading has enabled NBIM to build the infrastructure and gain the expertise to compete in a competitive part of the marketplace
- Data is the key to improving trading efficiency. Tracking all data components of the trading cycle is extremely difficult but more than pays for the effort

Total Equity Trade Volume 98 - 06



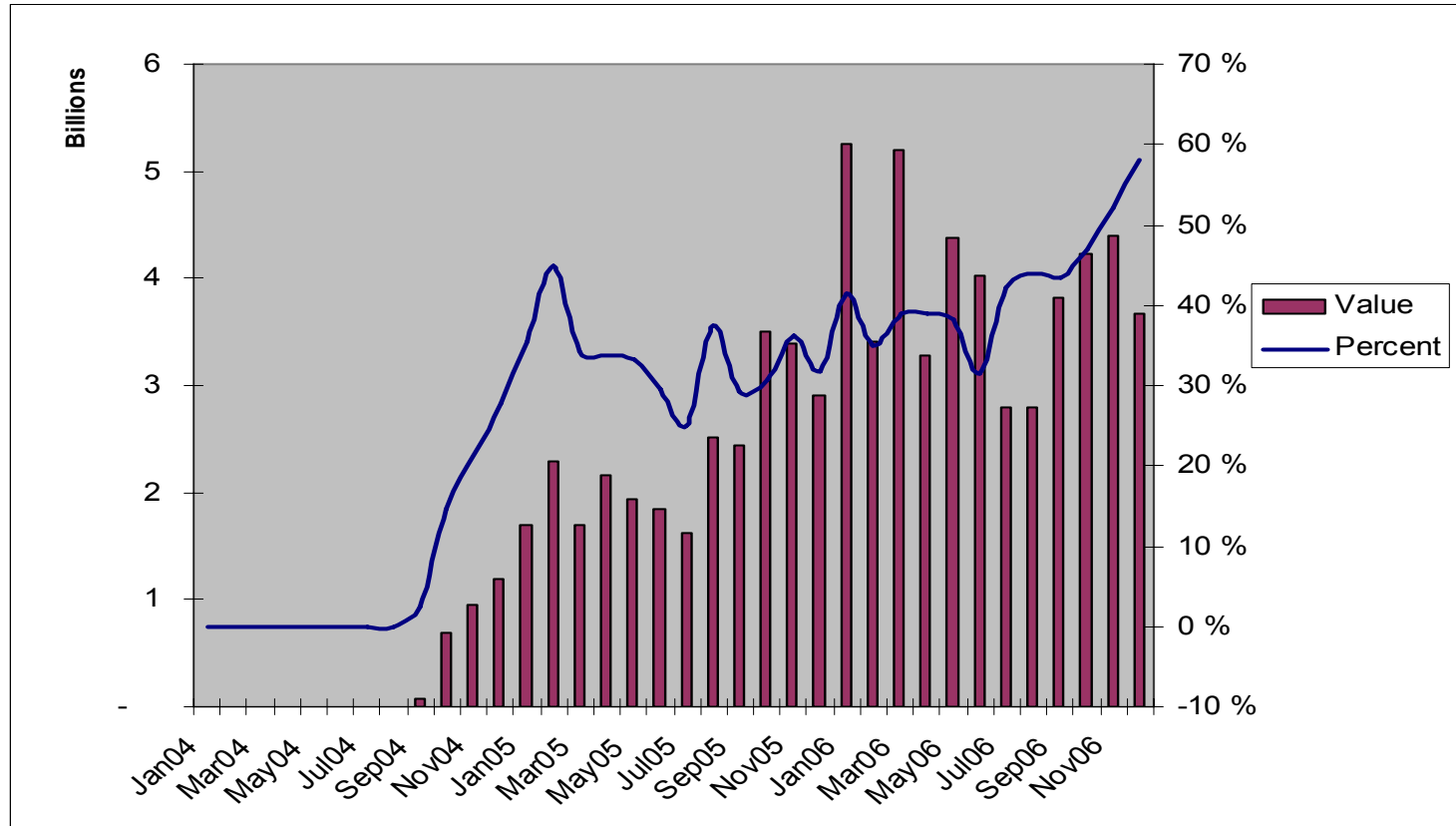
Equity trading volume tripled from the end of 2004 to the summer of 2006 and is expected to increase for the foreseeable future

How is Volume Distributed (%)



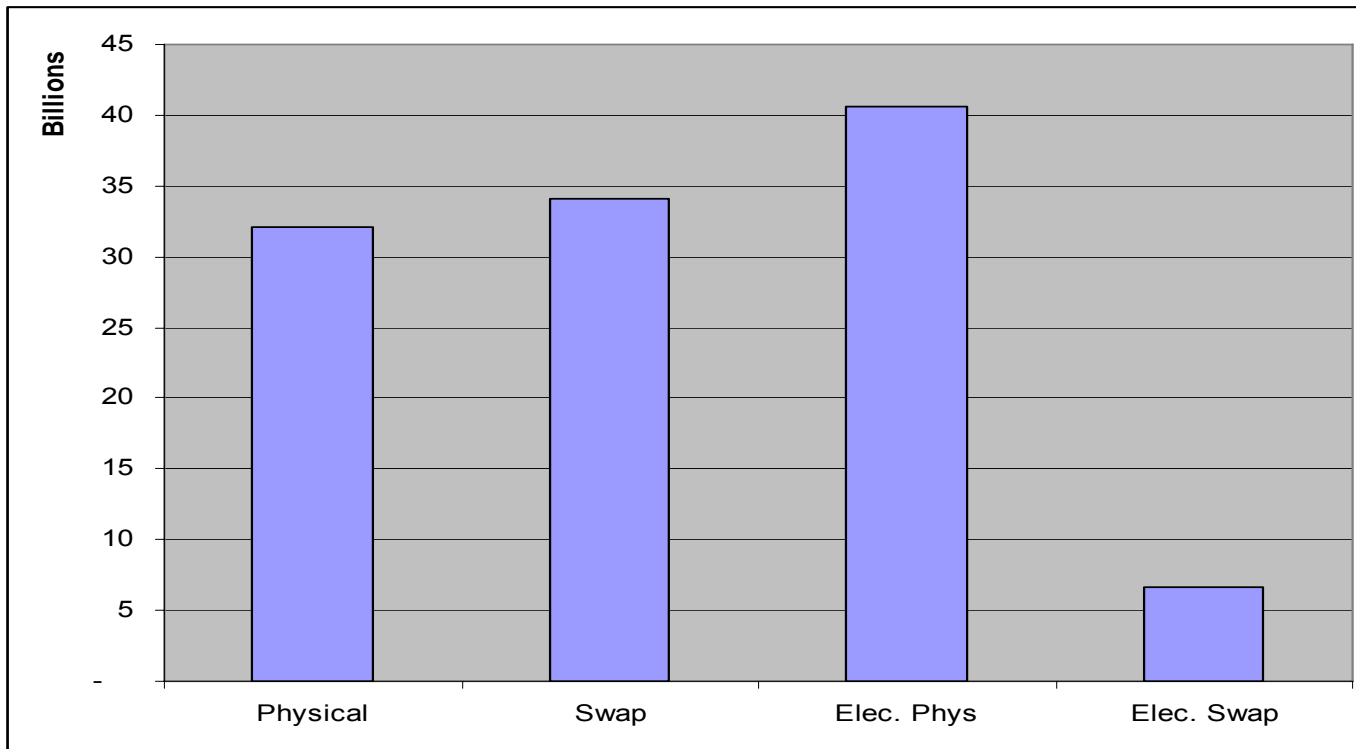
Natural flows and capital are the sweet spots for broker interaction. This is an area of focus for us. Tracking costs told us that agency is not optimal relative to other alternatives.

Electronic Trading Volumes 2004 - 2006



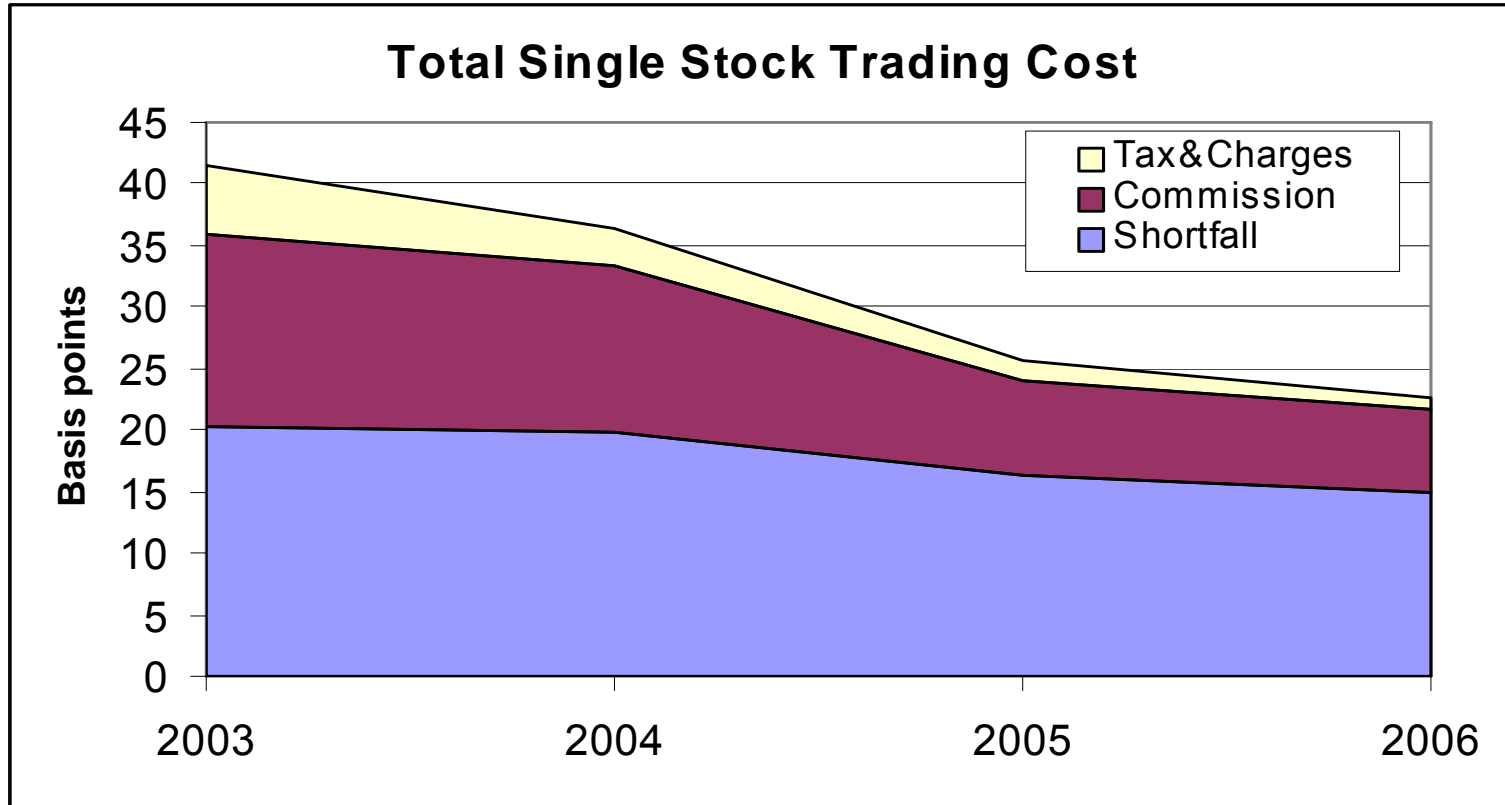
Being nimble is important in the fast changing trading environment. We see electronic trading as an important tool required to improve efficiency and lower total trading costs.

Volume By Instrument 2006



Swaps have their place in an investment strategy, but are expensive to trade given constraints in execution. Tracking costs enabled us to see the costs confirming what the traders were telling us.

Cutting the Trading Cost



Diligent management enabled a significant decrease in trading costs despite strong growth in volume and average ticket size

Trading - Conclusions

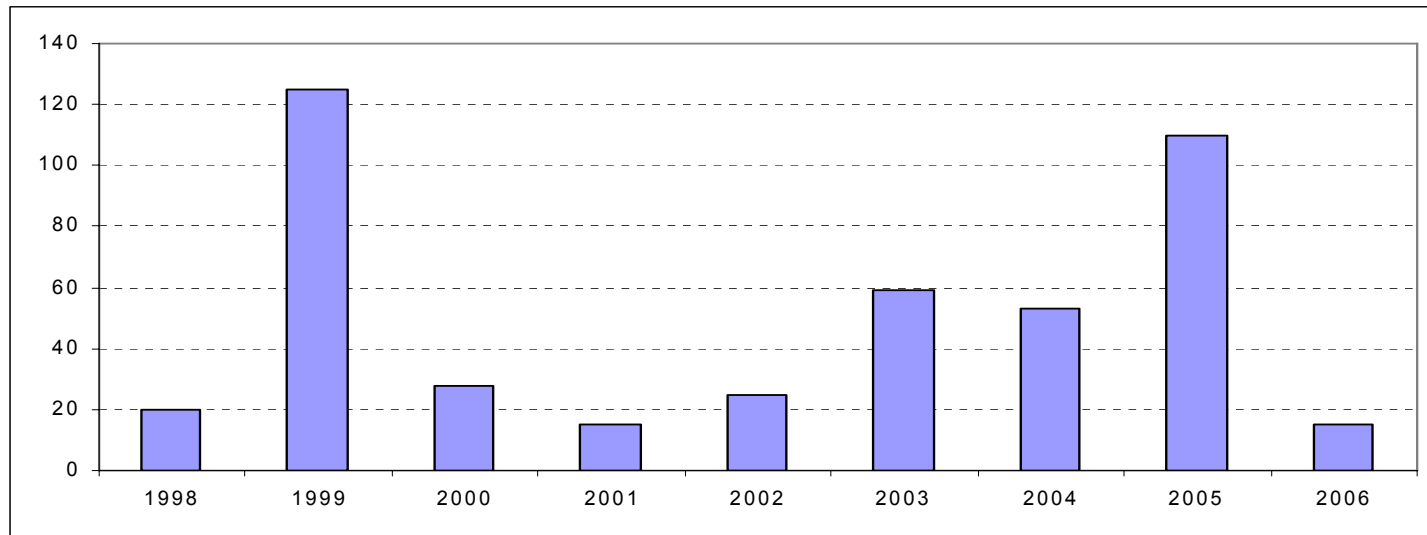
- Actively managing and monitoring all trading costs is important
- Lowering commissions is only a small start
- The ability to influence the trading mix has changed dramatically over the last 5 years giving the buy-side the tools to actively manage total trading costs
- The key to lowering trading costs is **Data** and access to **Data**. Good **Data** is important not only for improving trading costs but should also be extended to improving portfolio management decisions

The α Challenge

Challenges in Alpha Management

- Create excess return against the benchmark
 - targeting 0.25% over rolling 3 year horizons
 - with costs less than 0.1% ex performance fees
 - and annual inflow at USD 20 – 50 bn / year

Excess Return, Basis Points



Move to More Scalable Alpha-Strategies May Imply Lower Information Ratio

- NBIM prefers relative value and fundamental strategies
- Our IR is now 1.22 However, we may be forced to move to more factor based strategies

Management strategy	Tactical allocation	Factor-based strategies	Fundamental strategies	Relative value
Analytical ability	+	+	++	+++
Number of independent positions	-	-	+++	++
Implementation costs	+++	+	++	+
Experience	-		++	+++
Expenses	Low	Moderate	High	High
Expected information ratio	Low	Moderate	High	High

The Principles behind Our Active Management

- Very high respect for the market. Applying financial theory. Humility and discipline
- Active management only where there may be some less market efficiency and where we find/develop managers with unique expertise
- Specialization. More than 100 sub-portfolios
- Extensive delegation. No committee structure
- Incentives linked to performance

"Financial Market Theory for Cautious Investors"*

"The possibility of achieving an above average return lies in being able to identify cases of incomplete market equilibrium. To be able to detect what is abnormal, it is necessary to know what is normal."*

* Jan Mossin, *Markedseffisiens* (Market efficiency), TANO, 1986

Textbook Approach to Active Portfolio Management

- Active management is a process. Active management begins with raw information, refines into forecasts, and then optimally and efficiently constructs portfolios balancing those forecasts of return against risk
- Active management is forecasting, and a key to active management performance is superior information
- Active managers should forecast as often as possible (the fundamental law)
- Mathematics cannot overcome ignorance/lack of information

R.C. Grinold & R.N. Kahn, Active Portfolio Management, 1994, 1999

”The Fundamental Law of Active Management”

- **Information Ratio = Return / Risk**

$$IR = IC \cdot \sqrt{BR}$$

Information Coefficient (IC) = $\text{corr}[\alpha, \theta]$

α = expected (ex ante) return

θ = actual (ex post) return

$\text{corr}[\alpha, \theta]$ = correlation between α and θ

Breadth (BR) = number of independent positions

- **The Challenge: Improve IC (hit ratio)**
- **and/or increase breadth by taking many independent positions and trade often**

Necessary Conditions for Creating Alpha

- Talented people
- Motivated and challenged in a rational, efficient and supportive structure

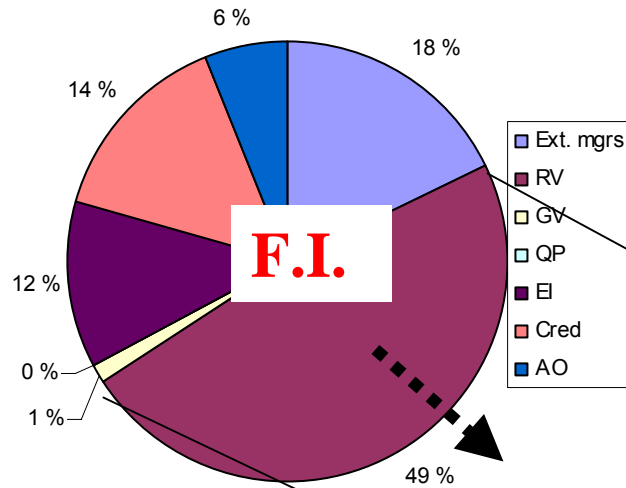
Rational and Supportive Structure

- Clear investment philosophy
- Various investment strategies
- Specialization
- Large number of independent positions
- Good access to information
- Alpha separated from Beta
- Low costs in trading and transitions

Specialization and Independence

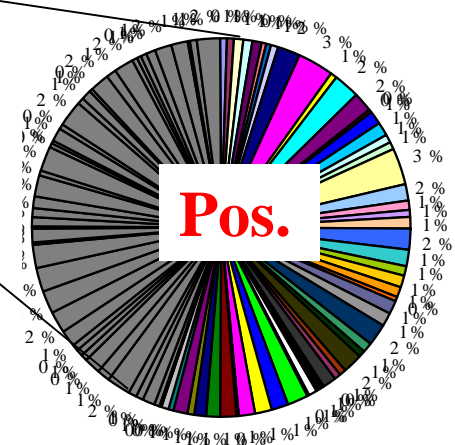
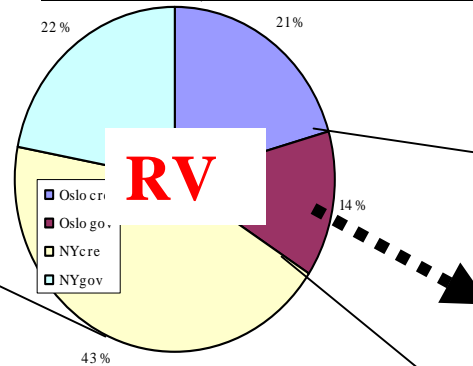
- Specialization, focus
Very clearly defined mandates. Specialist expertise to provide the competitive edge needed in a near efficient market
- Independence, low correlation
Different types of investment strategies in various units; a large number of individual investments. No committee decisions; no predefined processes

Example: Risk Allocation Fixed Income



Correlation matrices, profit units

	EI	cred b	cred a	rv	gv	qp	ao	ext a
Average	0.02							
EI	1							
cred b	-0.754115	1						
cred a	0.152501	-0.208785	1					
rv	0.723803	-0.822739	0.296542	1				
gv	0.180472	0.44208	0.209786	0.2730606	1			
qp	0.457215	-0.328319	0.136915	0.0839749	0.092456	1		
ao	0.387236	-0.560345	0.674421	0.6618643	0.036886	-0.063968	1	
ext a	-0.271266	-0.38964	0.323637	-0.0025061	-0.612593	-0.359838	0.125951	1



Talented People

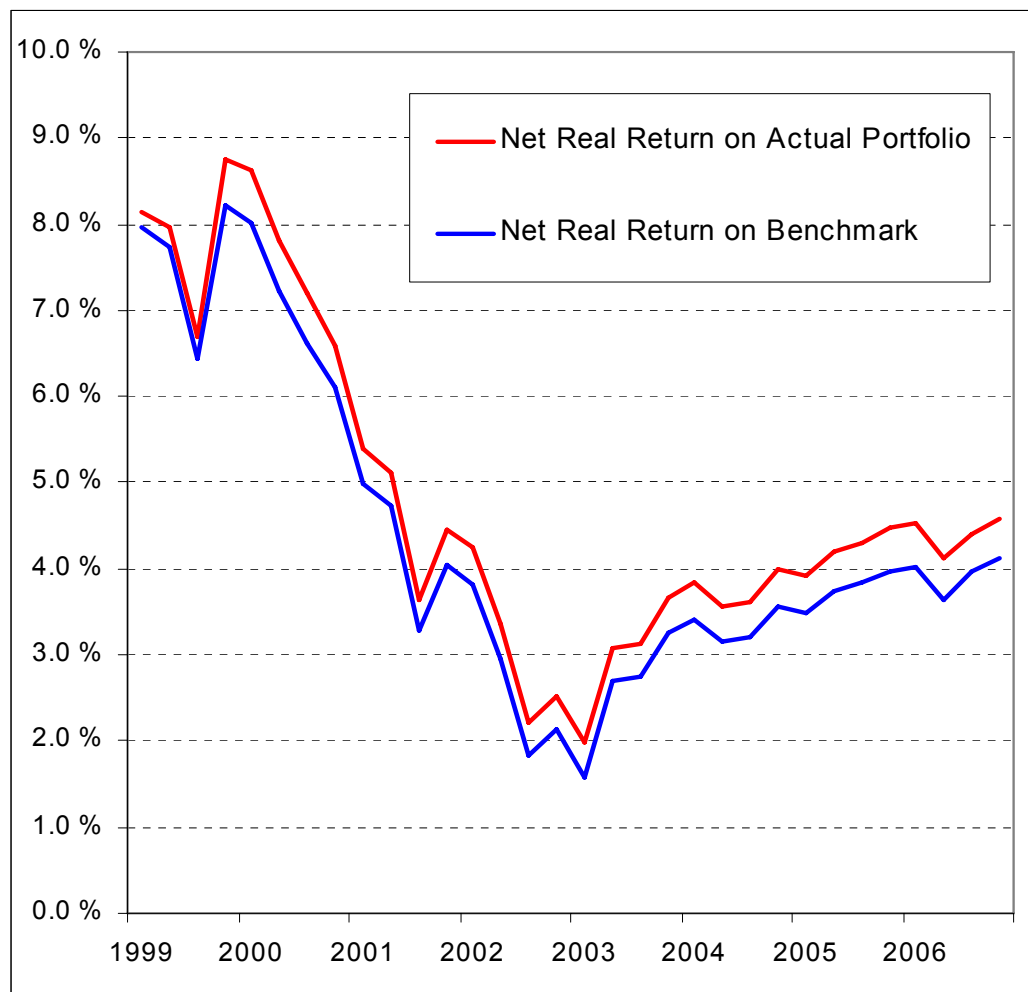
- NBIM learning from external and internal management: Alpha creation is mostly about the property of the people. Only special talents create alpha.
- The key issues is then: How to recruit, develop, motivate and retain talents

Empowerment and Ownership

- Individual investment mandates and considerable freedom to develop own investment style, methodology and tools
- Individual incentive structure
 - clearly defined and measured
 - ‘managing own money’
- Ownership in all other processes
 - operations included in the business units
 - division of responsibilities, defined work task
- Independence in team structure
 - optimal size for flexibility and communication
 - accountability and visibility without ‘atomization’
 - blending competition and support
 - avoiding ‘group think’

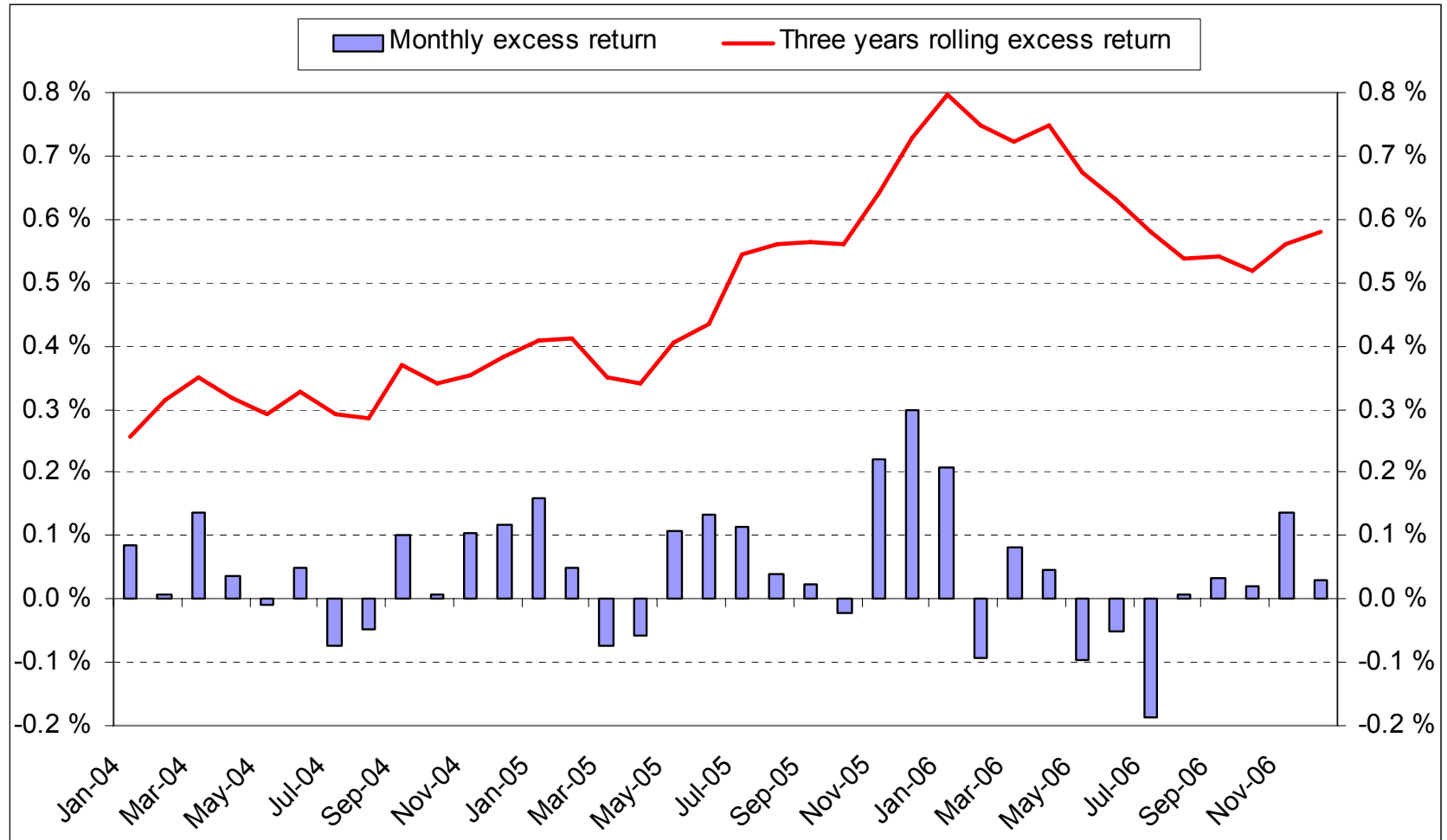
Performance

Average Annual Net Real Return Since 31/12 1996



- Average annual net real return (adjusted for management costs and inflation) is 4.58 %
- Annual real return on the benchmark is 4.12 %

Excess Return Last Three Years



Annualised Contributions to Gross Excess Return. 2004-2006. Percentage Points

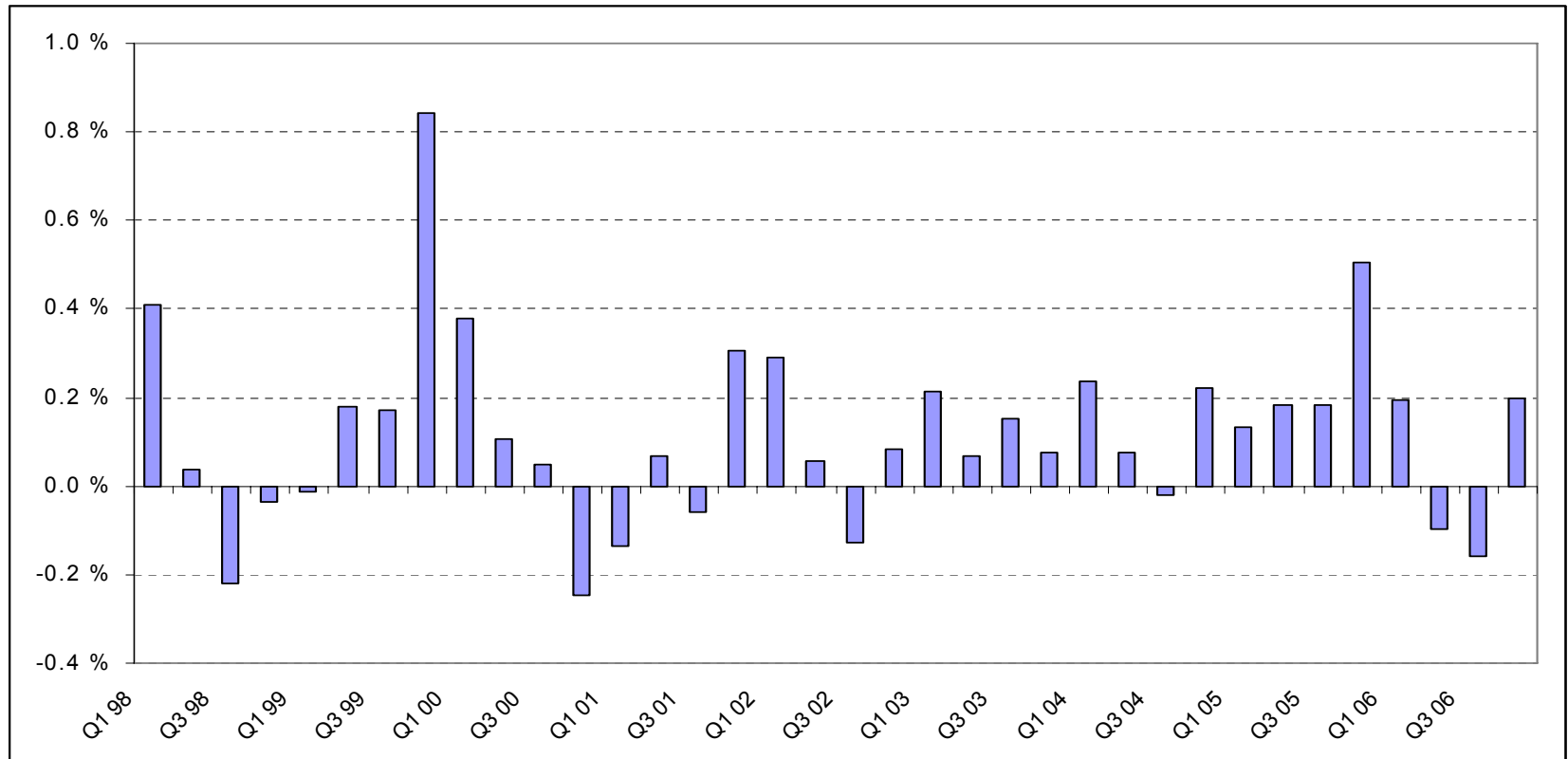
	External management	Internal management	Total	Excess return in each asset class
Equity management	0.18	0.20	0.38	0.95
Fixed income management	0.04	0.16	0.20	0.32
Total	0.22	0.36	0.58	

Information Ratios 2004 – 2006

	External management	Internal management	Total
Equity management	0.48	1.44	1.08
Fixed income management	1.69	2.58	2.77
Total	0.61	2.55	1.60

The IR is a measure of risk-adjusted return and is an indicator of skills in investment management. It is calculated as the ratio of excess return to the actual relative market risk to which the portfolio has been exposed. The IR indicates how much excess return is achieved for each unit of risk.

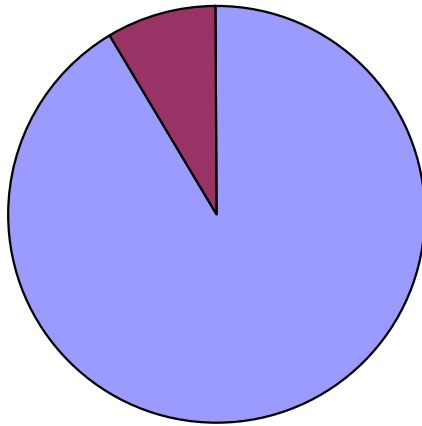
Quarterly Excess Return Since 1998



Average annual excess return since 1998: 0.48 percentage points
 Cumulative excess return NOK 28,9 bill.
 Information ratio 1.22

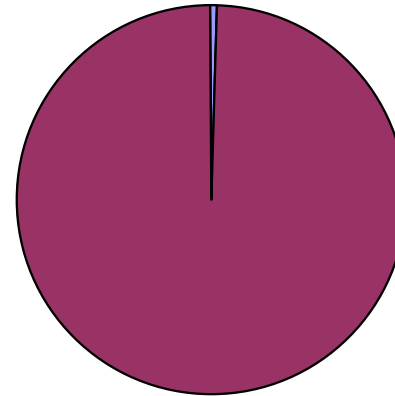
Excess Return and Contribution to Total Risk From Active Management

Excess return and return on the benchmark portfolio



■ Benchmark ■ Excess return

Risk contribution due to active management



■ Risk due to active management ■ Benchmark risk

- Active management has increased the return with no increased risk

NBIM Critical Success Factors

- Time is spent on professional challenges – not marketing
- Empowerment of individuals (mandates and resources)
- Delegated power matters more than placement in org charts
- No committee governance with unclear responsibilities
- Meritocracy – rewards and positions are based on performance
- Ability to change leadership and structure when performance or new challenges requires it
- Incentive level and structure is competitive and fosters the targeted risk-taking and behavior

Discussion

The Advantage of Size
Capacity Constraints

The Advantage of Size

- Economies of scale in beta management and transition
Easy to scale from a system and -competence base with fixed costs. Can afford large investments in systems
Low commissions. Our flow has value
Low trading costs gives more opportunity for applying quant strategies
- Size and organizational skills gives power to demand and build new products with service providers, like: Custodians, prime brokers, prime custody, back-office
- Size advantage in securities lending
- 24/7 systems and organization

The Advantage of Size (2)

- Access to company information; scale advantage in some research, easier access to the global talent pool
- Some lower fees in external management
- Top credit rating; balance sheet advantages
- Some studies indicates a positive relation between alpha and size (next two slides)

Large funds did better than small funds.

- On average, the Net Value Added was higher by 28 bps for a \$1 billion fund compared with a \$100 million fund.

- Size predicted Net Value Added since larger funds have lower costs and have higher weightings in specialised, high performing asset classes. The belief is supported by the fact that the size factor was reduced significantly when the following factors were added: Total Cost, US Small Cap Stock, and Private Equity.

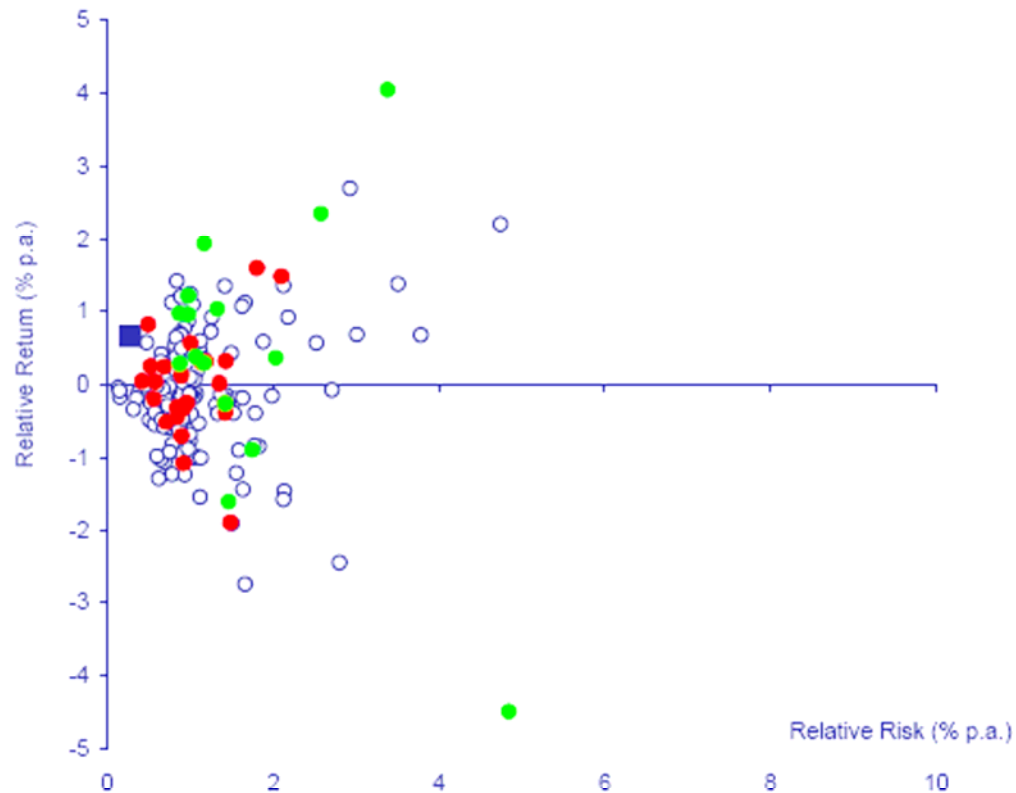


Net Value Added versus Size (log10)	1991-2005
All Funds	
Log (Size) Coefficient	0.28%
"t" statistic	4.3

"T" statistic values in excess of the absolute values of 2.0, 1.6 and 1.3 are significant at the 95%, 90% and 80% confidence levels, respectively.

Net Value Added vs. % Private Equity, % US Small Cap Stock, Total Cost (bps) and Size (log10)	1991-2005	
All Funds		
	Coefficient	"t" statistic
Private Equity	4.933%	2.8
US Small Cap Stock	2.700%	3.1
Total Cost	-0.004%	-1.4
Log (Size)	0.155%	1.9

Big is Better?



○ WM All Funds Universe

● WM50 Universe

● Top 15

○ Each circle in the risk/return space represents a fund relative to its own benchmark.

Capacity Constraints

- Market impact. (Trading costs may eat too much of the alpha return. But as explained, we try to build trading into an advantage)
- May have constraints in external active management
- Lack of scalability in some of the internal alpha strategies. May be difficult to keep the return targets?
- May a fat and complacent organization follow with increased size?

Discussion

- Yes, it is possible to become too big, but we are still not there
- When there is one owner of the assets; by splitting in different portfolios, there is a risk for ending up with costly index management (overlap that averages out active positions)
- Better way of splitting up: Keep the beta and transition machines, set up different & focused alpha satellites
- Avoiding being fat & complacent: Line structure with real delegation, results having effect on compensation and position for everybody, outsourcing of all activities that are not in the core business, individual measurement