Pensions

Istanbul - DC

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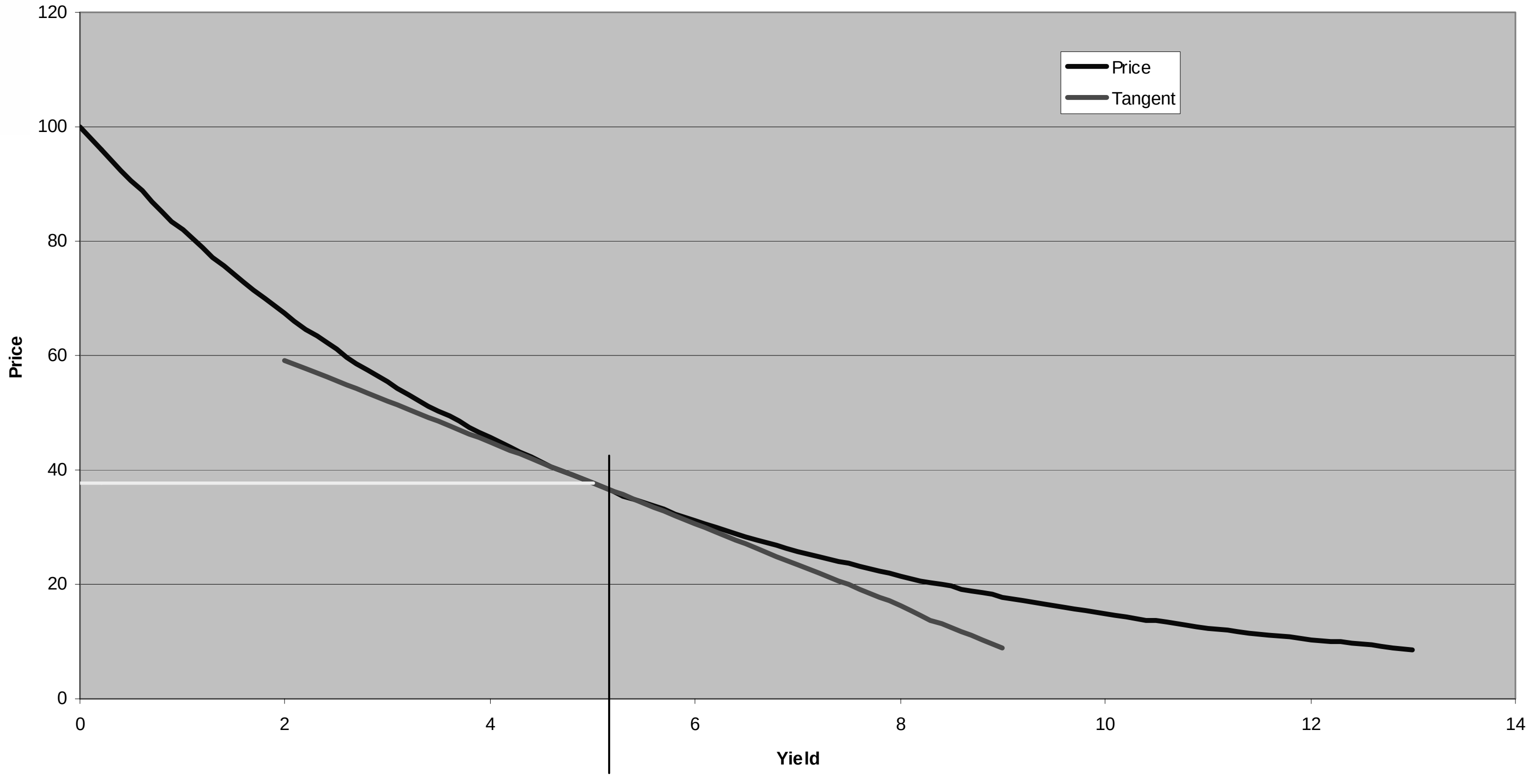
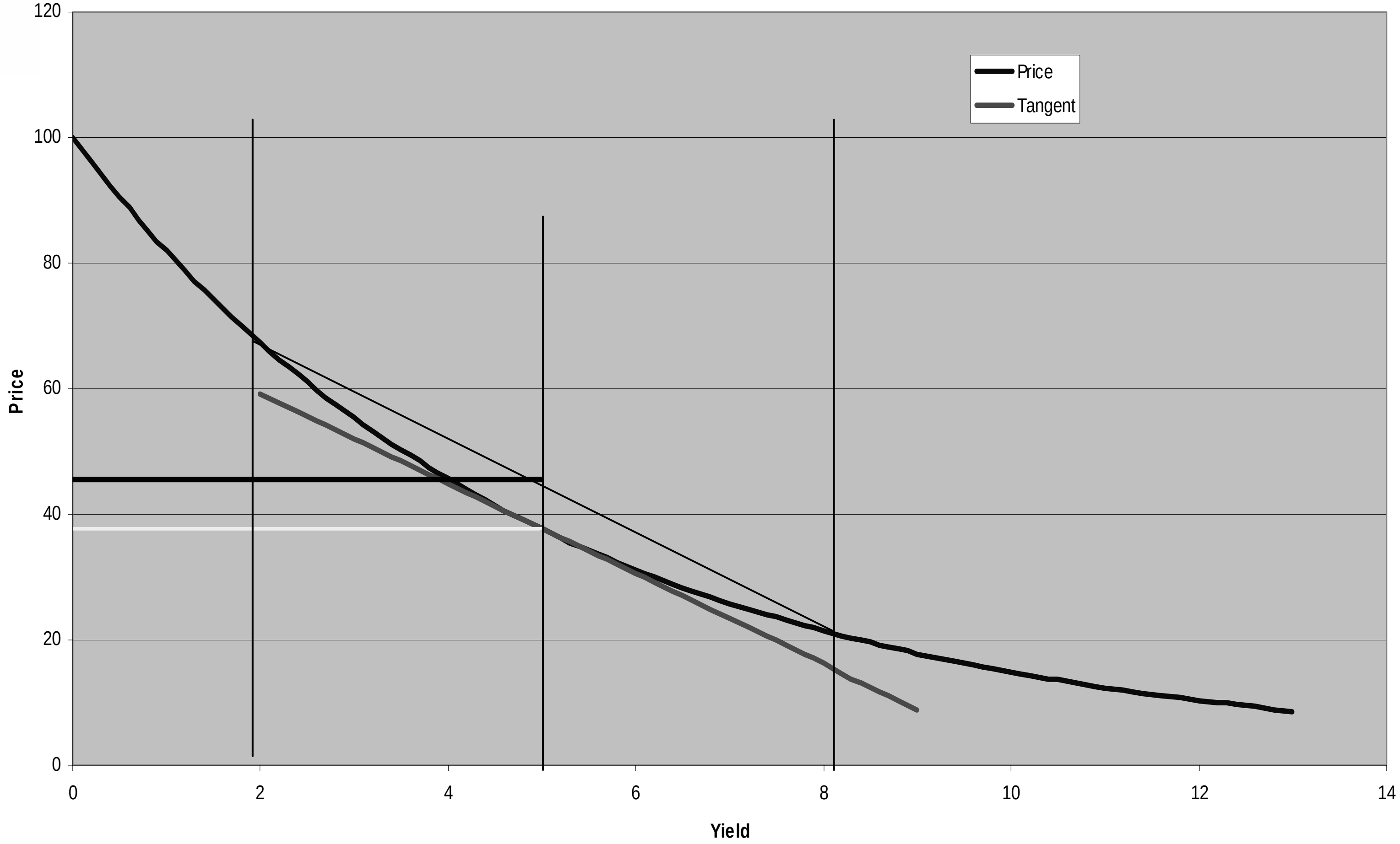
Rate of change

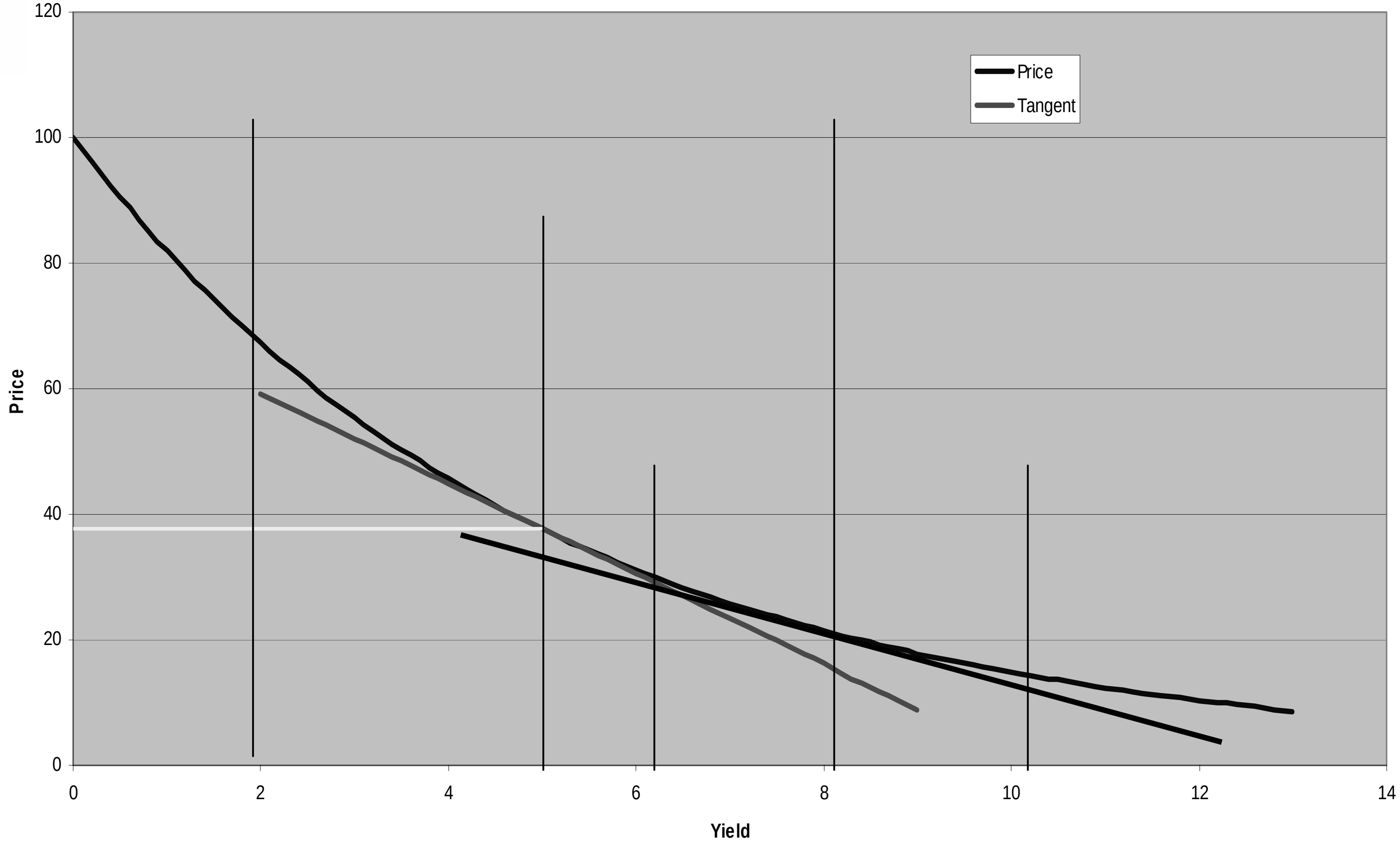


Bond Price – Yield Curve

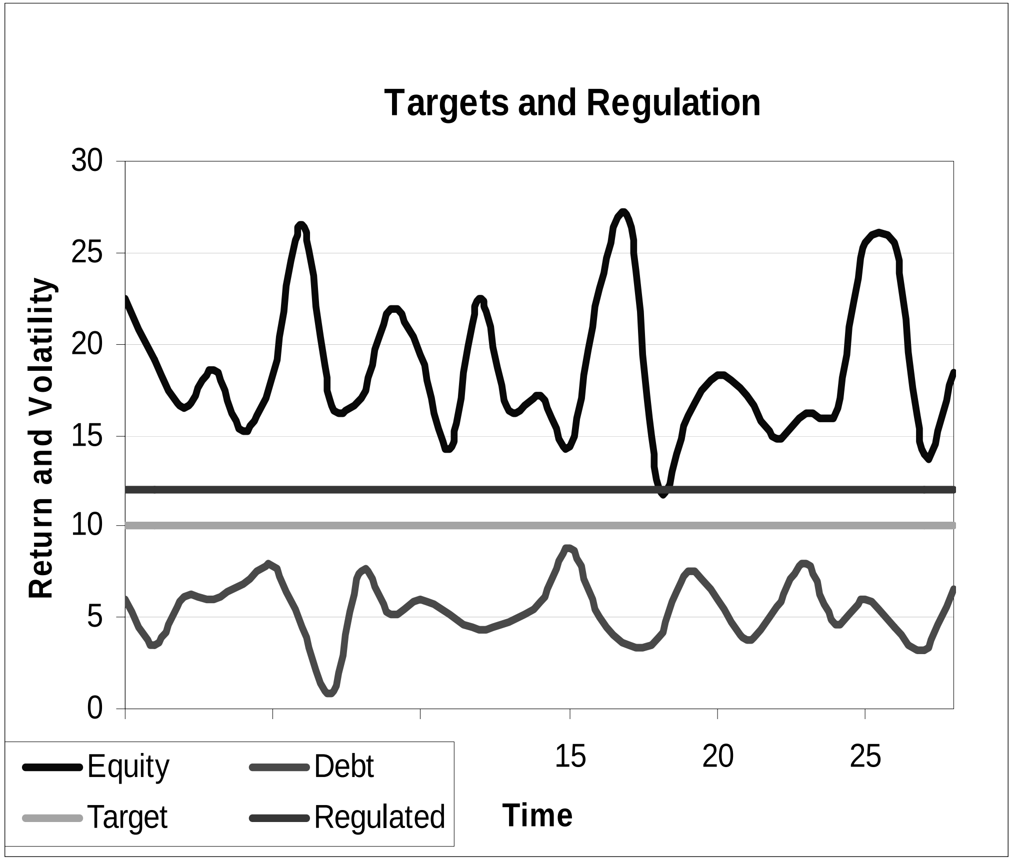
And convexity



And the risk problem



Volatility and Return and Tracking Error



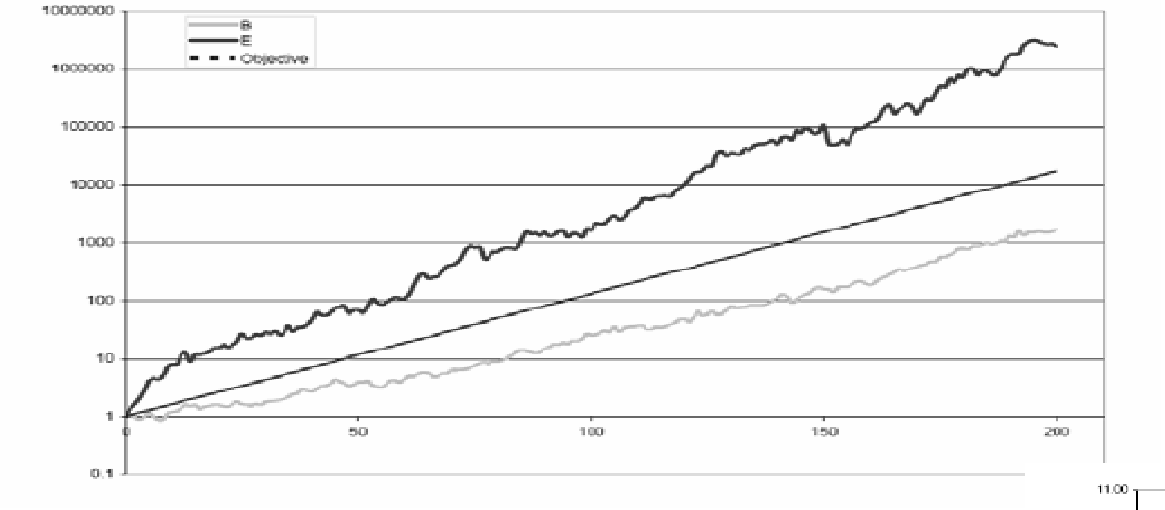
Risk based regulation also has us favour the lower returning asset.

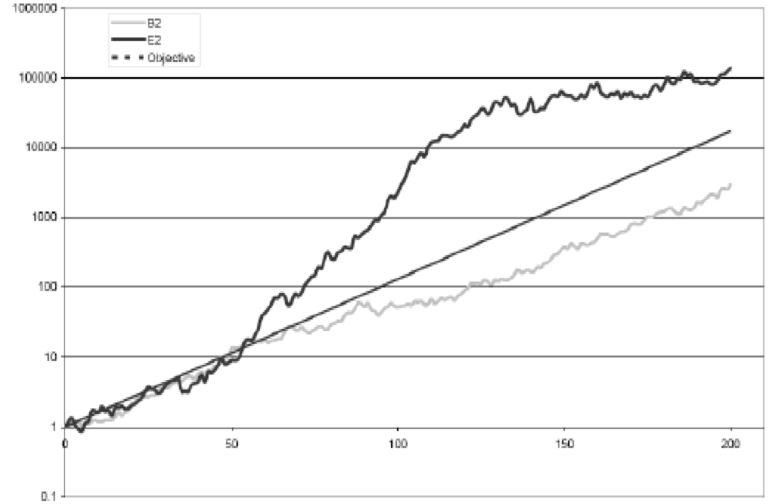
A related tracking error problem
True TE = Sqrt (Mean^2 +Volatility^2)

	TE	True TE
Equity/Debt	13.97	19.22
Equity/Target	9.48	12.80
Debt/Target	4.88	6.70
Equity/Reg	7.70	10.15
Debt/Reg	6.80	9.47

Downside measures

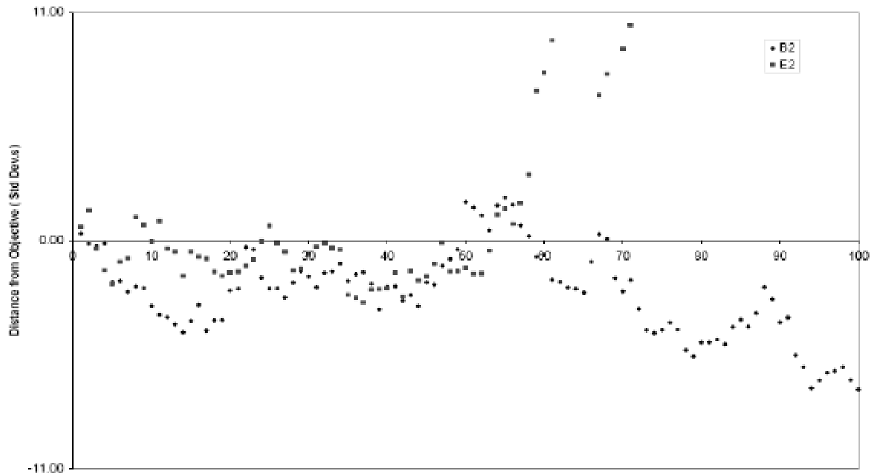
$IR(E) = 0.505$ and $IR(B) = 0.492$





Distances from objective

Instability in drawdown

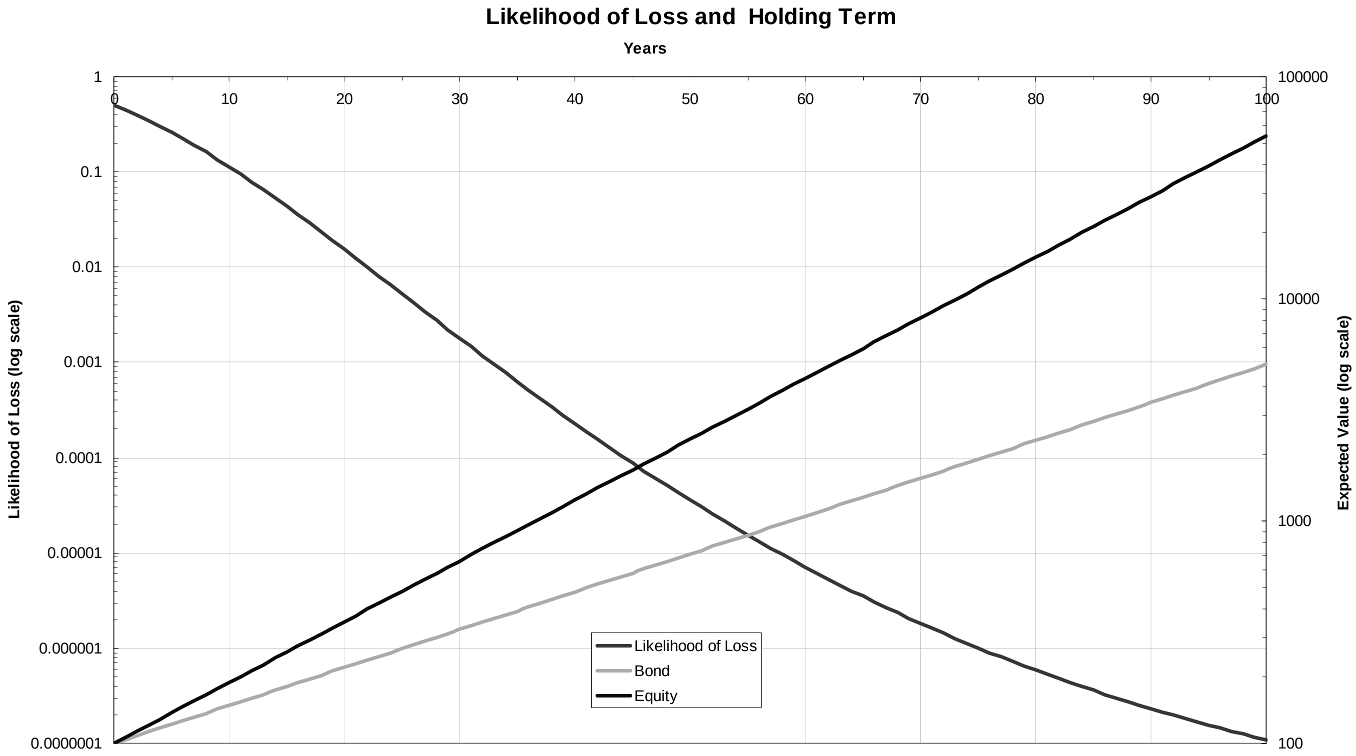


Market Risk Premium Exposure

Zero coupon bonds and non-dividend paying equity

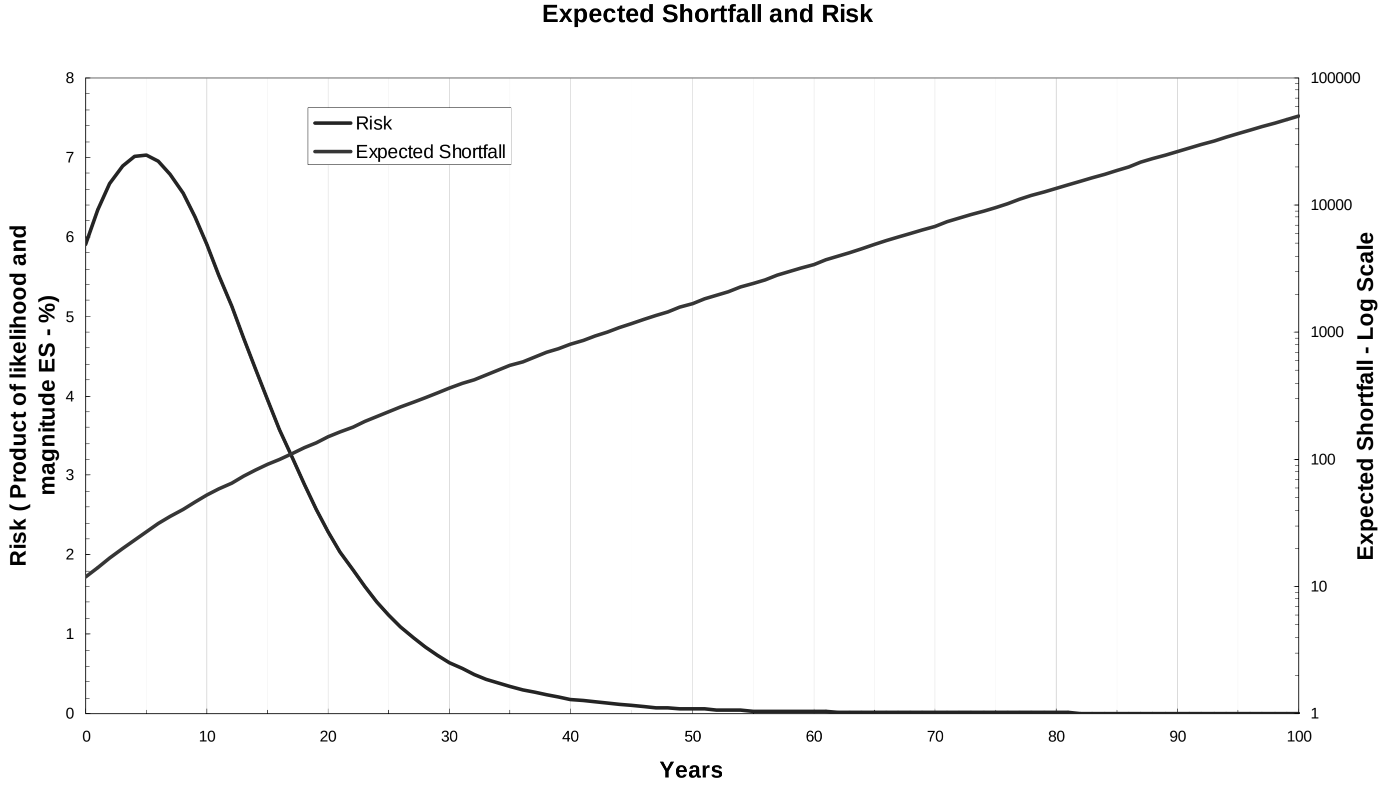
Return on Equity 10%, tax rate 35% - Expected return 6.5% Volatility 17.5%

Bond: Expected Return 4%, Volatility 9%



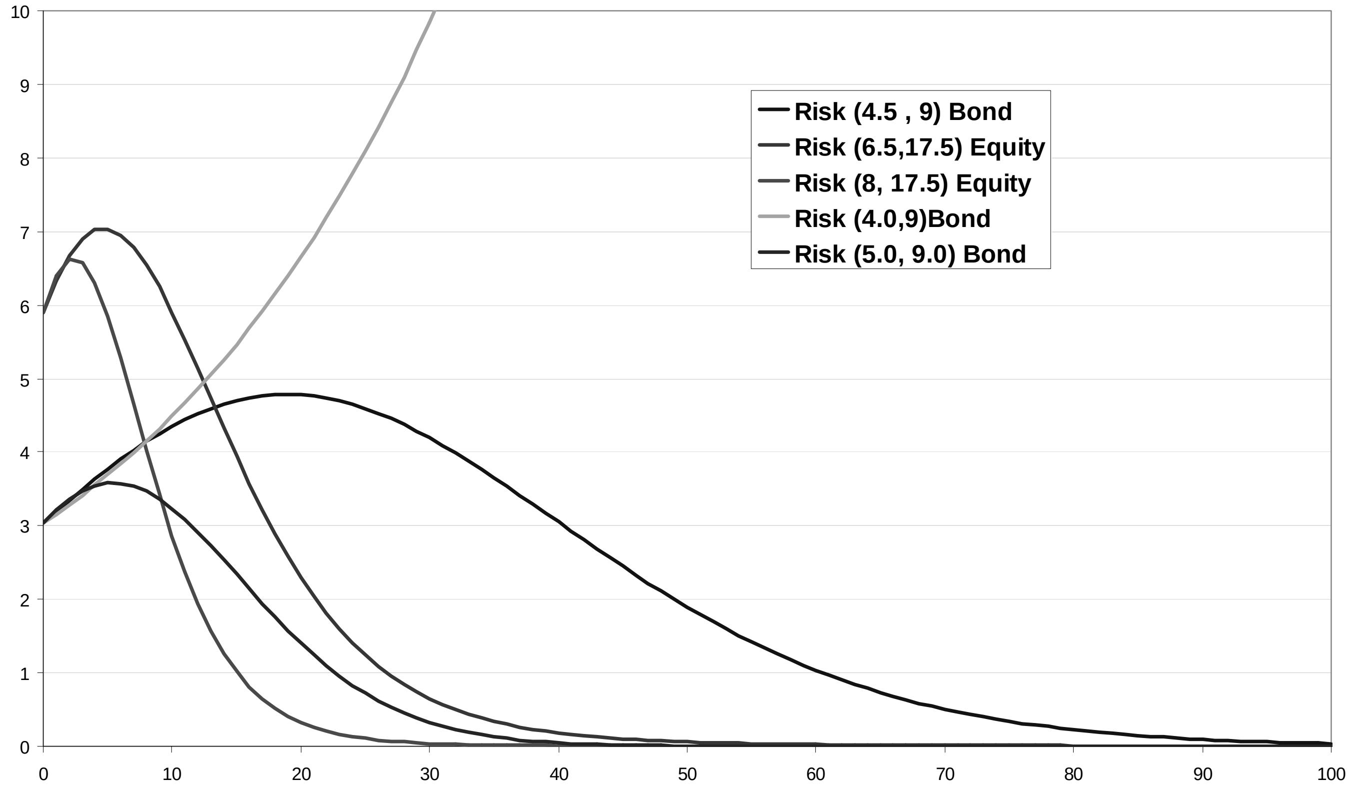
Shortfall and Risk

Equity relative to a 4% p.a. target



Expected shortfall increases over time, but risk – the product of the expected shortfall and its likelihood is complex and rapidly declining.

Equities and bonds

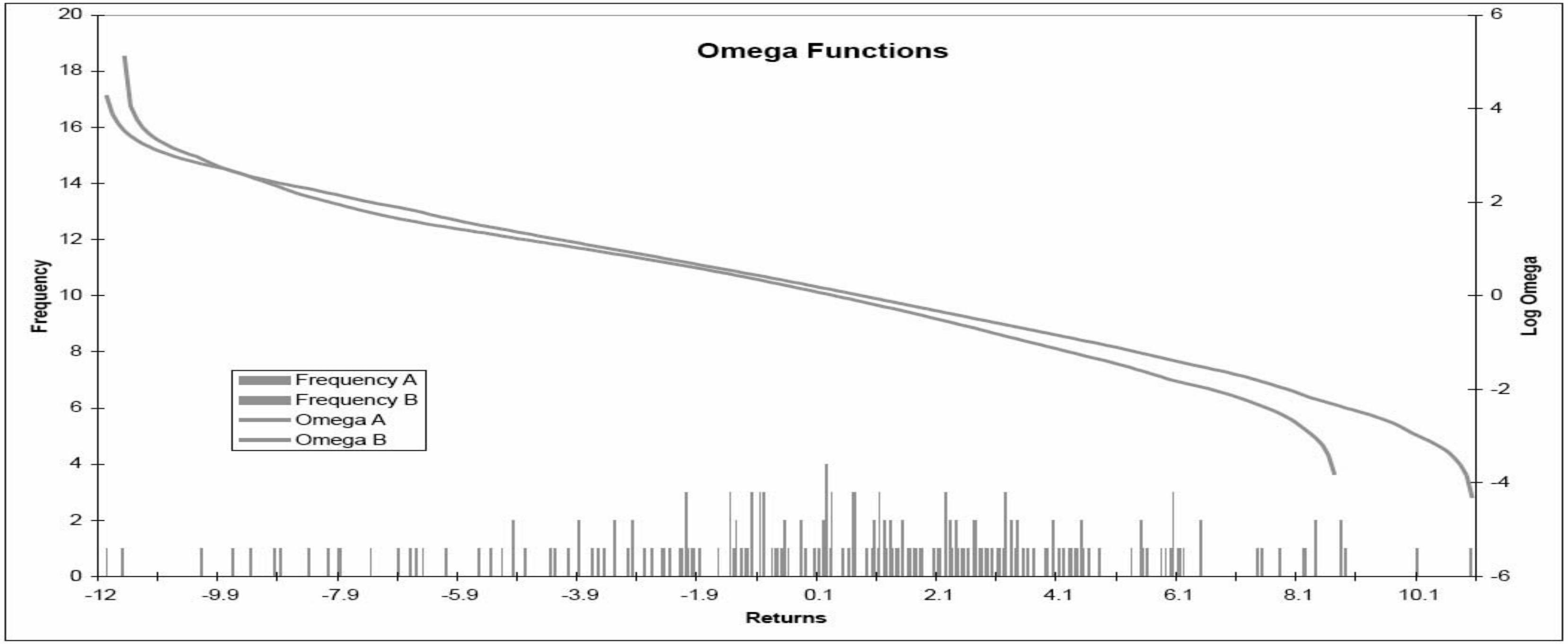


A mix of different bonds and equities

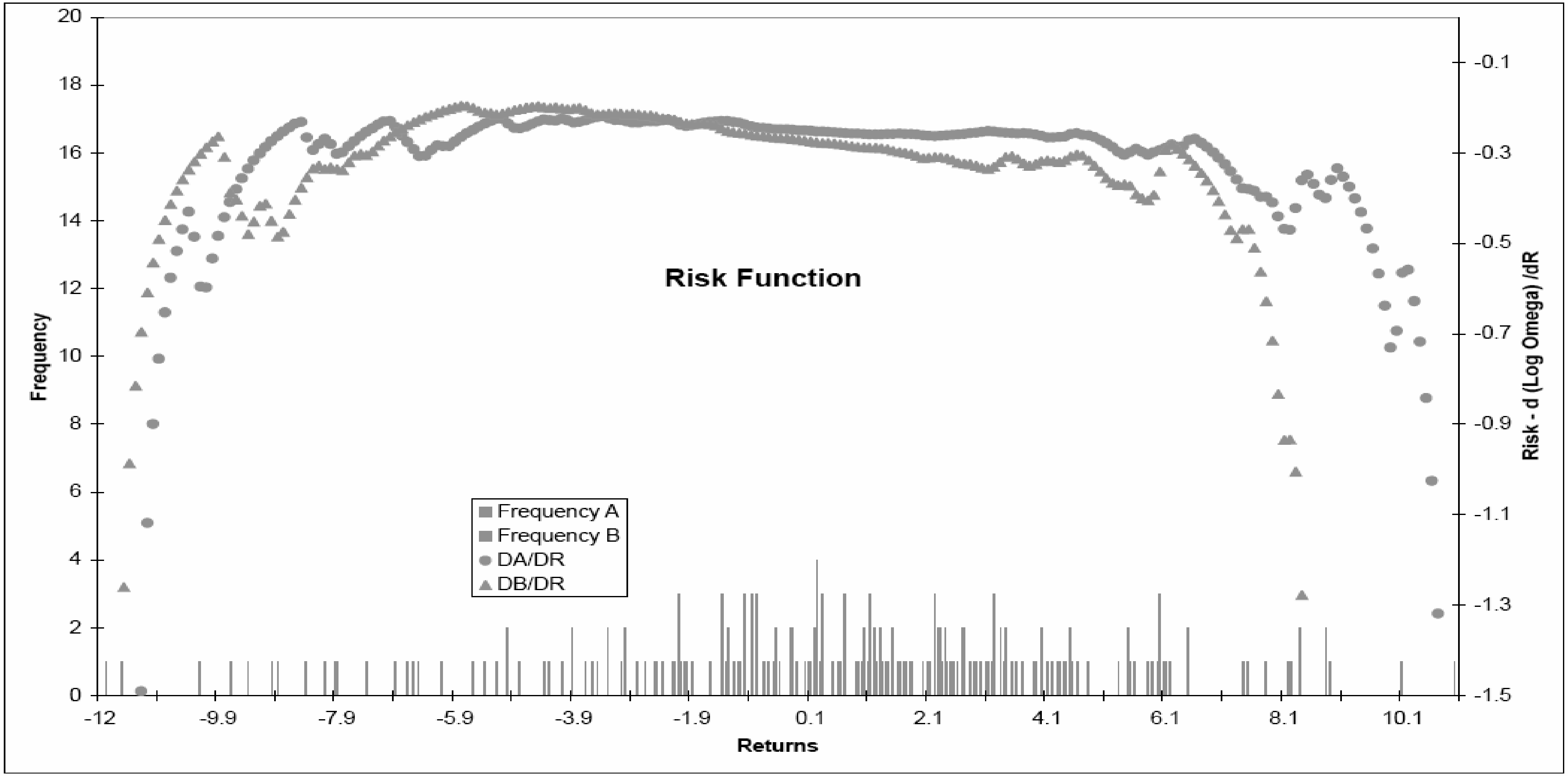
Which is riskier? It depends upon the horizon and the terms and conditions.

Some clarifications

It is not necessary with an empirical sample to estimate the (multivariate) cumulative density function as a precursor to estimating the Omega function.



And risk functions



DC Risk factors

- Contributions
- Investment Performance
- Longevity
- Timing & Transition

Contributions

- Size
- Taxes
- Timing
- Disability, Unemployment

Longevity

- DC vs DB
- Risk Sharing
- Risk Redistribution
- Size of Effects
- 25% of annuity at 25, 3% of annuity at 65
- Mitigants
- Life Annuities
- Precautionary savings
- The Bequest Motive

Longevity Mitigants

- 23% of UK company sales to Households in retirement
- That is a material contribution to profits
- Causal dependence
- And that means equity will mitigate in part longevity growth
- Longevity bonds ?

Investment

- Asset Allocation
- Risk premia
- Volatility
- Strategies
- Accumulation
- Decumulation

Going forward

- Taxes
- A market in pension tax credits?
- Tax neutrality

A full simulation

- The straw man model
- Is a full simulation model using a shortfall evaluation
- Relative to an income replacement ratio target
- And sensitivity illustrations

- Perhaps the most interesting part of that is determination of the replacement target.