Sanlam Investments

Portfolio Construction with Alternatives & incorporating illiquidity

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Agenda

- Introducing Alternatives
- Unpacking the Illiquidity Premium
- Determining Alternative Asset Betas
- Isolating Alternative Alphas
- Portfolio Construction
- Summary & Conclusion

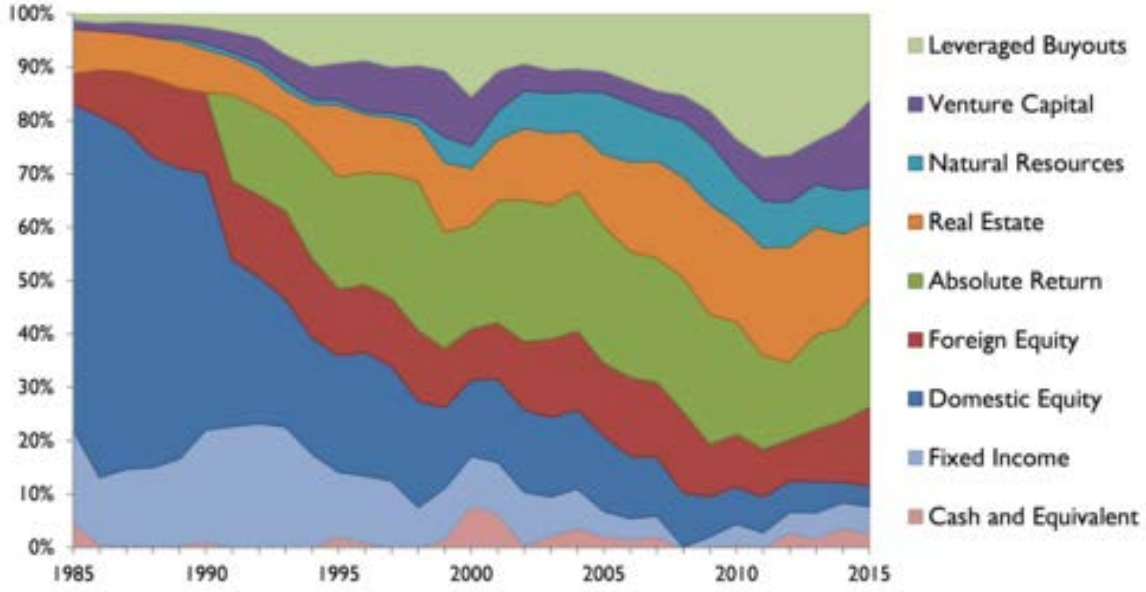
Describing Alternatives

- **Generally considered to include**
  - Hedge funds (absolute return strategies)
  - Private equity (buy-outs and venture capital) & private debt (loans)
  - Real assets including commodities, unlisted property and infrastructure
- **Rationale for inclusion**
  - Expectation of real returns in a low interest rate environment
  - Diversification from traditional asset classes
  - Accessing uncorrelated “excess returns”
  - Significant success achieved by Ivy League endowment & sovereign wealth funds

Yale University Asset Allocation

Comment

- Most successful US endowment
- 1985 : > 80% in US equities, Bonds & cash
- 2015 : > 70% in “alternatives”
  - 18% leveraged buy-outs
  - 11% venture capital
  - 7% natural resources
  - 15% real estate
  - 21% absolute return
- Higher expected return, lower volatility, longer time horizon



Over past 30 years, Asset allocation has added 1.7% p.a. ($11bn) vs median endowment

Source : Yale Investments office

Differentiation of Alternatives

- Generally require greater management oversight
- Reduced transparency and asymmetric information
- Reduced number of valuations p.a., greater levels of subjectivity and lower pricing efficiency
- Reduced liquidity with minimum lock-in periods BUT with implied compensation
- Often have an absolute return objective
- May use leverage
- Generally higher fees
- Lower correlation with traditional assets
- Limited opportunity set

Investment background

- Alternatives are arguably in the initial phase of introduction into institutional portfolios within South Africa
- Regulation 28 limits funds to
  - 10% in listed commodity vehicles
  - 25% in property (listed, immovable or combination)
  - 15% in “alternatives” with a maximum of
    - 10% in hedge funds
    - 10% in private equity
- Introductory weight will be a function of availability and investability not optimization
- Inclusion is often based on an absolute expected return

Valuation

- We concur with the Financial Analysts Journal article* that alternative assets are exposed to many of the same risk factors that drive stock and bond returns
- Key equation for alternative assets:

$$\text{Expected Return} = \text{Market exposure}(\beta) + \text{Alpha}(\alpha) + \text{Illiquidity Premium}(\zeta)$$

- Market exposure represented by multiples (coefficients) of typical times series including equities, bonds & cash
- The illiquidity premium will be estimated from historic returns and volatility
- Definition of risk: Measure used to quantify the probability that the investor's investment objectives will not be met PLUS inability to support a significant liquidity event

* FAJ Volume 70 2014 – Asset Allocation: Risk Models for Alternative Investments : Neils Pedersen & Sebastien Page

Calculating the Illiquidity Premium

CFA conference proceedings

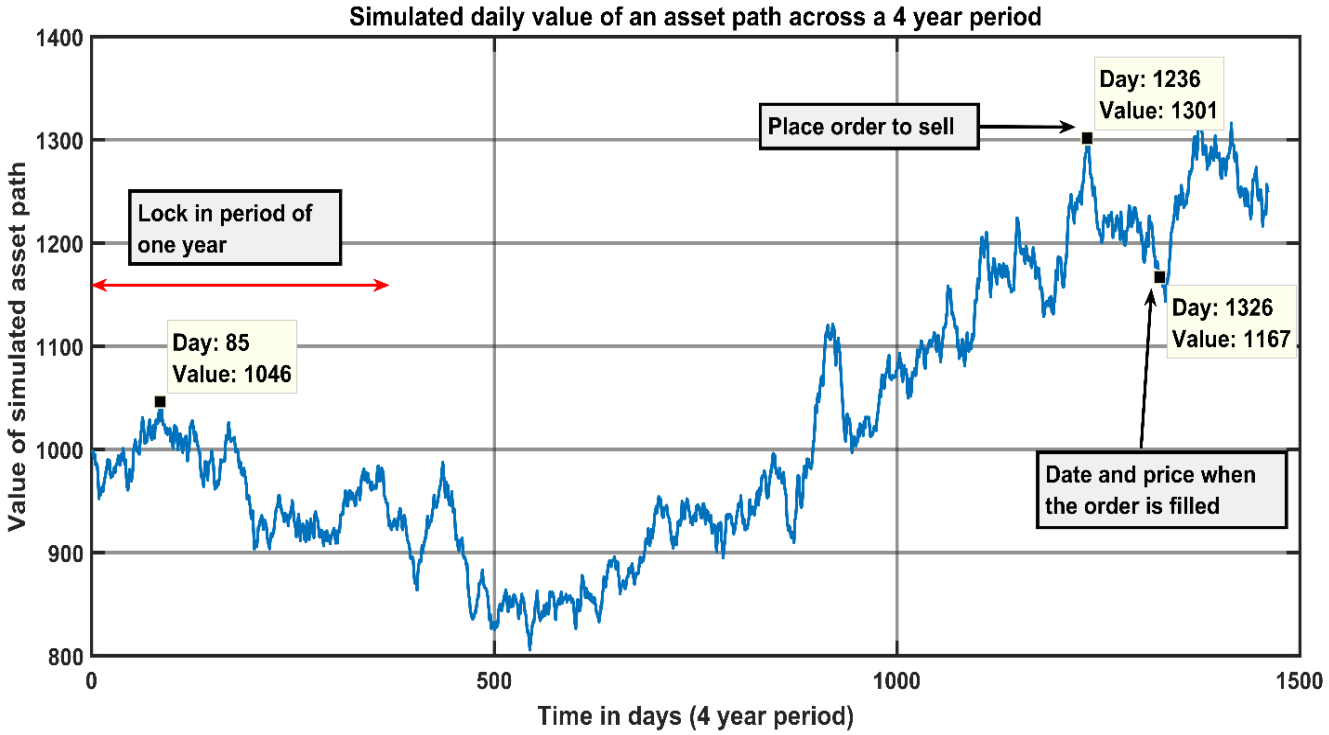
“Illiquidity premiums provide compensation for the associated loss of investment flexibility”

June 2010

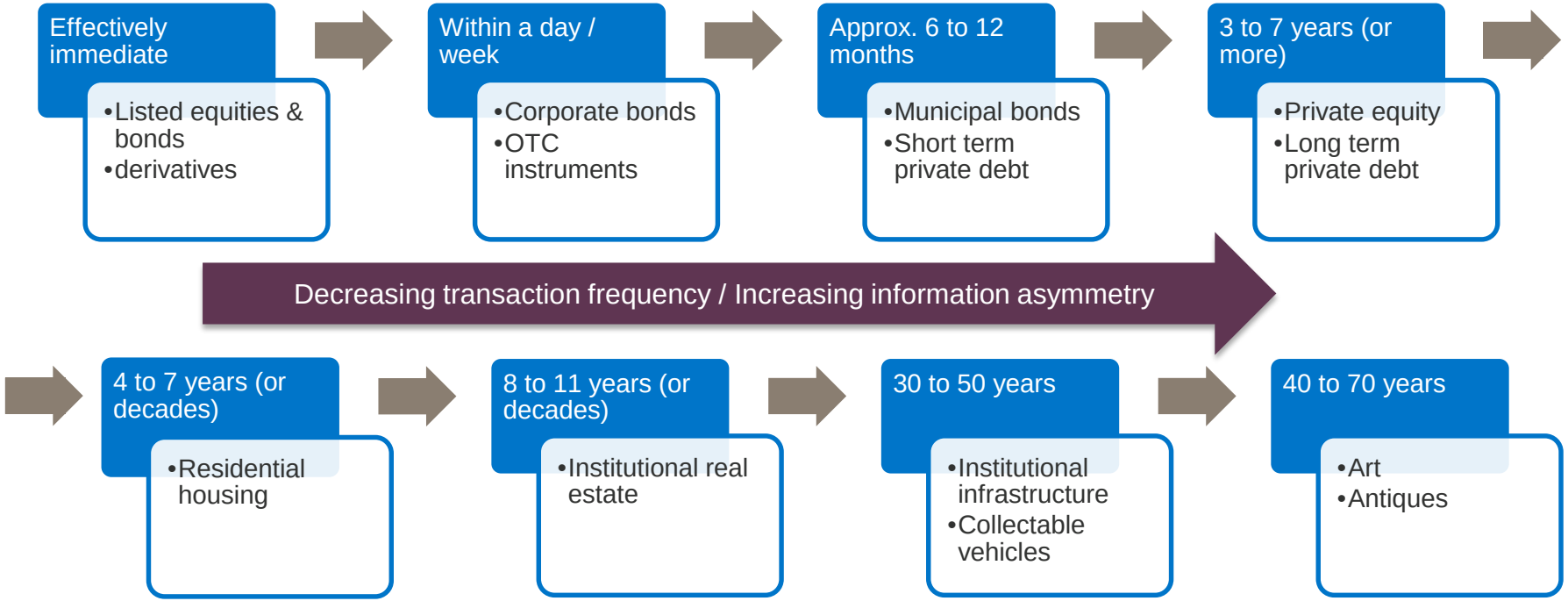
The illiquidity premium

- **Alternative definitions**
  - The additional return that an investor should receive for giving the product provider greater certainty over their assets under management
  - The discount a product provider should offer for imposing restrictions on the equivalent expected return time series
- **Factors that affect illiquidity premia (and must be compensated)**
  - Lock-in period
  - Time to execute an order
  - Volatility of asset

Unpacking the elements

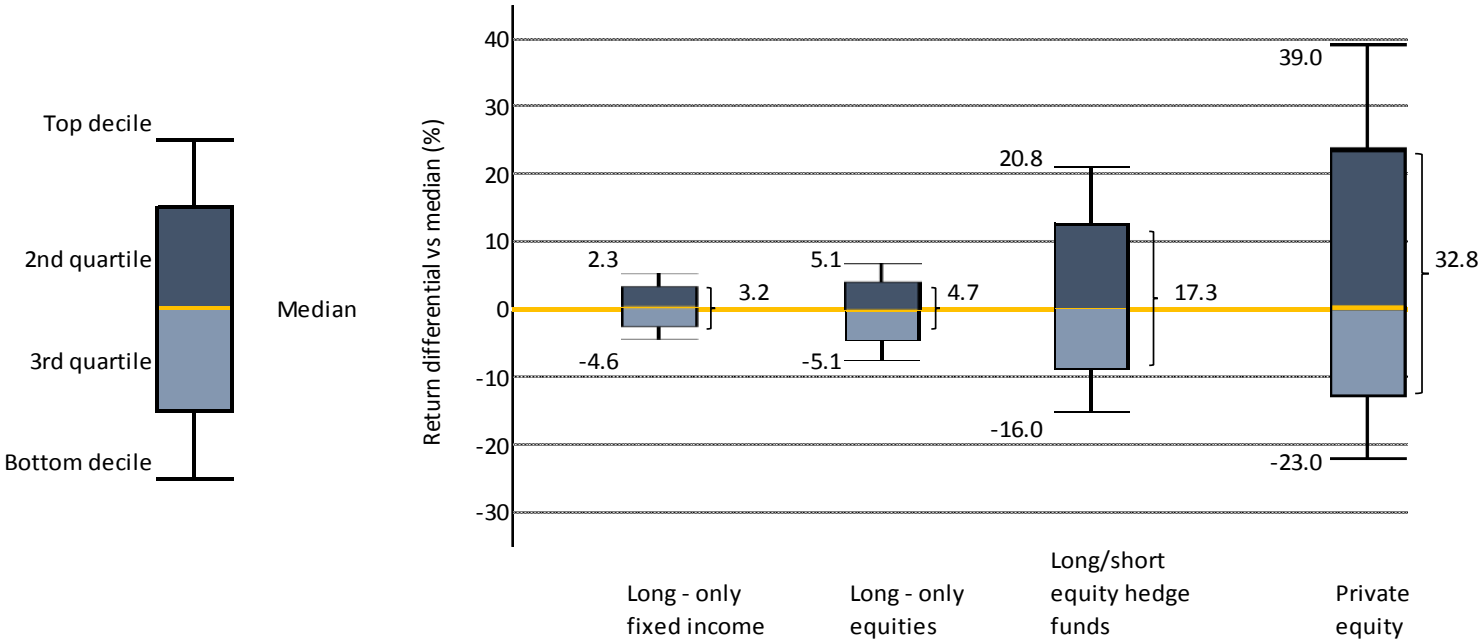


Illiquidity spectrum



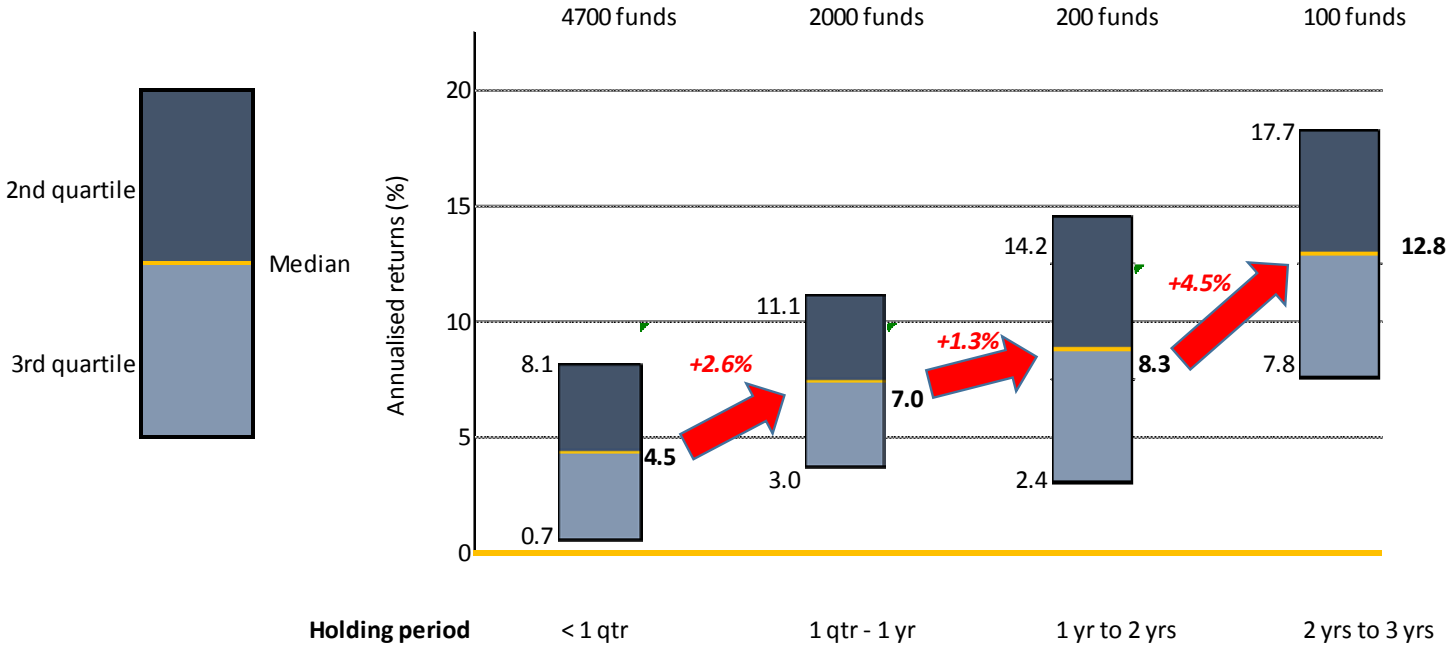
Manager dispersion vs illiquidity

Return dispersions increase as liquidity decreases



Holding periods vs returns

Less liquid hedge funds provide a significant return advantage



Source : "Waiting to Exhale" Global Hedge Fund Investor Trends and outlook, January 2014, Barclays Strategic Consulting

Alternatives characteristics

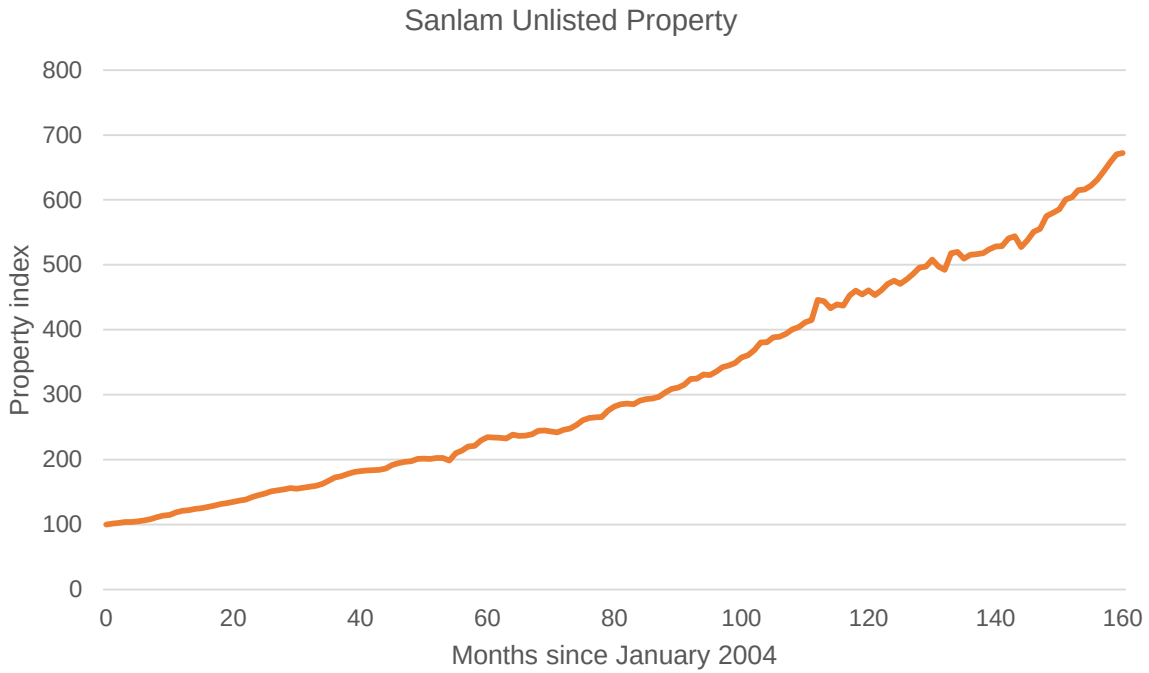
Asset Class	Equity Risk premium	Small Cap premium	Credit Risk premium	Unexpected return	Term premium	Illiquidity premium	Non-corporate GDP growth	Alpha
Equity • Private Equity : Venture • Private Equity : Buyout	• **High** • **High**	• **High** • Some				• **High** • **High**		• **High** • **High**
Fixed Income • Private Debt • Distressed Debt		• Some	• **High** • **High**		• **High** • Some	• **High** • Mod	• **High**	• **High** • **High**
Real Assets • Unlisted Infrastructure • Unlisted Real Estate • Agricultural (e.g. Timber)	• Some		• Some • Mod	• **High** • **High**	• **High**	• **High** • **High** • **High**	• Mod • **High**	• Mod
Hedge Funds • Event driven • Fixed Income Arbitrage	• Some	• Some • Some			• **High**	• Mod • Mod		• **High** • Mod

Source : Mercer

Modelling

- **Parametric**
  - Fit formulae to the data
  - Preferred models are
    - Geometric Brownian Motion (GBM) – smooth, upwardly biased time series
    - Merton Jump Diffusion (MJD) – additional erratic factor in play (positive / negative valuation adjustments)
- **Non-parametric**
  - No formulae – lets the data “speak for itself”
  - Methodology is referred to as “bootstrapping”

Parametric model – a GBM example



Recommended : GBM model

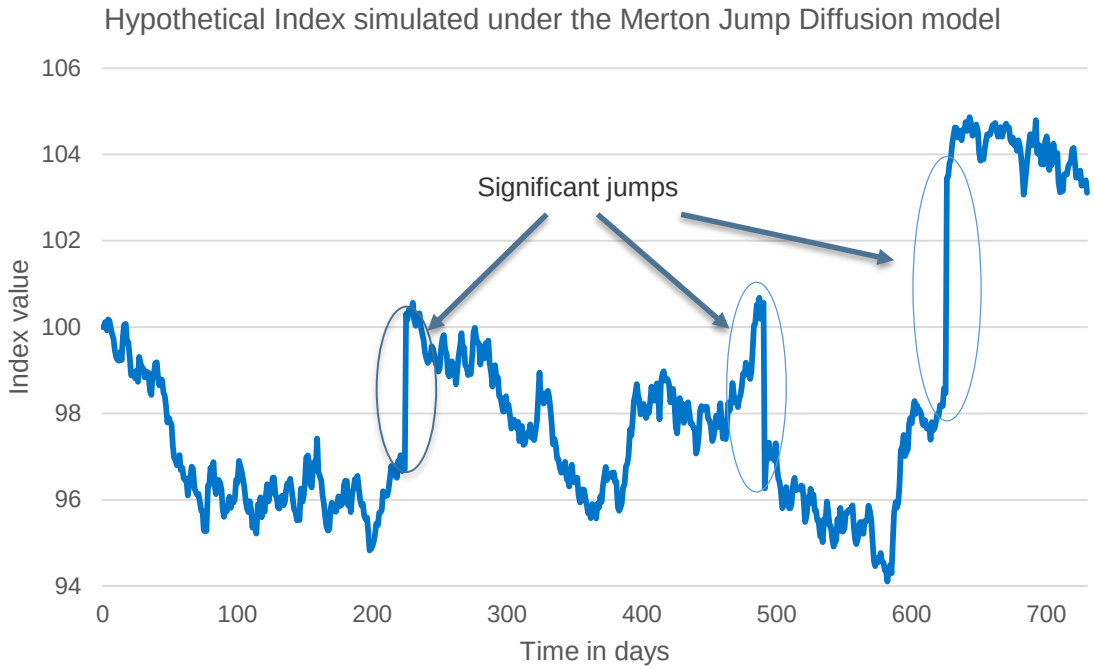
- Smooth time series
- Infrequent “jumps”
- Low volatility
- Exponential growth

Source : Sanlam Property Investments

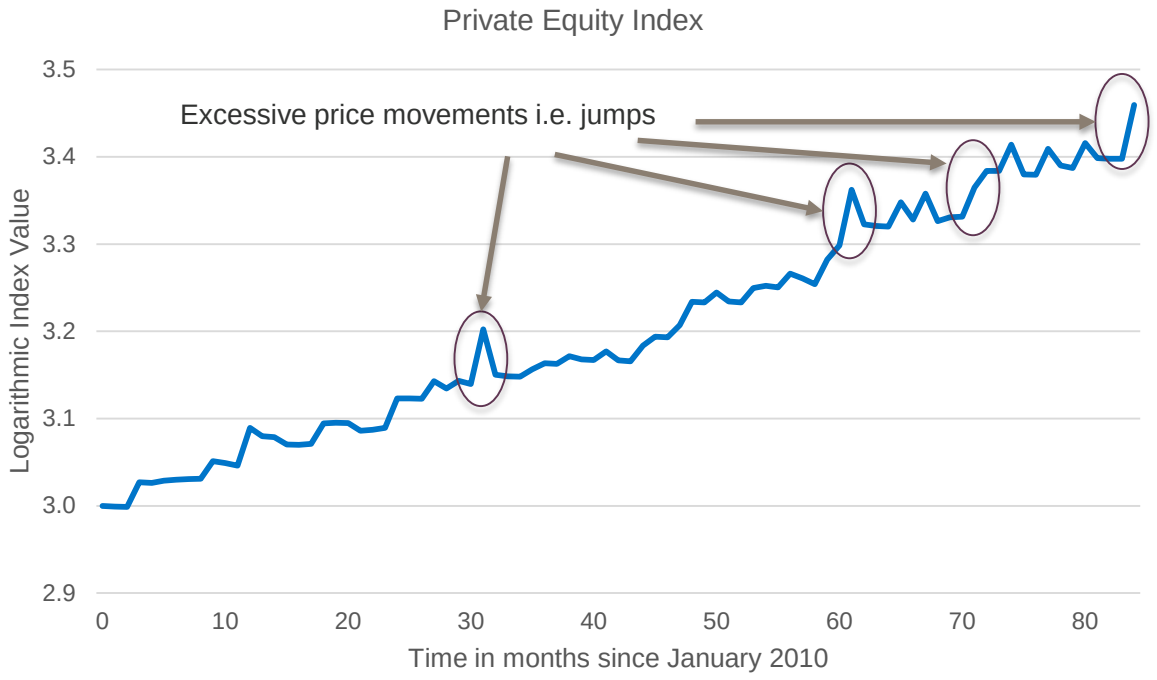
Parametric model selection

Recommended : MJD model

- High volatility
- Frequent “jumps”
- Diagnostic required
  - # of annual jumps
  - Average jump size
  - Variation in jumps



Parametric model – an MJD example



Recommended : MJD model

- Non-smooth time series
- Multiple “jumps”
- High volatility
- Exponential growth

Source : Riscura

Illiquidity results

Comparing alternatives assets

Description	Private Equity	Unlisted Property	Fixed Income Arbitrage Hedge Fund
Representative	Riscura Index	Sanlam Property	Sanlam Rho
History utilised	Jan ‘10 to Dec ‘16	Jan ‘04 to Apr ‘17	Oct ‘04 to May ‘17
Annualised return *	16.3%	15.4%	10.1%
Annualised Stdev	12.7%	4.2%	2.2%
# of jumps p.a.	0.58	0.21	2.95
Mean jump size	12.1%	4.9%	0.1%
Jump volatility	0.0%	0.0%	1.5%

Analysis executed as follows:

- Fit an MJD model to each time series
- Compare illiquidity premia for 12 month lock-in, 3 month order-delay and 7 year investment horizon

*** this factor plays no role in the calculation of the illiquidity premium**

Indicative illiquidity premia

- **Results:**

Premium type	Private Equity	Unlisted Property	Fixed Income Arbitrage Hedge Fund
Initial 12 month lock-in	9.7%	2.8%	1.9%
3 month order-delay	3.3%	0.9%	0.5%
Joint premium	13.3%	3.7%	2.4%
Annualised	**1.8%**	**0.5%**	**0.3%**

- **Comment**
  - High jump sizes and asset volatility delivers higher illiquidity premia
  - Lowest overall illiquidity premium is the Fixed Income Arbitrage Hedge Fund due to lowest volatility – dominant factor

Determining Beta

β - Breakdown Methods

Recall : Expected Return = Market exposure(β) + Alpha(α) + Illiquidity Premium(ζ)

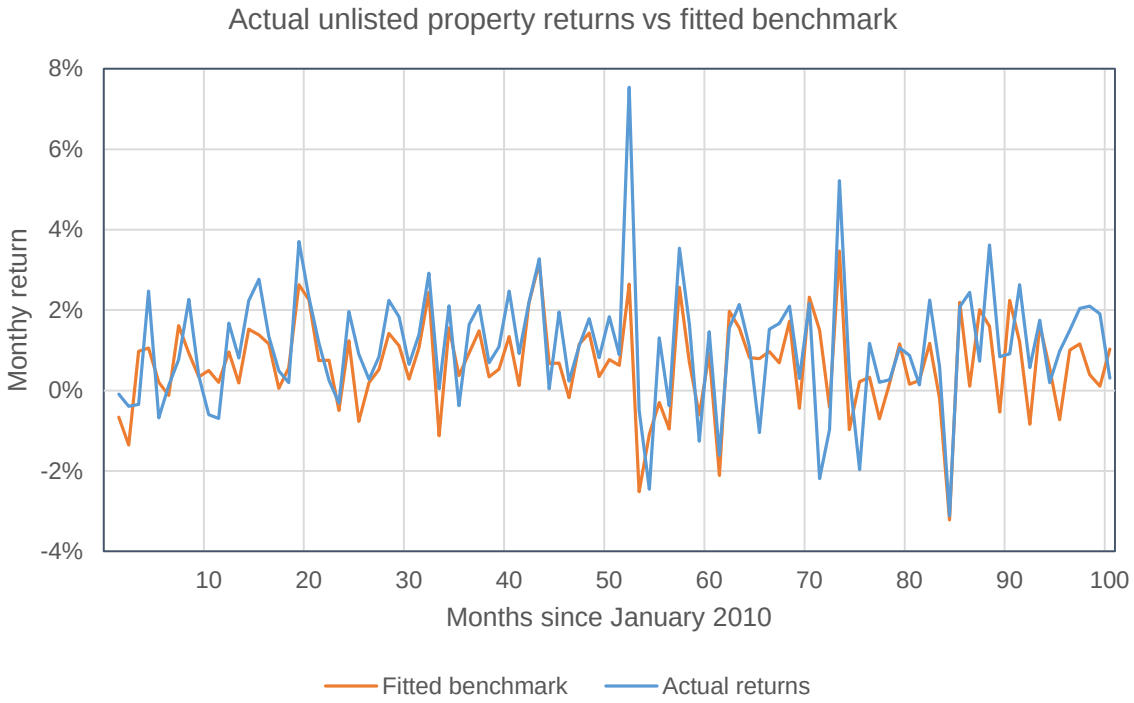
- Best representation of an alternative asset in terms of the market indices
- Two methods of construction:
  - Restricted : Replicate returns using portfolio “betas equal one” method
  - Derivatives replication: Gear (up/down) returns on underlying indices to replicate returns of the alternative asset though futures/CFD’s/options/etc.
- Created benchmark may or may not be investible, depending portfolio constraints, regulation 28, short-selling, restrictions on derivatives, etc.

β - Breakdown Methods

- General method:
  - $Return(\beta) = \beta_1 x_1 + \beta_2 x_2 + \cdots \beta_n x_n$
- $\beta's$ are constants.
- Fitting methodology is to minimise the following*
  - $MSE = \sum_{i=1}^{m} \left(y_i - \sum_{j=1}^{n} x_{i,j} * \beta_j \right)^2$
- Set an additional constraint: $\beta_j \in [-2, 2]$
- Restricted approach imposes a different constraint: $\sum_{j=1}^{n} \beta_j = 1$

Note*: The y_is represent the alternative asset's historical time series and the $x_{i,j}s$ represent the historical time series of the indices or assets that make up your current portfolio

Beta Analysis of Alternative Assets



Index	Betas
ILB	0.13
All Bond	0.44
Cash	0.34
SWIX equity	0.00
Property	0.06
Commodities	0.02
TOTAL	1.00

R-Squared : 51.5%
Correlation : 71.7%

Source: Sanlam Property Investments

Unpacking the Betas - rescaled

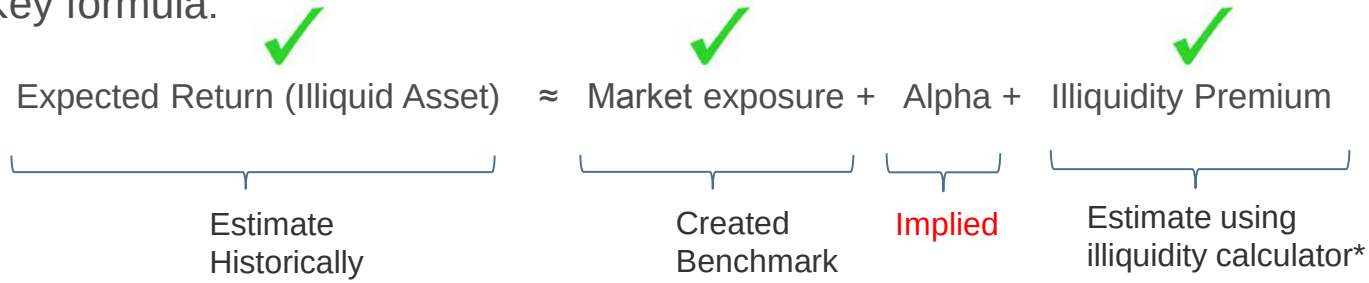
Asset	Representation	Beta	Bonds (ALBI)	ILB's (BSAGI)	Property (SAPY)	Equity (SWIX)	Cash (STFIND)	Commodities (WCPALL)
Private Equity	Riscura Index	7.5%	**0.44**	(-0.02)	(-0.05)	0.08	**0.39**	**0.17**
Unlisted Property	Sanlam Property	9.1%	**0.42**	**0.19**	0.07	0.04	**0.22**	0.06
Hedge Funds	Long Short Equity	10.6%	**(-0.23)**	**0.11**	**0.10**	**0.45**	**0.53**	0.04
	Market Neutral	7.1%	**(-0.17)**	0.07	0.04	0.09	**0.95**	0.02
	Fixed Income Arbitrage	7.9%	**0.32**	**0.17**	0.03	0.00	**0.44**	0.05
	Multi-strategy	8.8%	**(-0.13)**	**0.13**	0.09	**0.19**	**0.72**	0.01
	Event driven	6.8%	(-0.08)	0.05	0.05	0.02	**0.97**	0.00

- All relationships determined from equivalent data set : January 2010 to December 2016
- Significant relationships highlighted in Bold

Isolating Alpha

Alpha Analysis of Alternative Assets

- How do we use the created benchmark?
- Key formula:



- Use implied alpha and fit a probability density function to the data
  - Raises new question, which statistical distribution?
  - Generalized extreme value distribution ➔ Very flexible!

*Note: The illiquidity calculator is a proprietary research tool developed by the Institutional Research and Solutions team.

Alpha Analysis of Alternative Assets

- Compare decomposition for two different alternative assets
- Unlisted Property

Return	≈	Beta	+	Alpha	+	Illiquidity Premium
14.4%		9.1%		4.2%		0.6%

- Hedge Fund – Sanlam Rho

Return	≈	Beta	+	Alpha	+	Illiquidity Premium
10.1%		7.4%		2.2%		0.3%

Source : Sanlam Investments

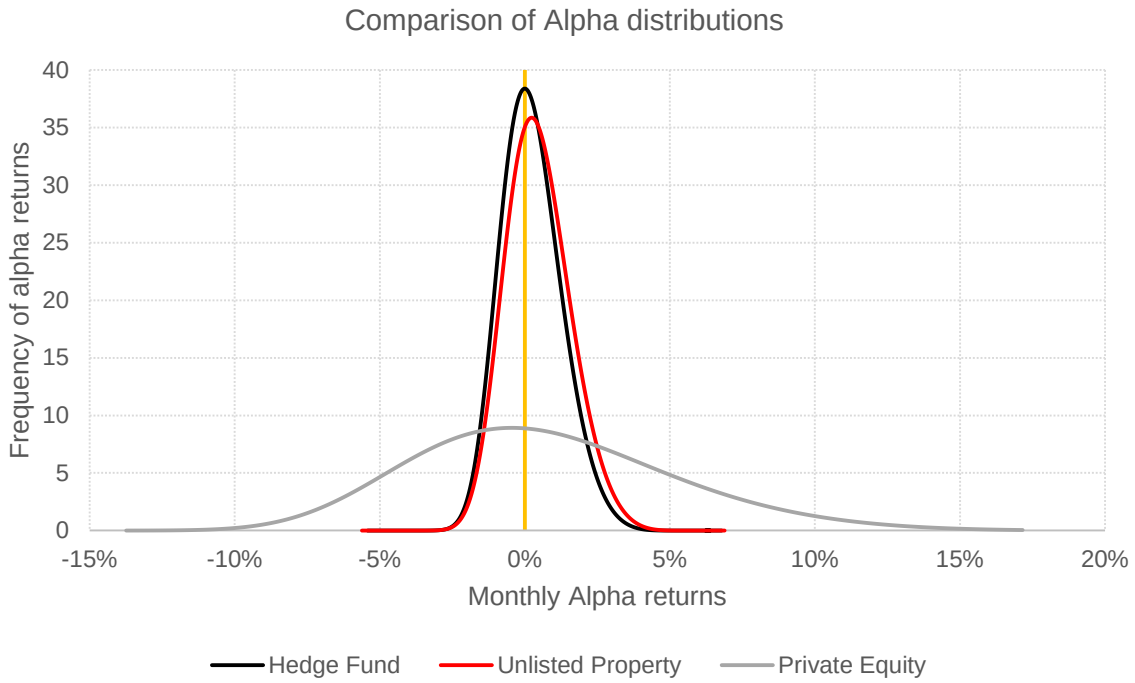
Comparative data – Jan ‘10 to Dec ‘16

Asset	Representation	Expected return	Beta	Illiquidity premium	Implied Alpha	Omega (>Beta + IL)
Private Equity	Riscura Index	16.3%	7.5%	1.5%	6.5%	1.5
Unlisted Property	Sanlam Property	14.4%	9.1%	0.6%	4.2%	2.6
Hedge Funds	Long Short Equity	14.2%	10.6%	0.5%	2.6%	2.0
	Market Neutral	7.6%	7.1%	0.2%	0.2%	1.1
	Fixed Income Arbitrage	10.6%	7.9%	0.4%	2.1%	1.8
	Multi-strategy	13.3%	8.8%	0.3%	3.8%	3.0
	Event driven	12.2%	6.8%	0.1%	5.0%	32.7

General deterioration in Hedge fund overall return over time BUT stability in Beta & illiquidity elements

Source : Riscura, Sanlam Investments & Hedge Funds Africa

Alpha Analysis of Alternative Assets



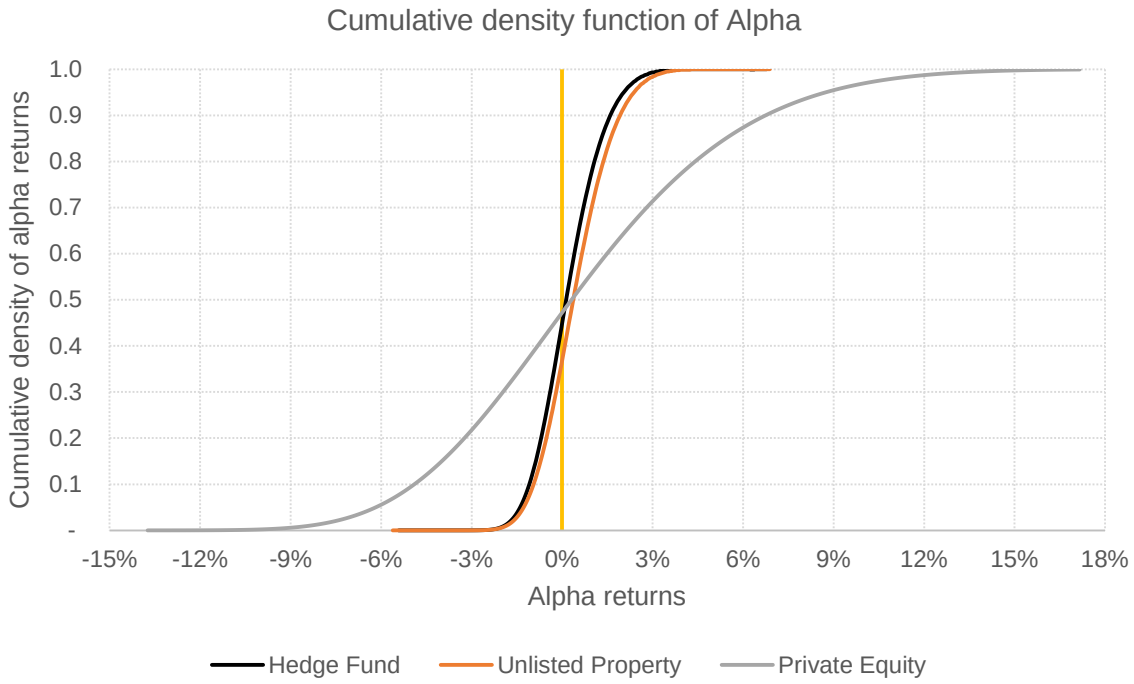
Annual Alpha means:

Private Equity	:	6.5%
FI Hedge fund	:	2.1%
Unlisted Property	:	4.2%

Important:

The alpha distribution can change depending on which assets/indices we used to create our benchmark

Alpha Analysis of Alternative Assets



Omega values

Private Equity	:	1.50
FI Hedge fund	:	1.76
Unlisted Property	:	2.62

Note: Omega ratio > 1 (i.e. at an Alpha of 0%) then the asset has more upside potential than downside potential relative to the benchmark

Portfolio Construction

Portfolio Construction

How do replacement ratios work?

- Decide what % of the alternative we wish to include, e.g. 10%
- Use the $\beta_j s$ from the benchmark creation*:

$$New\ Weight = Old\ Weight\ - \frac{\beta_j}{\sum_{j=1}^{n} \beta_j} * 10\%$$

- Subject to constraints e.g. Regulation 28

Note*: The case where is close to zero can be dealt with by refitting using ridge regression to determine the

Adjusting domestic allocations

Asset	Bonds	ILB's	Property	Equity	Cash	Comm.	Alternative (Single)	Expected Return	Expected Stdev
Typical benchmark	**20.0%**	**7.5%**	**7.5%**	**50.0%**	**12.5%**	**2.5%**	**-**	**11.7%**	**6.9%**
+ Private Equity	15.6%	7.8%	8.0%	49.0%	8.6%	0.8%	10.0%	12.7%	7.0%
+ Unlisted Property	15.8%	5.6%	6.8%	49.6%	10.3%	1.9%	10.0%	12.3%	6.9%
+ Long Short Equity	22.3%	6.4%	6.5%	45.6%	7.2%	2.1%	10.0%	12.1%	6.9%
+ Market Neutral	21.7%	6.8%	7.1%	49.1%	3.1%	2.3%	10.0%	11.8%	6.9%
+ Fixed Income Arbitrage	16.8%	5.8%	7.3%	50.0%	8.1%	2.0%	10.0%	12.0%	6.9%
+ Multi-strategy	21.3%	6.2%	6.6%	48.1%	5.3%	2.5%	10.0%	12.2%	6.9%
+ Event driven	20.8%	7.0%	7.0%	49.9%	2.8%	2.4%	10.0%	12.3%	6.9%

The use of Betas in making an asset allocation adjustment allows the Volatility to remain generally the same with the introduction of positive Alpha increasing the Expected Return

Adjusting domestic allocations

Asset	Bonds	ILB's	Property	Equity	Cash	Comm.	Alternative (Multi)	Expected Return	Expected Stdev
Typical benchmark	**20.0%**	**7.5%**	**7.5%**	**50.0%**	**12.5%**	**2.5%**	**-**	**11.7%**	**6.9%**
+PE/UP/MSHF (10%/5%/5%) Naïve strategy	14.2%	6.1%	7.2%	48.1%	3.9%	0.0%	20.0%	13.2%	7.0%
Utilising techniques : Omega optimisation above benchmark (11.7%) annualised return									
+PE/UP/MSHF (3%/7%/10%) Alternatives optimised	16.9%	4.9%	6.3%	47.7%	2.7%	1.5%	20.0%	12.6%	6.9%
+PE/UP/MSHF (3%/7%/10%) Full portfolio optimised	0.0%	18.1%	10.0%	49.3%	0.0%	2.6%	20.0%	13.2%	6.9%

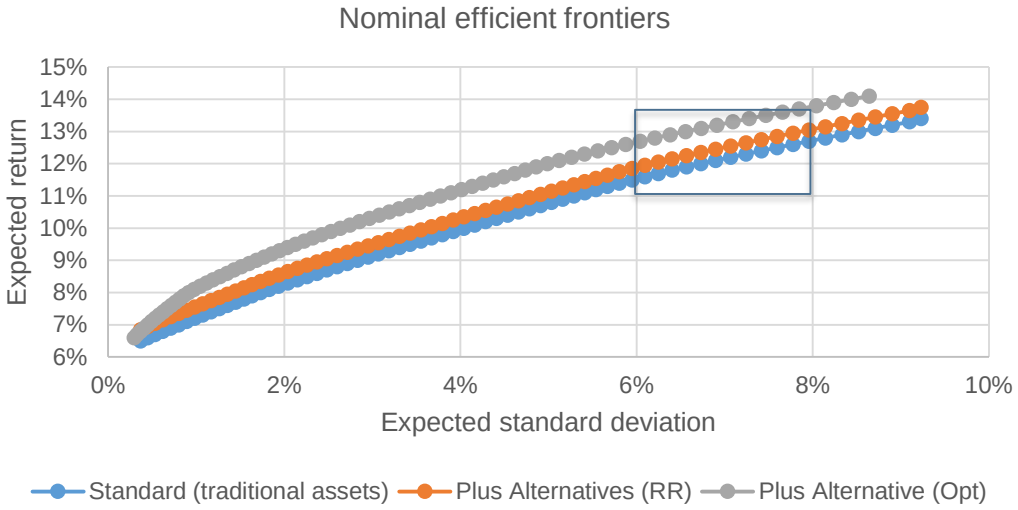
Multiple alternatives can be introduced simultaneously (subject to constraints) – recommendation is to calculate weights based on an Omega optimisation vis-à-vis the implied benchmarks

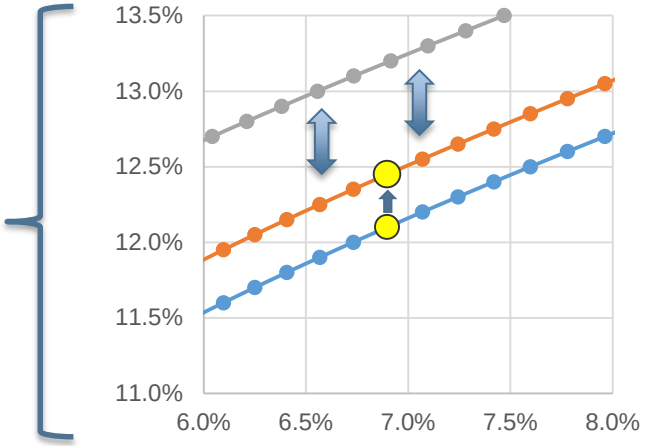
Summary & Conclusion

Summary

- Alternatives are being introduced into retirement funds at an increasing rate
- This is largely a consequence of a need to access:
  - Elevated returns in a low-return environment
  - Market maturity within the alternative space (reduced investment risk)
  - Uncorrelated alpha
  - Wider opportunity set / increased diversification
- Initial framework focuses on
  - Deconstruction : $\boxed{\text{Expected Return} = \text{Market exposure}(\beta) + \text{Alpha}(\alpha) + \text{Illiquidity Premium}(\zeta)}$
  - Estimating illiquidity premiums
  - Stable betas (relationship to standard market indices)
  - Including alternatives utilizing a replacement methodology into current structures

Conclusion





- A replacement approach provides the context for including Alternatives by targeting an equivalent level of risk but elevating return – we push up the efficient frontier and solve for the same risk.
- This approach avoids the complexity of accurately generating a covariance matrix across all assets with disparate valuations periods
- Position of line is a function of allocation to alternatives – optimised line should represent upper limit within constraints

QUESTIONS

THANK YOU