

Global Services

London Borough of Barnet

Introduction to Performance Measurement

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Limited Access



Return Methodologies

- Money & Time Weighted Returns
- Arithmetic or Geometric
- Compounded & Annualised
- Benchmark Calculations
- Relative Returns
- Performance Attribution



Return Methodologies

Money Weighted Return (MWR)

- The intuitive i.e. 'not rocket science' calculation
- The **rate of return** achieved over a period of time
- Based upon gains/losses expressed as a percentage of the portfolios average value
- With this measure, the quantum of assets has a bearing on the outcome i.e. the “M” in MWR
- Not all ‘participants’ have a bearing on this quantum
- We need an alternative measure

Calculations are contained in the appendix

Return Methodologies

Time Weighted Return (TWR)

- The problem?
 - £100 earned on a value of £1000 = 10%
 - £50 earned on a value of £5000 = 1% = result c11%? but.....
 - £150/£3000 (average) = 5% !
- The Trustee impacts the quantum of assets through withdrawal e.g. pension payment
- Time weighted return is used to compare the performance of a portfolio **removing** this impact of cash flows
- Facilitates comparison of funds with different cash flows
- Facilitates comparison of portfolios with similar mandates
- Simply derived by compounding MWRs calculated over each period between 'external' cash flows

Calculations are contained in the appendix

Return Methodologies

Arithmetic or Geometric?

- The arithmetic difference adequately describes the relationship between a portfolio and its target, it is unsuitable for the construction of time series', quantifying growth in value or for inter fund comparison
- Whilst intuitively unappealing, a 'geometric' calculation overcomes these factors because it recognises the compounding effect of returns
- This is best illustrated by an example. . .

Return Methodologies

Arithmetic or Geometric Example?

- A fund returns 7% each quarter, and the corresponding benchmark is 5%. Clearly the fund is 2% different (better) than benchmark each quarter and intuitively, 8% over the year, as below;

	Period 1	Period 2	Period 3	Period 4	Year
Fund	7.0	7.0	7.0	7.0	28.0
Benchmark	5.0	5.0	5.0	5.0	20.0
Difference	2.0	2.0	2.0	2.0	8.0

- Applying these to a portfolio valued at £100 gives us;

	Start Value	Period 1	Period 2	Period 3	Period 4	Year
Fund	100	107.0	114.5	122.5	131.1	
Benchmark	100	105.0	110.3	115.8	121.6	
% Difference		1.9	1.9	1.9	1.9	7.8%

- The **compounding** effect means that the relative % change in value isn't 8%, but 7.8%

Return Methodologies

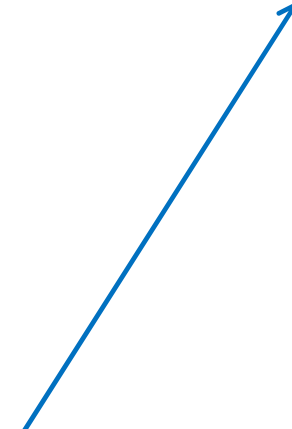
Arithmetic or Geometric

	Start Value	Period 1	Period 2	Period 3	Period 4	Year
Fund	100	107.0	114.5	122.5	131.1	
Benchmark	100	105.0	110.3	115.8	121.6	
% Difference		1.9	1.9	1.9	1.9	7.8%

- The periodic returns cannot simply be added however i.e.

$$1.9 + 1.9 + 1.9 + 1.9 = 7.6$$

- We need to **compound** them i.e.

$$(1.019 \times 1.019 \times 1.019 \times 1.019) = 1.078 = 7.8\%$$


Return Methodologies

Return Time Series

- The **cumulative** return is simply that observed over periods in excess of a year.
- The **annualised** return expresses the above in terms of a single 'average' return e.g. 5%p.a.

Return Methodologies

Benchmark Calculation

- A benchmark is a yardstick against which the portfolio is to be measured and can be made up of a single index or a composite of indices
- Examples: FTSE, S&P 500, MSCI World, BarCap Global Aggregate
- A composite benchmark is calculated as follows:

Investment	Weight %	Benchmark Return	Contribution
US Equities	35	5.0	$35/100 \times 5.0 = 1.75$
World ex US Equities	35	3.0	$35/100 \times 3.0 = 1.05$
Global Bonds	30	4.0	$30/100 \times 4.0 = 1.20$
Total Benchmark			4.0

Return Methodologies

Relative Return

- The ratio of return achieved by the portfolio and that achieved by its chosen benchmark over a given time period
- For example, if a portfolio returned 26% against 20% for its benchmark, the relative return is:

$$\frac{1.26}{1.20} - 1 \times 100 = 5\%$$

- Using a ratio allows the size of the underlying returns as well as the size difference to be taken into account

Manager Benchmarks

Portfolio	Allocation %	Benchmark	Investment Target
Schroders Diversified Growth	30.0	60% FTSE All Share/ 40% FTSE World ex UK GBP Hedged	RPI +5% p.a. over 5 – 7 years
Schroders Corporate Bonds	15.0	Merrill Lynch GBP Govt All Stocks	0.75% p.a. (gross) over rolling 3 years
Newton Real Return	30.0	1 Month LIBOR + 4%	1 Month LIBOR +4% p.a. over rolling 5 years.
Newton Corporate Bonds	15.0	Merrill Lynch over 10 years Inv Grade Index	Outperform the benchmark by 1% p.a. over rolling 5 years
LGIM Global ex UK equity	5.0	FTSE World ex UK	Track within +/- 0.5% p.a. the index for 2 years in every 3.
LGIM Corporate Bond Fund	5.0	iBoxx £ Non Gilts	Outperform by 0.75% p.a. (before fees) over rolling 3 years.
Internal Fund (Cash)	0	GBP 7 Day LIBID	

Manager Performance

	% FMV	1 Year	3 Years	5 Years
POOLED MULTI ASSET				
SCHRODER INVESTMENT MGMT	31.0	10.6	9.0	
60/40 EQUITY BENCHMARK		9.7	12.6	
<i>Relative Return</i>		0.8	-3.2	
SCHRODER INVESTMENT MGMT		10.6	9.0	
RPI +5%		5.9	7.2	
<i>Relative Return</i>		4.4	1.7	
NEWTON	30.0	6.0	5.7	
1 MONTH LIBOR +4%		4.5	4.5	
<i>Relative Return</i>		1.4	1.1	
CORPORATE BONDS				
SCHRODER INVESTMENT MGMT	14.5	12.0	9.4	
BAML GBP NON GILTS ALL STOCKS		13.2	8.8	
<i>Relative Return</i>		-1.1	0.5	
NEWTON	16.1	17.4	10.8	
BAML GBP NON GILTS > 10 YRS		18.9	11.5	
<i>Relative Return</i>		-1.3	-0.6	
LGIM	2.2	13.1	9.1	8.7
IBOXX GBP NON GILTS		13.1	8.7	8.0
<i>Relative Return</i>		0.1	0.3	0.6
GLOBAL EQUITY				
LGIM	5.7	19.7	14.9	10.5
FTSE WORLD EX UK		19.9	14.9	10.5
<i>Relative Return</i>		-0.1	-0.1	0.0
Cash				
INTERNALLY MANAGED	0.5	0.3	0.4	
INTERNAL FUND BENCHMARK		0.3	0.4	
<i>Relative Return</i>		0.0	0.0	

Above benchmark returns in Pooled Multi Asset from both Newton and Schroders was beneficial over the latest year.

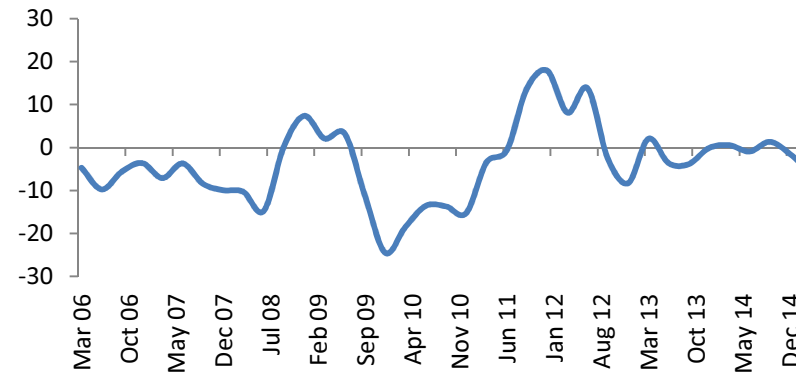
Whilst Schroders has outperformed it's investment target, the return is well below the 60/40 equity composite benchmark over the last three years.

Evaluation & Measurement

Realistic Timescales

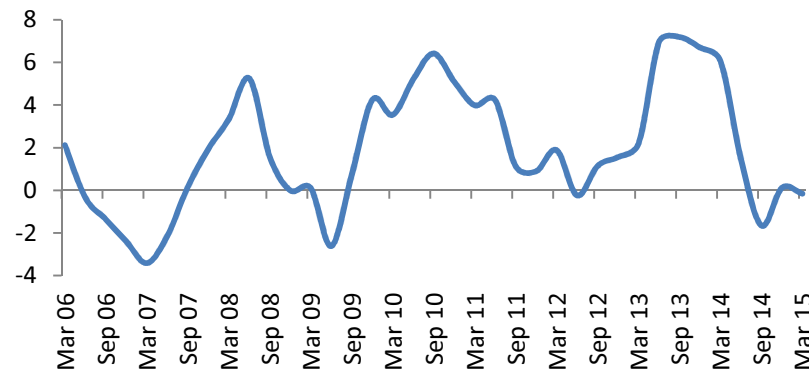
- Markets are cyclical

'Value' versus 'Growth'



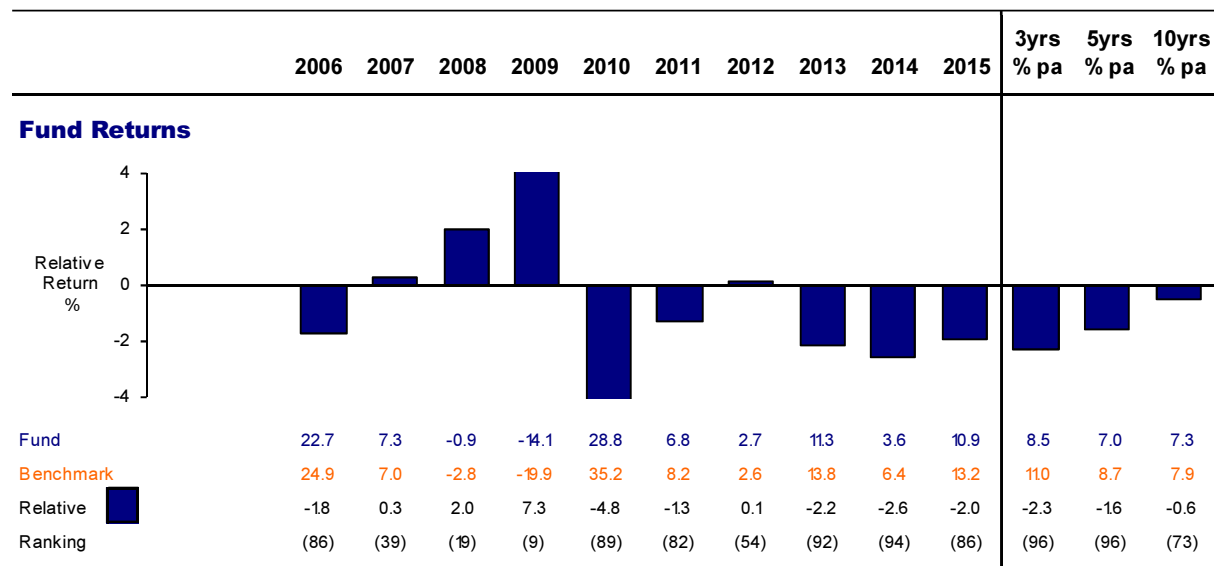
- Manager performance is cyclical

Global Equity Manager



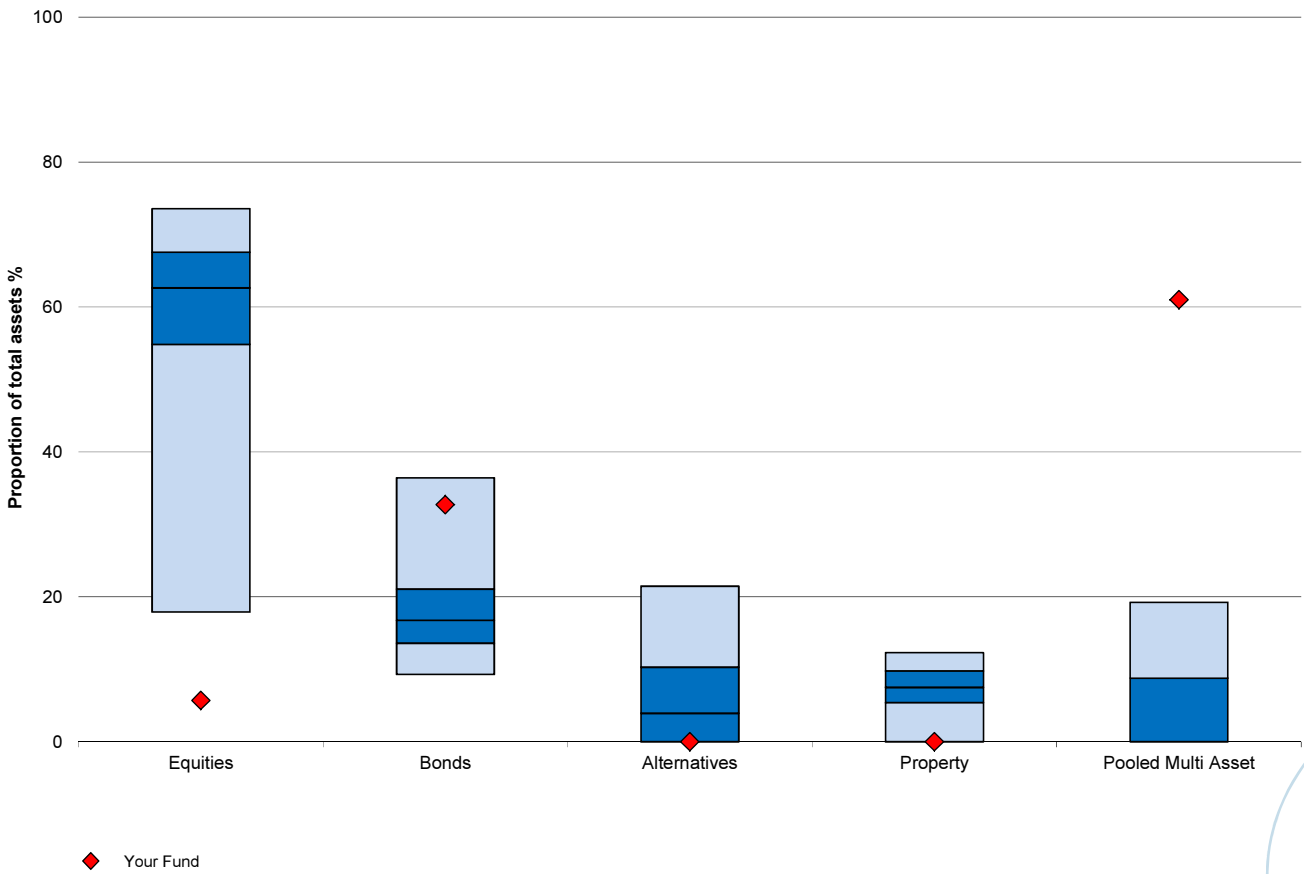
Evaluation & Measurement

Consider Temperature Checks (Peer Group)



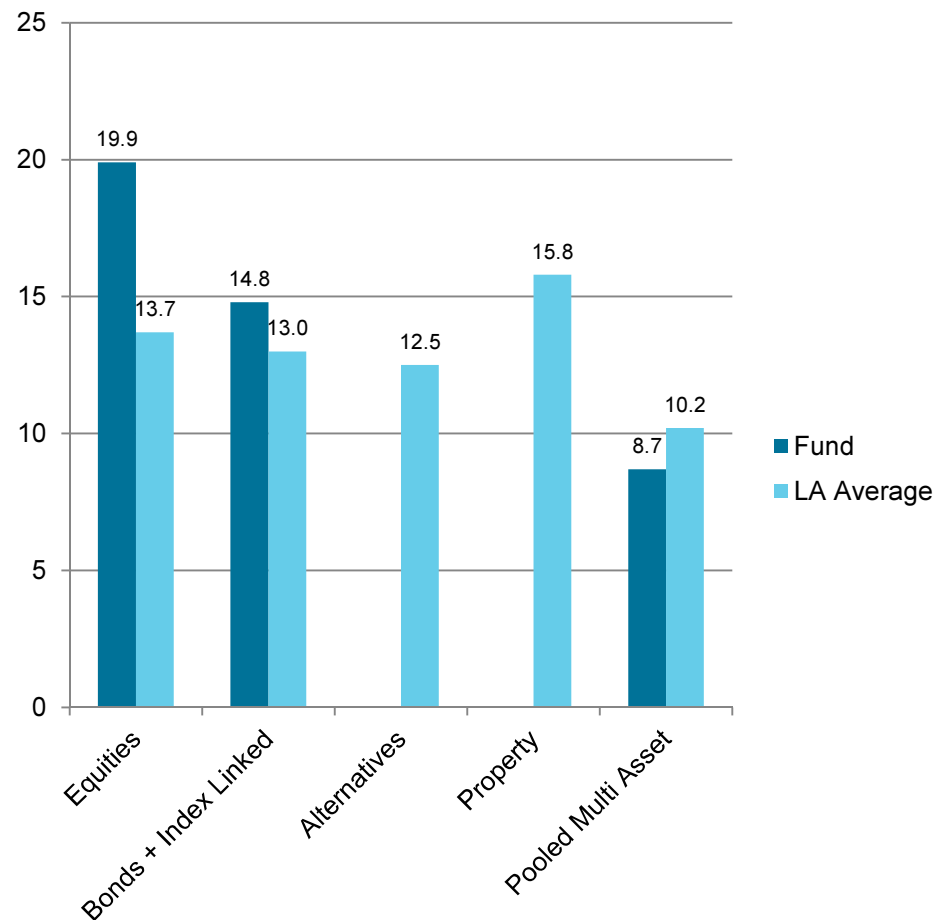
Following the restructure in 2010, the fund has consistently achieved positive absolute returns, albeit well below the local authority average return.

Asset Allocation Latest Year



The fund is well below the average weighting in equities and significantly above the average commitment to Pooled Multi Asset

Performance Returns – Latest Year



There were strong absolute returns from equities and bonds during the period. The fund outperformed the average in both categories.

The key factor in the below average performance was the below average commitment to equities and above average weighting in PMA.

Performance Measurement

Summary

- The process is simple
- It's important to identify and monitor the performance of all contributors – asset strategy and asset managers
- Appreciate what really matters
- There is a clearly defined and appropriate order in which to define a fund's 'working' benchmark
- This benchmark needs to be continually monitored
- Be realistic about timescales

Introduction to Risk

Introduction to Risk

- Performance is not just about returns
- Risk is important
- Risk parameters should be an integral part of setting investment strategy
- Funds' risk appetites will vary
- Risk generally defined as volatility of returns
- Standard deviation is used to measure volatility



Introduction to Risk

Standard Deviation

- People come in lots of different heights. Let's think about the height of UK men.
- The average man is 5'9". This means half of all men are taller than 5'9", and half are shorter than 5'9".
- Men's heights fall into what's called a standard distribution, or a bell curve.
- Out of one hundred men, about 2/3 of them are between 5'6" and 6'. About 2/3 of all men are $5'9" \pm 3"$.
- This is known as one **standard deviation**
- About 1/3 of them are outside this range, with about half of those on each side. So, about 1/6 are 6'1" or taller, and about 1/6 are 5'5" or shorter.



Introduction to Risk

Types of Risk Measures

Ex-Post

- Translated from Latin means “after the fact”
- Observes historical risk and return values

Ex-Ante

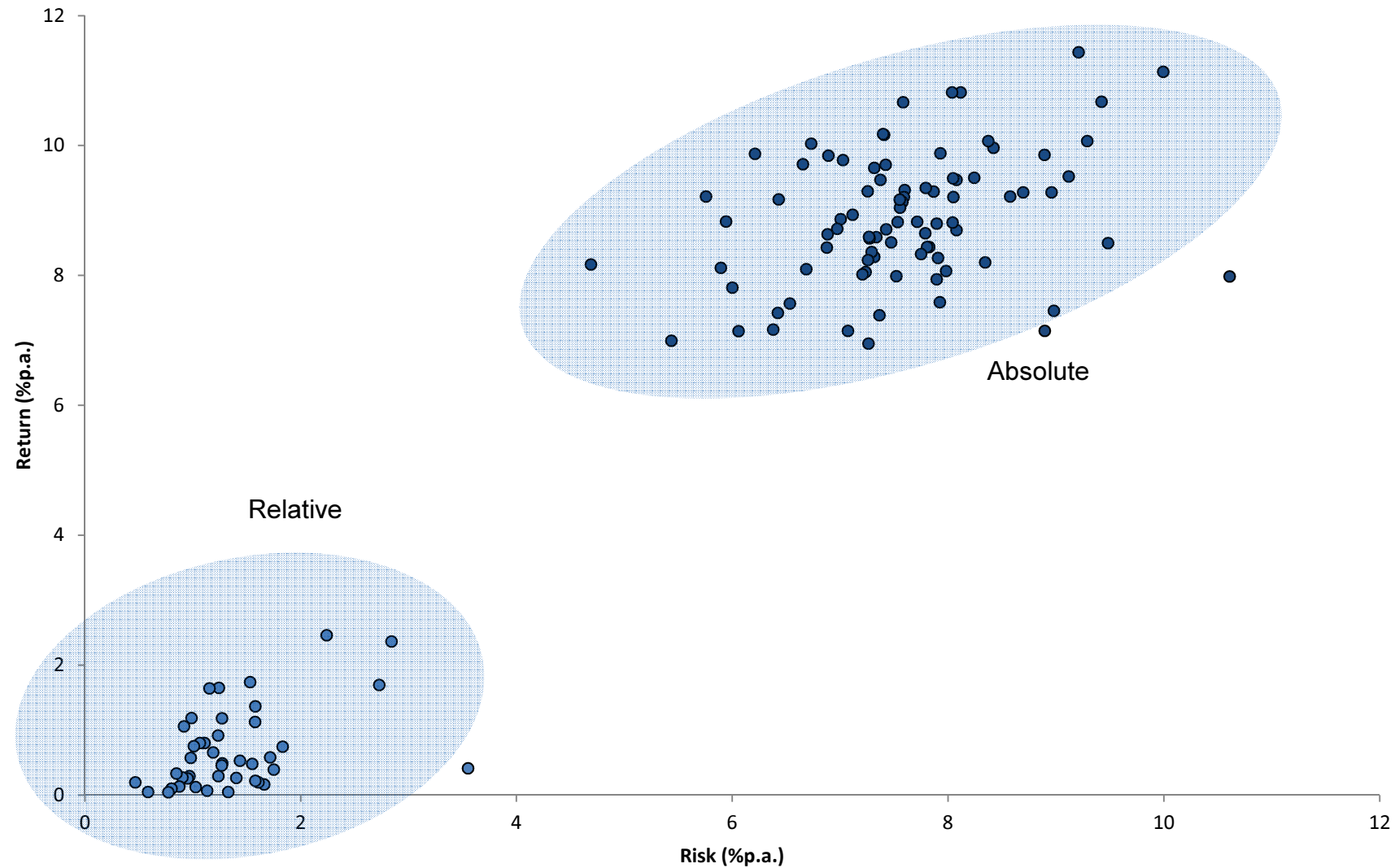
- Translated from Latin means “before the event”
- Refers to future events, such as future returns
- Uses forward looking analytics such as VaR

Introduction to Risk

Other Key Terms

- The observed performance and risk will be dictated largely by the fund's asset allocation
- A small proportion of this performance and risk will be generated by your investment managers
- The two key terms;
 - **Absolute** risk and return - contributions from asset allocation and investments selection
 - **Relative** risk and return – contribution from your investment managers
- **Volatility** and **observed** also describe the absolute risk
- **Tracking error** and **active** are often used to describe the relative risk

Local Authority Universe Five Years to end March 2015



Introduction to Risk

Comparing Profiles

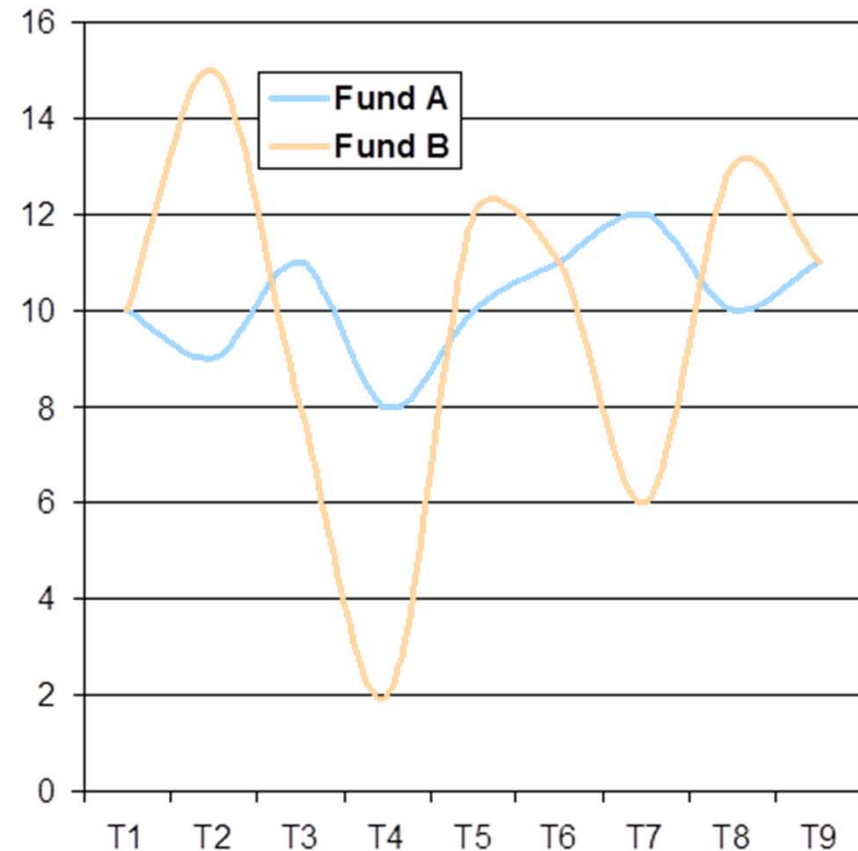
- It's important to consider risk and return when looking at investments
- Which fund below is better from a risk reward perspective?

Annualised Return (% p.a.)	
Fund A	12.5
Fund B	12.5

Introduction to Risk

Comparing Profiles

- Fund B has a very different risk profile than Fund A
- Fund A has delivered a better risk adjusted return
- Generally expect extra return for greater risk - otherwise why take it on?
- There are no guarantees though!



Introduction to Risk

Comparing Profiles

- By using the return series, you can calculate the standard deviation

	Year 1	Year 2	Year 3	Year 4	Annualised Return (% p.a.)	Standard Deviation (% p.a.)
Fund A	+10	+15	+8	+17	12.5	4.2
Fund B	+22	+15	-5	+20	12.5	12.4

- Both funds achieve the same annualised return with different levels of risk
- Fund A has delivered a much better *risk adjusted* return
- This table of data contains much better information

Introduction to Risk

Correlation

- Not all asset types grow or contract at the same rate or same time
- It's important to understand **correlation**
- UK and European equities are highly correlated
- Equities and property are lowly correlated
- Blending of different asset types will shape overall volatility e.g. combining lowly correlated assets will dampen volatility
- This is key when setting your investment strategy

Introduction to Risk

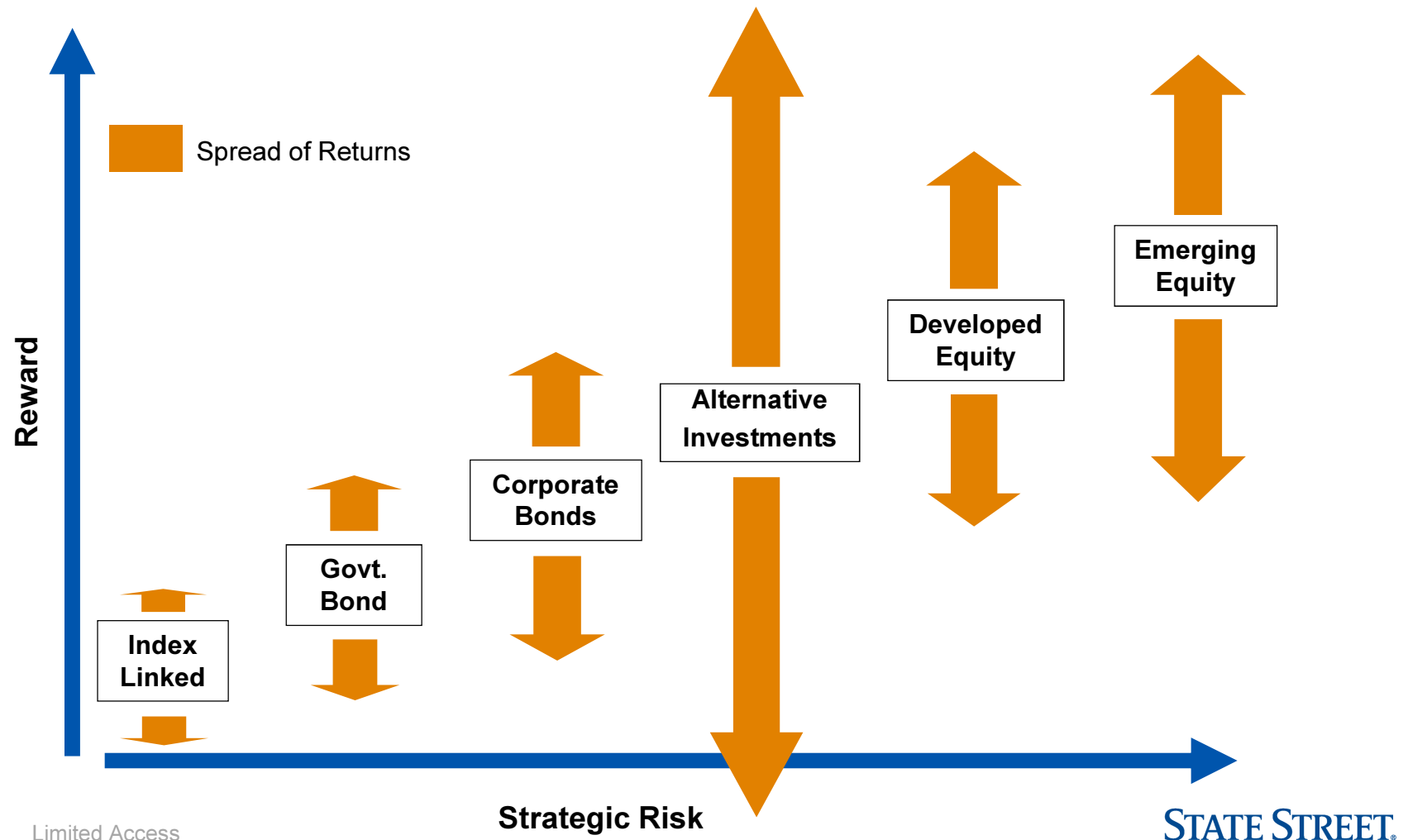
Information Ratios (I.R.)

- A simple measure used to quantify a managers skill in converting risk into excess return (**alpha** in industry jargon)
- It is simply relative **return** divided by the relative **risk**
- Active managers will purport to offer IR's > 0.5
- Our research over many years jars with this!

Skill is not a commodity It can't be bought It can't be predicted It doesn't persist

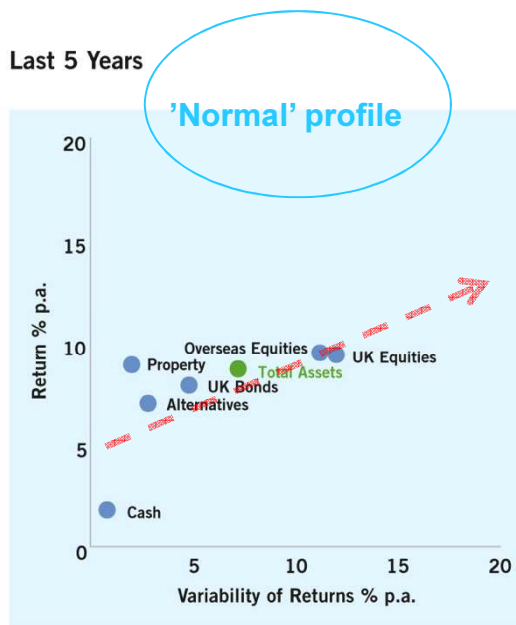
Introduction to Risk

Long Term Risk & Return Trade off

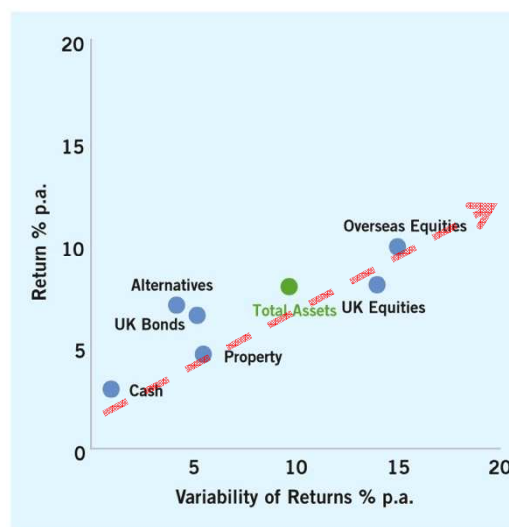


Long Term Risk and Return

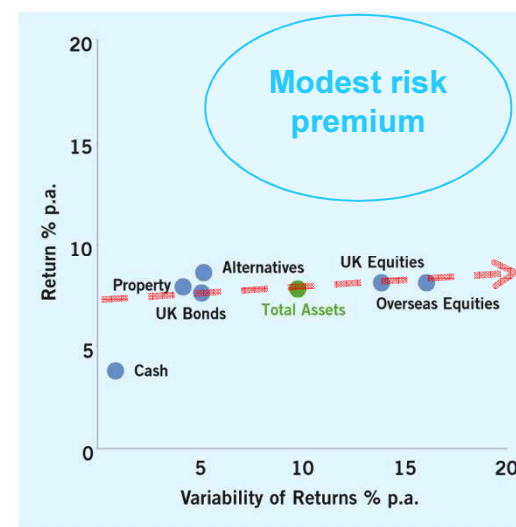
Last 5 Years



Last 10 Years



Last 20 Years



* Source: State Street Global Services Performance Services, 2015.

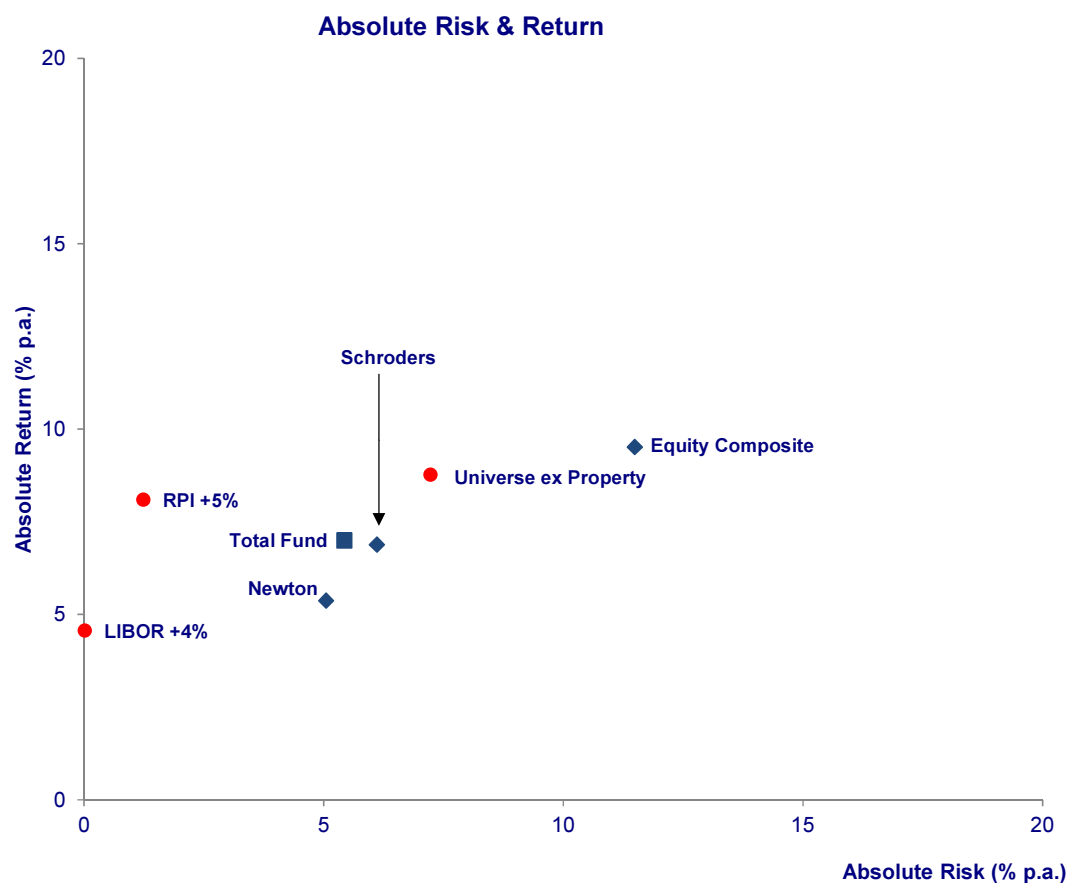
Past performance is not a reliable indicator of future results.

LB of Barnet Fund Value at end March 2015

Values (GBP)'00 Mandate		Value at 31/03/2014	Transactions	Capital Gain / loss	Income	Value at 31/03/2015	% Fund
SIM	Pooled Multi Asset	256,539	127	26,992	89	283,658	31
NEWTON	Pooled Multi Asset	257,736	0	17,376	-1,428	275,111	30
NEWTON	Bd GBP Cpt	125,753	1	21,985	-88	147,739	16
SIM	Bd GBP Cpt	118,730	-6	14,138	90	132,863	15
L&G GLB EQ	Eq Gbl x UK	43,398	0	8,629	-69	52,027	6
L & G	Bd GBP Cpt	17,534	0	2,344	-37	19,878	2
INTERNAL	Cash	8,934	-4,403	0	8	4,530	0
Total Fund		828,624	-4,280	91,463	-1,436	915,806	100

The pooled multi asset strategy with Newton and Schroders account for 60% of the asset allocation.

LB of Barnet Absolute Risk and Return – 5 Years % p.a.

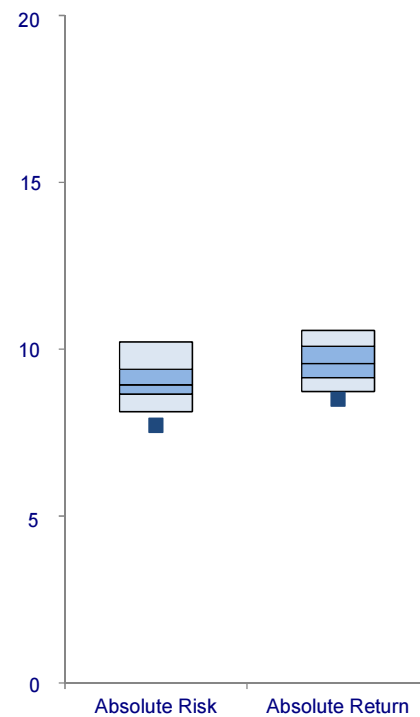
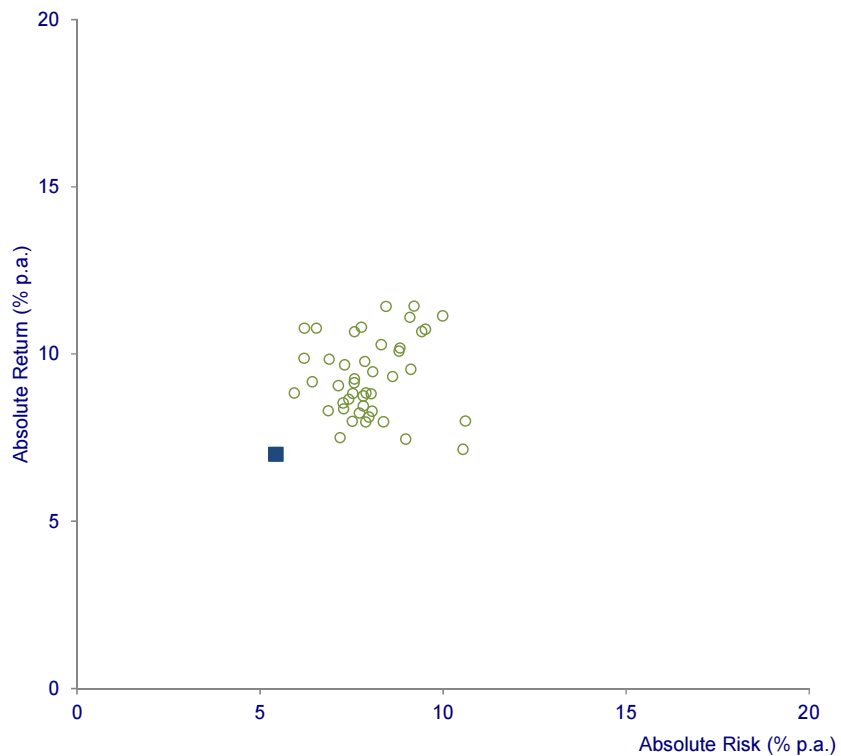


The PMA funds have a lower level of risk compared to the universe and the 60/40 composite benchmark.

During a period where risk has been rewarded in return, the fund is well below the local authority average return.

LB of Barnet Absolute Risk and Return – 5 Years % p.a.

Absolute Risk & Return



The fund risk and return is the lowest within the universe.

Introduction to Risk

Summary

- Risk is not a bad thing
- Risk is all about variability and confidence in outcomes
- Risk is required to outperform
 - asset class risk to outperform a **risk free rate**
 - manager relative risk to outperform the **asset benchmark**
- Investment **strategy** cannot be set without explicit reference to risk
- Risk can set boundaries for appropriate behaviour
- Risk can highlight changes in manager behaviour

Appendix

Return Methodologies

Money Weighted Return (MWR)

- It is calculated as follows:

$$\frac{(\text{FMV} - \text{IMV} - \text{NI}) + \text{I}}{\text{Average Capital Employed}} \times 100$$

KEY

FMV = Final Market Value

IMV = Initial Market Value

NI = Net Investment

I = Income

- The average capital employed (also known as mean fund) is the initial market value + time weighted net investment
- This can be approximated to initial market value + 1/2 net investment, assuming new money in the middle of the period

Return Methodologies

MWR & TWR Example with no cash flow

Initial Value	Value 10 June	Value 20 June	Value 30 June
1,000	1,080	1,200	1,150

$$\text{MWR} = \frac{1,150 - 1,000}{1,000} \times 100 = 15\%$$

$$\text{TWR} = \text{Compound 3 period MWRs}$$

$$\text{MWR} = \frac{1,080 - 1,000}{1,000} \times 100 = 8\%$$

$$\text{MWR} = \frac{1,200 - 1,080}{1,080} \times 100 = 11.11\%$$

$$\text{MWR} = \frac{1,150 - 1,200}{1,200} \times 100 = -4.17\%$$

$$\text{TWR} = [(1.08 \times 1.1111 \times 0.9583) - 1] \times 100 = 15\%$$

Return Methodologies

MWR & TWR Example with a cash flow

Initial Value	Value 10 June	Value 20 June	Net Investment (9am on 21 June)	Value 30 June
1,000	1,080	1,200	240	1,380

$$\text{MWR} = \frac{1,380 - 1,000 - 240}{1,000 + (1/3 \times 240)} \times 100 = 12.96\%$$

$$\text{TWR} = \text{Compound 3 period MWRs}$$

$$\text{MWR} = \frac{1,080 - 1,000}{1,000} \times 100 = 8\%$$

$$\text{MWR} = \frac{1,200 - 1,080}{1,080} \times 100 = 11.11\%$$

$$\text{MWR} = \frac{1,380 - 1,200 - 240}{1,200 + 240} \times 100 = -4.17\%$$

$$\text{TWR} = [(1.08 \times 1.1111 \times 0.9583) - 1] \times 100 = 15\%$$

Return Methodologies

Cumulative and Annualised Returns

- For example; a portfolio's annual returns over three consecutive years are +11%, +32% and +26%.
- The actual cumulative return over three years is calculated as follows;

$$[(1.11 \times 1.32 \times 1.26) - 1] \times 100 = 84.6\%$$

- The annualised return is simply the cube root of the three year return, i.e.,

$$[\sqrt[3]{ (1 + 0.846) } - 1] \times 100 = 22.7\%$$

- Therefore returns of 22.7% p.a. over three years would give an actual return of 84.6%
- Use the fifth root for a five year period etc.

Return Methodologies

Performance Attribution - Asset Allocation Calculation

- For example, an asset class comprises 50% of a fund's benchmark but only 45% of the actual allocation. It has returned 4% against the index of 2% and the overall benchmark is 5%.
- The Asset Allocation (or Policy) impact is calculated as follows:

$$\begin{aligned} &\text{Portfolio weight} - \text{Benchmark weight} && \times && \frac{\text{Index Return}}{\text{Total Benchmark Return}} \\ &45\% - 50\% = -5\% && \times && \frac{1.02}{1.05} && = -2.9\% \\ &&& && && = +0.1\% \end{aligned}$$

- So, this Fund has benefited by 0.1% from underweighting an underperforming asset class

Return Methodologies

Performance Attribution - Stock Selection Calculation

- Using the same example the Stock Selection (or Manager Contribution) impact is calculated as follows:

Portfolio weight	x	Portfolio Return	
		<hr/>	Index Return
45%	x	$\frac{1.04}{1.02}$	= +2.0%
		=	+0.9%

- So, this Fund has gained a further 0.9% from the manager's performance relative to the benchmark that was set

Contact details for further information

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