Economics, asset allocation and currency hedging at the New Zealand Superannuation Fund.

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Presentation to Boutique Fund Managers Forum

October 2012

NEW ZEALAND SUPERANNUATION FUND

Outline

I. NZSF background – reference portfolio benchmark and value-adding activities

II. The Superfund's "macro" views and asset allocation

1. Our take on the short run outlook and risks
2. How we model the medium to long-term outlook
3. Other activities: Investment themes and portfolio stress testing
4. Feeding this into our valuation models, investment and asset allocation decisions

III. The Superfund's approach to currency hedging

1. The logic of the Reference Portfolio 100% NZD hedge benchmark
2. How we approach emerging market hedging
3. Dynamic adjustment (strategic tilting) of FX

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I. Mandate of the New Zealand Superannuation Fund

Our Act sets our mandate (s58)

- Best-practice portfolio management
- Maximising return without undue risk
- Avoiding prejudice to New Zealand's international reputation

We also have a New Zealand Investment Directive from the Minister

"…opportunities that would enable the Guardians to increase the allocation of New Zealand assets in the Fund should be appropriately ***identified and considered*** *by the Guardians*." **NOTE – this is explicitly subject to s58**

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I. Reference portfolio concept

- The RP is a *notional*, low-cost passive portfolio
- Level of risk in the RP appropriate for Fund's purpose and objectives
- Takes Fund's endowments and relevant beliefs into account
- Long-run ('equilibrium') concept
- Used to evaluate value added in actual fund; our benchmark.
- Performance of the RP and value-add reported on a monthly basis to the Superfund's Board and quarterly to the Minister of Finance.
- Relevant horizon for performance assessment is typically a matter of years – our Board and stake-holders understand this.

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I. Reference Portfolio Composition

Exposure	Benchmark	Reference Portfolio
Global equities	MSCI All Country World Investable Market Index hedged to NZD	70%
New Zealand equities	Customised NZX 50 Capped index	5%
Global property	FTSE EPRA/NAREIT Developed Index (listed property) hedged to NZD	5%
Global fixed Interest	Customised index comprising the market-capitalisation-weighted aggregate of the following indices: 1. Barclays Capital Global Aggregate Index hedged to NZD 2. Barclays Capital Global High Yield Index hedged to NZD 3. Barclays Capital Inflation Linked Global Index hedged to NZD	20%
Foreign currency exposure		0%

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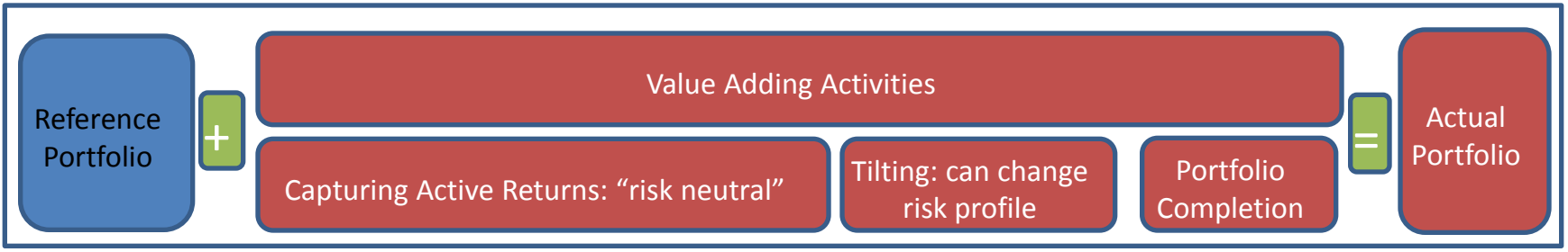
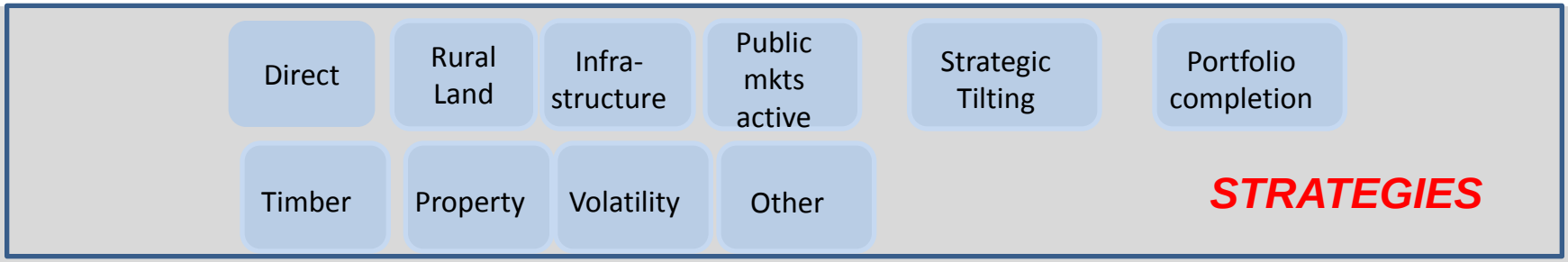
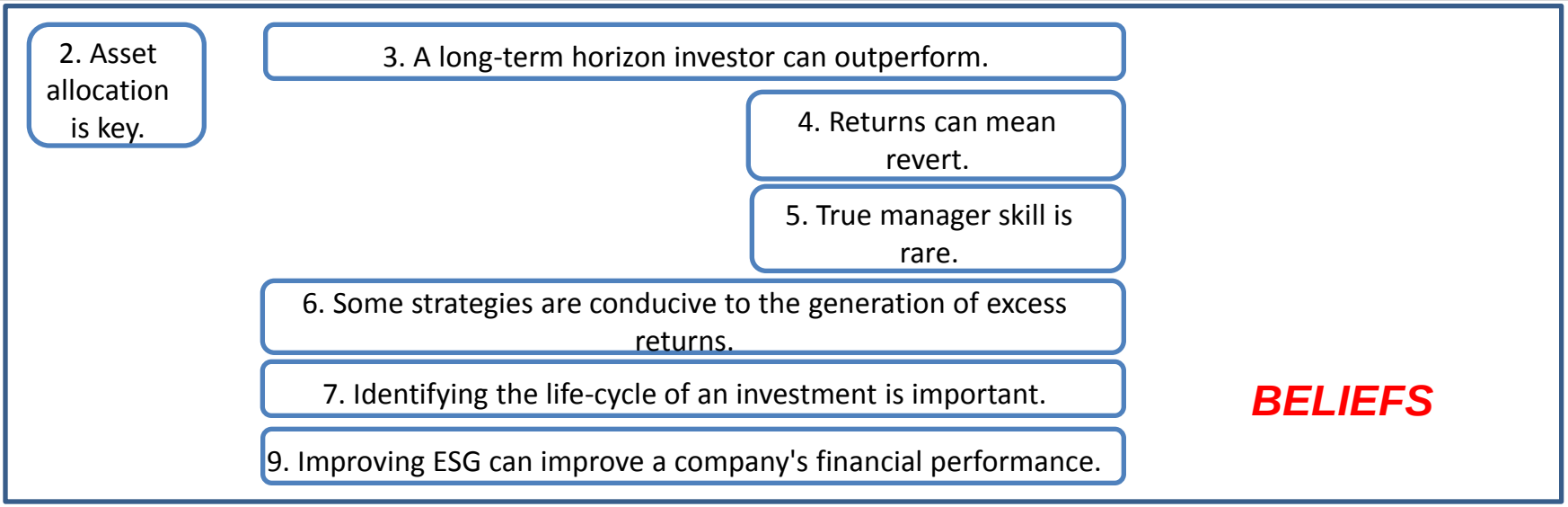
I. Building the actual portfolio: anchored to beliefs







II. Macro views: short-run outlook

- Purpose of our monitoring of the short-term outlook and risks is to provide a context for interpreting movements in markets and opportunities
- We do not take “tactical bets” based on how we think the short-term outlook and risks will evolve relative to market expectations (though we do have external managers that do, e.g. Bridgewater).
- We do take large positions based on medium to long term “mean reversion” assumptions and use risks around the “base case” outlook as a hook to consider risks to the portfolio and investment opportunities under consideration (discussed later)

II. Macro views: IMF World Economic Outlook

- Tight fiscal policy is having an negative impact on growth
- Very easy monetary policy is providing support
- But “uncertainty” weighs on growth prospects
- 17% chance of <2% World growth
- Forecast assumes progress on Eurozone and US fiscal cliff

	2012	**Change from July**	**2013**	**Change from July**
World	3.3	-0.2	3.6	-0.3
Advanced	1.3	-0.1	1.5	-0.3
Emerging	5.3	-0.3	5.6	-0.2

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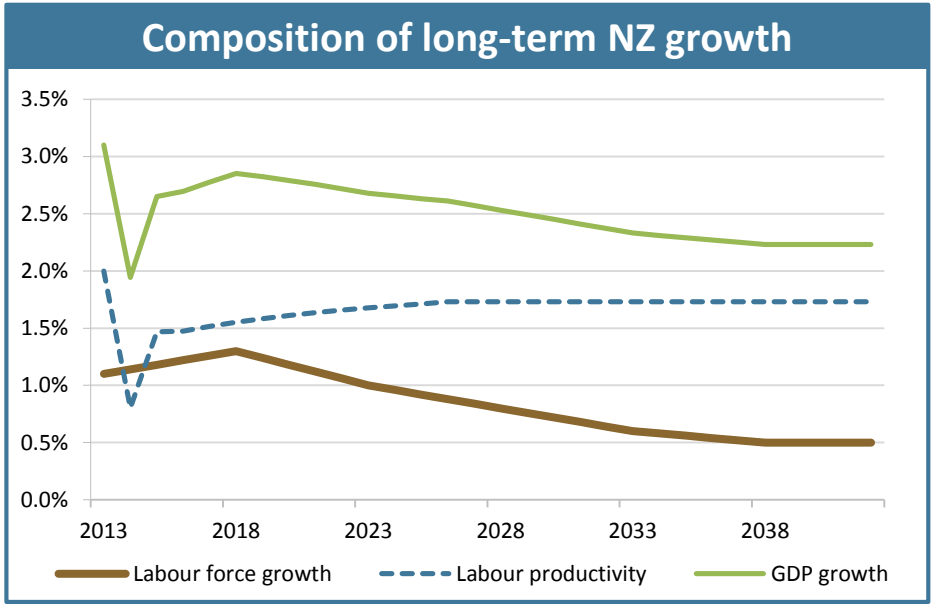
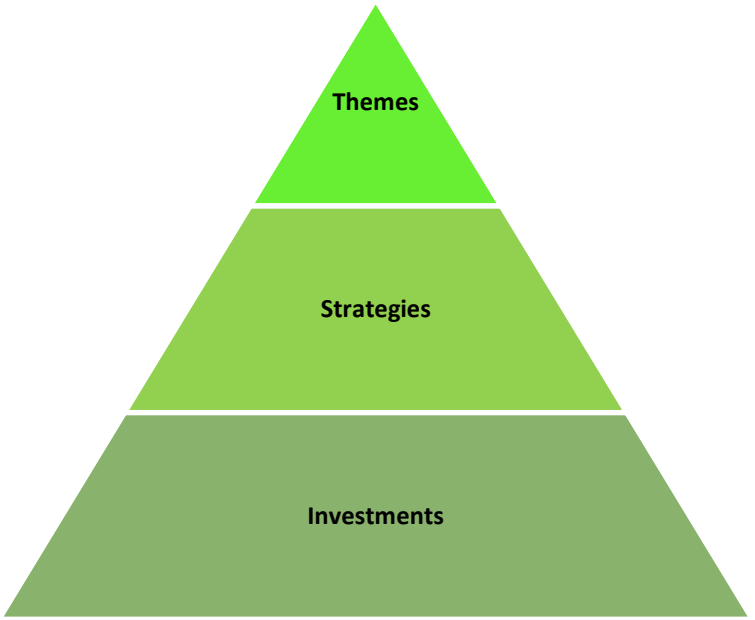
II. Macro views: long-term NZ economy outlook



- Labour force growth peaks around 2018 then enters period of steady decline
- Even with improved productivity performance, typical growth rate falls from 3% to less than 2.5% by 2030.
- Productivity assumption already to optimistic?
- Sensitive to migration assumption (average 12,000; current -4,200)
- Demographic “slowdown” a key global issue over coming decades; impact on NZ relatively light

II. Our "economics" also feature in the development of the Fund's core long-term investment themes

- Themes are long-term influences on the economy and capital markets that are expected to be relatively immune to business cycle and other short-term influences.
- NZ Superfund's thematic focus includes: (1) Resource Sustainability; (2) Emerging Market Segmentation and (3) Changing demand patterns
- Thematic impacts are often "slow burners" subject to uncertainty. As such, they will not usually be fully-priced in by markets given myopic horizons. This suits our long-term investment horizon endowments -- we have the discipline to wait until markets better reflect thematic influences.
- Access points to themes may also play to our tolerance for illiquidity and/or Sovereign Status endowments
- Investment opportunities taken will more often than not have an underlying thematic rationale, given our front-line investment professionals are guided by an opportunity search process the embeds themes.
- We think the thematic overlay also makes the portfolio more resilient to a range of risks – particularly those that play out over a longer horizon.



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Thematic implications for New Zealand 2050

Rising emerging market incomes and associated "Western" demands for protein and travel

This demand is as near a given as you can get given historic pattern of increasing expenditures on protein, higher quality branded goods, and services such as tourism as incomes rise. But rest of world will also invest to meet rising demand, e.g. Chinese and Brazilian agricultural expansion into Africa. What sets NZ apart is:

- Fact much of our agriculture and *especially* fishing production base is fairly sustainably managed c/f other countries.
- NZ expected to be relative "winner" from climate change -- physical impacts modest c/f many countries, ahead of the curve with respect to ETS, energy production has high renewable content (may offer significant longer-term cost advantage).
- We do not in general suffer water "stress", e.g. we don't have to share water resources with other countries or heavily rely on aquifers for agricultural production. World Bank projections suggests that by 2030 around **90%** of World's population will suffer some degree of water scarcity.
- Above factors imply we have an unusually good ability both to supply and capacity to reap added-value from appealing to consumer demand for sustainably produced agricultural products. But not a given -- does require conscious effort to develop brands and understand and educate offshore markets.

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Thematic implications for New Zealand 2050

- We will also likely see continued strong growth in tourism arrivals as center of gravity shifts to Asia, with the potential technology “game changer” being hypersonic travel (3 hours from Auckland to New York!)
- Numbers alone imply strong positive tail wind for tourism related infrastructure (e.g. airports and airport hotel facilities) but value-add is not just a numbers game.
- If these opportunities are reaped the “terms of trade” or price we receive for exports relative to price we pay for imports will continue the upward trend established in the early 1990s; implying we will get richer as a nation.

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II. Macro views: scenario analysis and stress testing

Stress tests and scenario analysis conducted at the Fund have been considered for the following purposes:

1. To provide the Board with an estimate of the scale of short-term maximum losses we may face with differing degrees of growth asset exposures to help inform the risk profile and FX hedging choices that were made in the 2010 Reference Portfolio Review.

2. To test the ability of the Fund to complete the portfolio and meet its collateral obligations under specific macro shocks and/or counter-party failure scenarios (i.e. stress testing of the Fund's liquidity pool).

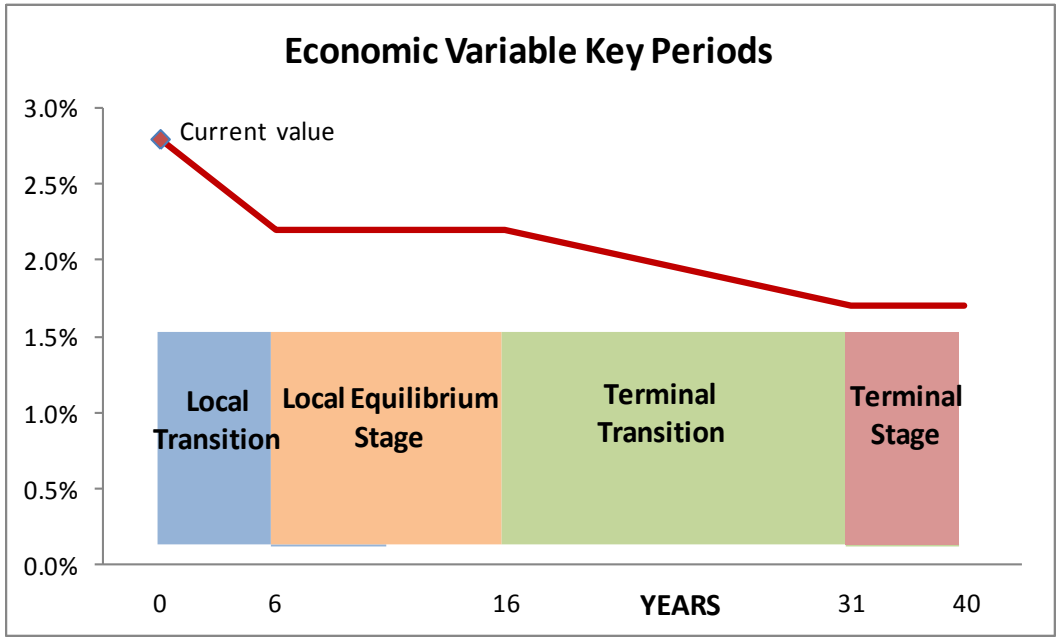
3. To develop the diversification rankings across asset classes and strategies in the Heat Map tool.

4. To consider potential downside risks around specific investment opportunities (e.g. Euro area stress scenarios were considered in developing range of expected returns for the European distress opportunities).

5. To provide a sense of the range of outcomes we may expect with the actual portfolio, largely for information only, in the Investment Environment Reports and occasional Strategic Tilting reports and Board papers.

II. Macro views: our long run assumptions

- We forecasts country level inflation, real GDP growth and interest rates out over a +40 year horizon.
- Our real growth assumptions are based on OECD trend growth (to 2026) and UN demographic (to 2100) assumptions.
- The forecasts go through transition stages wherein it is assumed in the long-run all countries converge to the same inflation and OECD per-capita GDP levels (see graphic below).
- Assumptions imply real exchanges increase in EM countries and rest of world
- We link real interest rates to real growth.



II. Macro views: our long run assumptions

- Discount rates paths we apply in valuing markets and investment opportunities are a function of real growth, inflation and asset or market specific risk premia.
- These paths are used across all valuations done by NZSF so that investments can be compared on an equal footing.

- A key value-add activity where this valuation work appears is the Fund's Strategic Tilting program.
- Here we 'tilt' broad market exposures as a function of our valuation views, the risk we take on in tilting the positions (absolute and active risk), and the confidence we have in our ability to identify "fair value" in the various markets we model
- Tilting is usually a "contrarian" strategy vs. "market consensus": in the short run positions can go against us.
- We think we have the Governance structures and time horizon in place to manage this.

III. Hedging FX

- Our Reference Portfolio benchmark is to hedge 100% of our foreign currency exposures where practical, or to impose a "proxy' where not (is an issue for some EM currency exposures).

Why 100%?

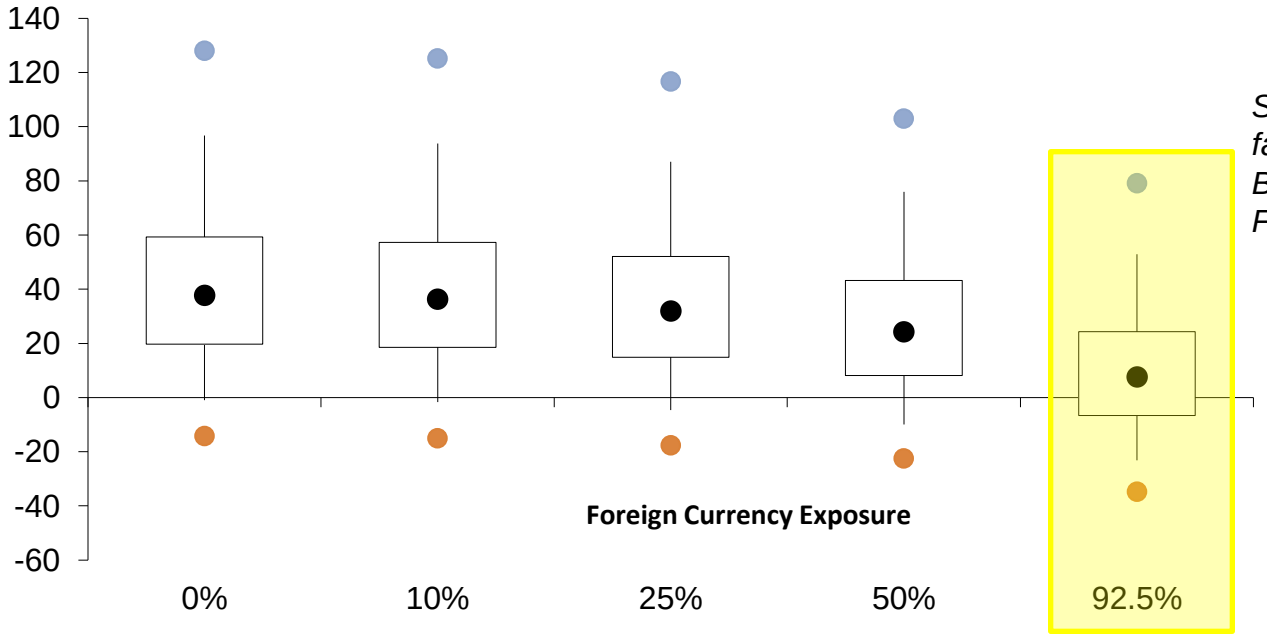
- Minimum portfolio risk position for the Reference Portfolio is to hedge around 60% of our offshore exposures given its risk and correlation assumptions.
- But on average we expect a positive carry pick-up versus our offshore exposures (around 150bp per annum).
- Our judgment is that this carry pick up is more-than-sufficient compensation for the extra risk taken being 100% hedged
- This judgment is partly a function of our long-term focus and ability to withstand short-term volatility: with a shorter-term focus arguably 100% is not appropriate…

III. Hedging FX

Downside tail outcomes after 1 and 3 years with different degrees of FX hedging

	Base case – all currency exposures hedged	10% foreign currency	25% foreign currency	50% foreign currency	92.5% foreign currency
One year					
1st percentile	-25.9%	-23.3%	-19.2%	-16.9%	-18.4%
5th percentile	-9.7%	-9.5%	-9.2%	-8.6%	-10.7%
Three years					
1st percentile	-7.9%	-7.1%	-6.4%	-6.0%	-7.5%
5th percentile	-2.6%	-2.3%	-2.0%	-1.8%	-3.1%

Long run (30 year) expected outcomes (RP value-add vs. NZ cash) with different degrees of FX hedging



Significant chance we fail to outperform NZ T-Bills under low levels of FX hedging

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III. Hedging FX

- In the actual portfolio we deviate from the 100% hedge Reference Portfolio for two main reasons:
    1. When we think we can earn a better risk-adjusted return by lowering (or increasing) the hedge ratio
    2. When it is difficult in practice to directly hedge (as is the case in many EM and frontier market currencies)

- Both are active decisions: value-add is measured against the Reference Portfolio

- Another active decision regarding hedging arises from the "tenors" (length of FX forwards) that our Portfolio Completion team chooses to hedge over vs. the RP benchmark, which is a one-month tenor. Generally we select a range of tenors with an average length greater than one month. This in part if a pragmatic response to the size of the Fund and the impact we can have on the NZD forward market.

III. Hedging FX

- The first active decision to deviate from the 100% hedge benchmark is captured as a 'tilt' as part of our Strategic Tilting program
- Here we model the expected return from FX as a function of carry and mean reversion in the level of the NZD vs. a range of other currencies the Fund has significant exposures in to our estimated bi-lateral "equilibrium levels"
- Equilibrium levels are estimated using a range of modeling approaches that try to estimate the fundamental or longer term level of a currency (e.g. one model we use is based in the RBNZs macro balance model).
- Carry is known with certainty (embodied in FX forwards) while the equilibrium level of the NZD (or any other currency) is subject to considerable uncertainty, as is the timing of adjustment to it.
- For this reason we need to estimate that there is an unusually high expected return from FX before deviating from the benchmark position. For the case of going short the NZD or long FX, this will be the case when carry is very low and/or when we estimate the NZD to be significantly over-valued.

III. Hedging FX

- For our EM exposures we have three cases:
  - (1) Where exposures are material (around 0.75% Fund NAV or more) and we can directly hedge to the NZD because their FX markets are sufficiently developed we directly hedge (e.g. South Korea and Taiwan)
  - (2) Where exposures are material but the currency concerned is highly pegged to a OECD currency we usually apply a currency proxy; e.g. for our Hong Kong and Chinese exposures we apply a USD proxy hedge. The reason for this is that it is usually cheaper to execute the proxy
  - (3) EM FX exposures that are not material are left un-hedged. Our analysis of these currencies is that they tend to be more correlated with the NZD than the USD or any other major, particularly in times of stress. Hence the NZD is a reasonable "proxy" in these cases. Also, as a group rates tend to be higher than NZ (e.g. Brazil, South Africa, Russia etc) so all else equal we receive a positive carry leaving these exposures unhedged.

APPENDIX

Example of the Proxy system

Asset Class	Reference Portfolio Benchmark	Add Private Market Exposures and remove proxies:					Rebalancing Target pre-tilting
		Private Equity	Infra-structure	Timber	Unlisted property	Other Private Markets	
Global equities	70.0%	-5.1%	-2.8%	-1.4%	-1.9%	-0.5%	58.3%
Global listed property	5.0%	-0.4%	-0.2%	-0.1%	-0.1%	0.0%	4.2%
New Zealand equities	5.0%						5.0%
Total Growth	**80.0%**	**-5.5%**	**-3.0%**	**-1.5%**	**-2.0%**	**-0.5%**	**67.5%**
Fixed Interest	**20.0%**	**+0.5%**	**-2.0%**	**-3.5%**	**-3.0%**	**-4.5%**	**7.5%**
- Private Equity	0.0%	+5.0%					5.0%
- Infrastructure	0.0%		+5.0%				5.0%
- Timber	0.0%			+5.0%			5.0%
- Unlisted Property	0.0%				+5.0%		5.0%
- Other Private Markets	0.0%					+5.0%	5.0%
Total Private Markets	**0.0%**	**5.0%**	**5.0%**	**5.0%**	**5.0%**	**5.0%**	**25.0%**
Total Portfolio	**100.0%**						**100.0%**
Volatility (std dev. over 1 yr)	**13.1%**	**13.1%**	**13.1%**	**13.0%**	**13.1%**	**13.0%**	**12.8%**

Each proxy is designed to keep the Fund's absolute risk largely unchanged

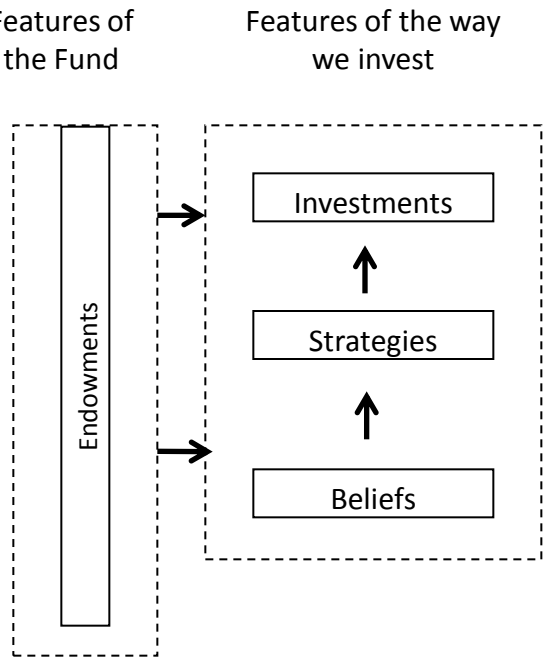
I. Key Investment Beliefs

Investment Decision	Belief	Fact
Governance and objectives	1. Clear governance and decision-making structures that promote decisiveness, efficiency and accountability are effective and add value to the Fund.	It is important to be clear about investment objectives for the Fund, risk tolerance, and the timeframe over which results are measured.
Asset allocation	1. Asset allocation is the key investment decision. 2. Investors with a long-term horizon can outperform more short-term focused investors over the long-run.	Risk and return are strongly related. There are varied investment risks that carry premiums/ compensations. Illiquidity risk is one such premium. Investment diversification improves the risk to return (Sharpe) ratio of the Fund.
Asset class strategy and portfolio structure	1. Expected returns are partly predictable within asset classes and returns can revert toward a mean over time.	Investment markets are competitive and dynamic, with excess returns very difficult to find and constantly changing source. Market volatility tends to cluster over short horizons but mean-reverts over longer horizons. Investment risks can be unbundled to make the Fund more efficient. This includes the separation of market (beta) and investment specific investment manager skills (alpha).
Investment and Manager Selection	1. True skill in generating excess returns versus a manager's benchmark (i.e. pure alpha) is very rare. This makes it hard to identify and capture consistently. 2. Some markets or strategies have characteristics that are conducive to a manager's ability to generate excess return. These characteris-tics tend to evolve slowly over time, although the shorter term opportunity set available in any market/strategy can vary through the cycle. 3. Identifying the life cycle of an investment is important in assessing the expected return. 4. Responsible asset owners who exercise best-practice portfolio management should have concern for ESG issues. 5. Improving ESG factors can improve the long term financial performance of a company.	Each investment should be made on the basis of its expected value-add to the Fund as a whole. Principal/agent conflicts exist with outsourced investment managers. The more efficient a market is, the more difficult it is for a manager to generate an excess return (versus their benchmark). Most excess return is driven by a combination of the research signals the manager is using, the conduciveness of their market to generating excess returns, beta factors and luck. Research signals and methods used by managers tend to commoditise over time through market forces. In some cases, synthetic exposure to a market or factor can provide a guaranteed excess return to the Fund, and represents an additional hurdle that an active manager must surpass.
Execution	1. Managing fees and costs and ensuring efficient implementation can prevent unnecessary cost.	

Strategies exploit our Endowments

What are "endowments"?

"Endowment" can be thought of as an essential feature or characteristic of our Fund, which is outside our control; it is not a matter of our choice. It is something that enables us to exploit a belief and invest in a particular way; it is also something that can stop us from exploiting a belief or investing in a particular way. So the endowments establish broad parameters for how we invest to meet our mission. The diagram below is a way of showing this.



What are our Endowments?

Sovereign status

The Fund is a pool of financial assets wholly owned by the Government and it obtains sovereign tax status as result. This is beneficial as foreign countries can have a different taxation approach to entities with sovereign status (i.e. a reduction in foreign tax leakage). Sovereign status can also be regarded favourably by counterparties and it can position the Fund as a potential co-investor of choice within New Zealand.

Certain liquidity profile

The flow of cash into and out of the Fund is governed by a public funding formula. This provides us with certainty, and transparency, of cash flow timing. This gives us the confidence to invest in assets that other investors may eschew given their own liquidity demands. We can buy assets when other market participants are constrained or have been forced to sell to meet their own liquidity demands.

Long Fund horizon

The investment structure of the Fund is designed to exist for many decades. This affords us the flexibility to undertake investments with longer-term return characteristics, such as private equity. In addition, it means that the Fund is more tolerant than other investors to market volatility, enhancing its ability to endure market cycles.

Independent investment responsibility

The legislation which created ourselves and the Fund also established our investment independence from the Government. Our investments are made for a specific purpose and the investment mandate contained within the legislation requires that they be made on a purely commercial basis. The Government may only direct us about its expectations of the Fund's overall risk and return. This investment independence gives us confidence to enter into investment arrangements that best suit the Fund's purpose, with minimum agency risk. The legislated investment mandate also requires us to manage the Fund in a transparent manner, and to have regard to environmental, social and governance standards. We believe this assists in positioning us to be an investor, or co-investor, of choice in many regions.

II. Opportunity prioritisation and scaling

- Our opportunity prioritisation is in part driven by a **heat map** tool that incorporates internal and external views on market mis-pricing (valuations) for a large range of asset classes and/or strategies, market efficiency, potential for portfolio diversification and alignment with ESG and themes.
- Opportunities that are assessed as favourable are prioritised for front-line investment search.
- Opportunities seen as least favoured are prioritised for potential divestment if they are assets currently in the portfolio. That is, the process is a *buy and sell discipline*.
- Our **investment framework** requires that we consider alternative **access points** for new potential opportunities in order to 'unbundle' sources of risk and return and to assess which offer the highest expected risk-adjusted returns.
- In this evaluation we utilise an **investment hurdles** tool that includes as inputs our current expected returns for the Reference Portfolio and (if applicable) passive public market equivalents for the access point under consideration, as well as our assessment of the loading of the opportunity onto these market exposures. In doing so we estimate how much the expected return is a function of market risk premiums versus manager skill and other factors.

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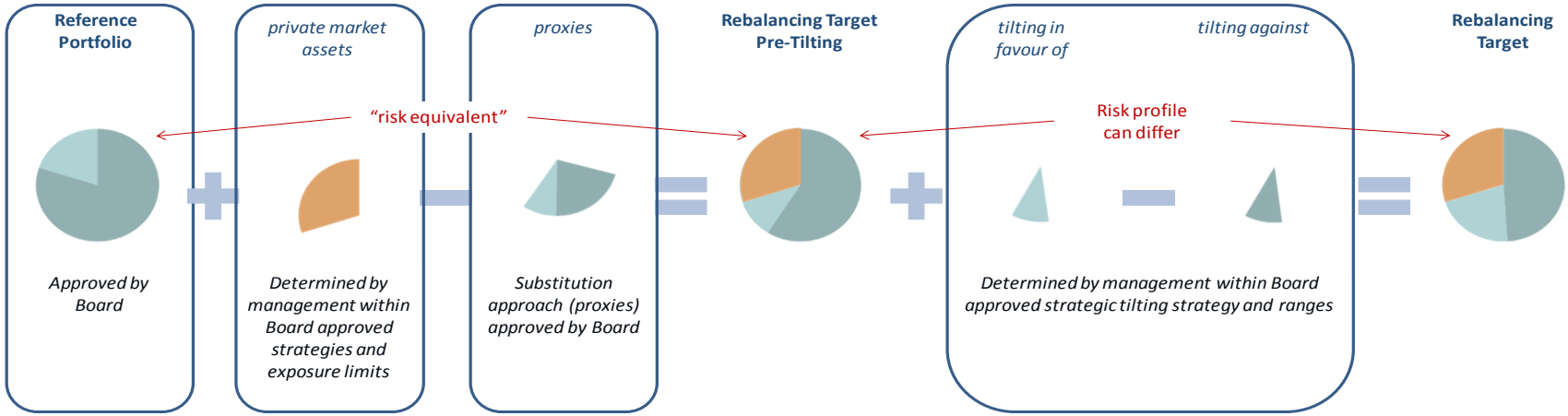
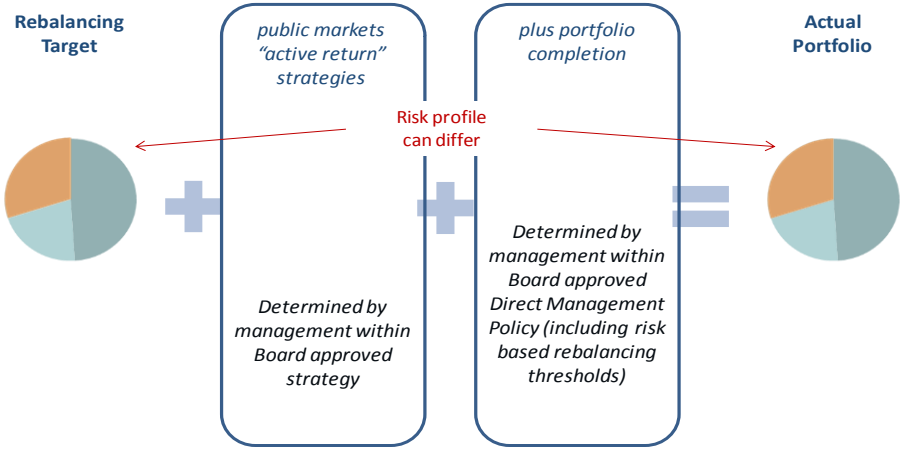
II. Opportunity prioritisation and scaling

- Our confidence in expected risk-adjusted returns and the value-add an investment may bring above the Reference Portfolio will be highest when:
  - there is consistency between our endowments and beliefs and the investment
  - we can clearly articulate factors that drive investment risk and return and we have considered a range of potential outcomes, including downside risks
  - the opportunity does not require a high level of skill ('pure' alpha) as the main driver of expected returns
  - we have the ability to execute and manage the investment risks ourselves.
- Scaling of the opportunity is driven by a **risk allocation process** that considers the expected impact on the performance of the portfolio (e.g. its Sharpe ratio), relevant constraints (e.g. liquidity, counter-party risk limits and single asset risk limits), as well as relevant organisational demands (tax, legal, etc) and operational complexity.

I. Portfolio construction: putting it all together





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II. Proxy system

- In general, the proxy system serves the following purposes:
  - It pre-defines public market proxies for unlisted or illiquid exposures. These are chosen so as to keep the absolute risk of the overall Fund relatively stable as exposure to unlisted exposures varies over time.
  - It allows the amount and composition of exposure to these value-add investments to be determined flexibly based on the nature of the opportunities rather than by determining fixed target weights (provided that they stay below current limits).
  - It ensures there is clear accountability, in terms of the opportunity cost, for the impact these value-add investments have on the Fund returns.

II. Proxy system

- There are two ‘slices’ of the reference portfolio that serve as proxies for assets introduced into the Fund: growth and fixed interest.
- Each value-add investment has a default proxy which is a set percentage of each of these slices as shown in the table.
  - Every 1% increase in the Fund weight for timber, for example, would be offset by a 0.3% decrease in the Fund’s growth assets weight and a 0.7% decrease in the fixed interest weight.
  - The proxies work symmetrically, so that decreases in the timber weight are offset by increases in the corresponding reference portfolio asset class weights.
- Default proxies can be overriden by the Investment Committee with all overrides reported to the Board.

	Default Proxy	
	Growth*	Fixed Interest
Private Equity	110%	-10%
Infrastructure	60%	40%
Timber	30%	70%
Unlisted Property	40%	60%
Other	10%	90%

* *This percentage applies to the total global equities and global listed property, with the same proportional composition as the Reference Portfolio weights for these two asset classes. Excludes NZ equities.*

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