"HOW WE INVEST" WHITE PAPER

THE 2020 REFERENCE PORTFOLIO REVIEW

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PREFACE

The Guardians of New Zealand Superannuation, the investment manager of the New Zealand Superannuation Fund (NZSF or the Fund), undertook a five-yearly review of the Fund's Reference Portfolio in 2019/20.

The Reference Portfolio has served as the Fund's benchmark since its adoption in 2010. It is an alternative portfolio to the actual portfolio the Fund invests in and is designed with the Fund's objective and mandate in mind.

This paper provides a summary of the 2020 Reference Portfolio review.

Stephen Gilmore
Chief Investment Officer

THE REFERENCE PORTFOLIO APPROACH

The Reference Portfolio is a notional, low-cost portfolio designed to meet our objective to maximise returns without undue risk to the Fund as a whole. It serves as both a governance benchmark and an articulation by the Board of the risk appropriate for the Fund's objective and mandate. In practice, it comprises just over half of our actual portfolio, with our active investment strategies making up the balance.

The Reference Portfolio is underpinned by the following key design principles:

NZSF Reference Portfolio Design Principles

Reference Portfolio should:		Implications
Be a simple, low-cost portfolio	→	Passive implementation of traditional asset classes.
Be diversified	→	Asset classes are represented by broad indicies.
Be appropriate in risk and return	→	We aim to maximise returns without undue risk as specified by our mandate.
Be relevant to a New Zealand-based investor	→	We aim to maximise returns in New Zealand dollar terms.
Be an equilibrium construct	→	We take a very long-term perspective where investors are appropriately compensated for the risk they bear.

The Reference Portfolio differs from the commonly used Strategic Asset Allocation (SAA) approach in that:

- It is a benchmark, not a guideline for the actual portfolio's composition;
- It contains traditional asset classes only;
- It is not affected by short-term market conditions, and will only change when there are fundamental changes to the market, the Fund's mandate and/or endowments.

Compared to an SAA, the Reference Portfolio approach encourages a greater separation between governance and management, focusing the Board on long-term strategic decisions while providing greater flexibility for management to add value to the portfolio over and above what can be achieved by simply implementing the Reference Portfolio.

Management exercises judgement in constructing the actual portfolio, based on its assessment of current asset pricing from long-term fair value. These decisions can be compared with the alternative of simply holding the Reference Portfolio. In this way, the Reference Portfolio is a device that is used to hold management to account for actual portfolio decisions.

Four key questions were central to our review of the Reference Portfolio:

1. What asset classes should be represented in the Reference Portfolio?
2. How much should be allocated to New Zealand assets?
3. Should we hedge interest rate and inflation risk?
4. What currency hedging strategy is appropriate?

Final decisions about the Reference Portfolio are made by the Board.

COMPOSITION

The composition of the Reference Portfolio, including its expected risk and excess returns over cash in 2010, 2015 and 2020, is shown below.

NZSF Reference Portfolio Composition

Asset Class	2010	2015	2020
Developed Market Equities	70%	65%	75%
Emerging Market Equities		10%	
New Zealand Equities	5%	5%	5%
Global Listed Property	5%	-	-
Total Growth	**80%**	**80%**	**80%**
Global Fixed Income	20%	20%	20%
Total	**100%**	**100%**	**100%**
Expected Return above Cash (p.a.)	**2.5%**	**2.7%**	**2.8%**
Long-run Risk (Volatility, p.a.)	**13.2%**	**13.5%**	**13.8%**

In 2020 we retained a Reference Portfolio allocation of 80% to growth assets and 20% to fixed income assets. This decision was made after reviewing extensive simulation results from our proprietary Reference Portfolio Review model. The 80/20 asset allocation is deemed to represent an appropriate balance between maximising returns and avoiding undue risk, as required by our legislative mandate. In addition, the Fund's endowments, including its long horizon and known contribution and distribution profile, support a strong weighting to growth assets.

REPRESENTATION

Consistent with the 2015 review, our starting point for the composition of the Reference Portfolio is the listed / liquid market. The Board chose global equities (shares) and fixed income (bonds) as they are by far the largest and most liquid asset classes.

We deviated from the 2015 review in choosing to assign weights to each asset class based on widely used liquid market index weights rather than the full investable market. This is because we considered our practical ability to invest the Reference Portfolio efficiently more important than getting access to the full investable market.

Consequently, in 2020 the Board agreed to combine the developed and emerging market equities allocations into a single global equities building block, with each component being able to vary in line with the relevant free-float global equity index. The 2015 review had fixed weights assigned to separate developed and emerging market blocks.

Commodity futures are another liquid asset class that could potentially be included in the Reference Portfolio.[1] The 2015 decision to exclude commodity futures from the Reference Portfolio was maintained.

Our view is that while commodity futures attract a risk premium, this premium is low relative to the volatility of the asset class, largely derives from rebalancing and is thus not a passive source of return.[2] Moreover, long commodity futures (in which we agree to buy the commodity at some future date) could be inconsistent with our Climate Change Investment Strategy, given that the most-tracked commodity futures indices are heavily exposed to energy.

[1] A commodity future is an agreement to buy or sell a commodity at a pre-agreed price on a set date in the future.

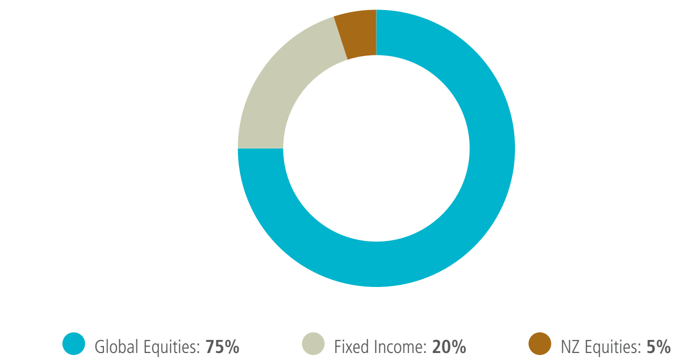
[2] Risk premium is the return in excess of cash earned by investors as compensation for taking passive exposure to the market or an asset class.
Rebalancing is the process of buying and selling the Fund's actual passive exposures back in line with the weightings of the Reference Portfolio.

New Zealand Equities

In 2009 we received a Ministerial direction to note that it is the Government's expectation that opportunities that would enable the Guardians to increase the allocation of New Zealand assets in the Fund should be appropriately identified and considered. When we first implemented the Reference Portfolio in 2010, we made a 5% allocation to New Zealand equities.

This 5% allocation is significantly overweight relative to New Zealand's benchmarking weight in the global equities universe of approximately 0.12%. We believe that this overweight is a meaningful contribution by the Fund to the New Zealand capital markets and does not contravene our mandate to maximise return without undue risk. The Board maintained the 5% allocation to New Zealand equities in 2015 and 2020.

2020 Reference Portfolio



Global Equities: **75%** Fixed Income: **20%** NZ Equities: **5%**

Interest Rate and Inflation Risk

The Reference Portfolio is subject to potential losses resulting from changes in interest rates. This can result from real interest rate and/or inflation shocks. We assume that interest rate (duration) risk is compensated over the long-term. Hedging, or removing, the interest rate risk would mean foregoing this premium.

Like interest rate risk, we take the view that inflation risk is fairly priced by markets, and thus any attempt to remove it from equities or bonds can be expected to lower the return of the Reference Portfolio. In our view a long-term investor like the Guardians, with no liabilities to match, need not pay for inflation protection.

Equities naturally offer some degree of inflation protection over a long horizon since companies typically raise prices in line with costs to protect margins. Given that equities are the dominant asset class exposure, the extent of the inflation risk in the Reference Portfolio is reduced.

To the extent that inflation risk matters to us, New Zealand inflation is more relevant to the Fund than global inflation. The most direct way to hedge this risk is to take a large exposure to New Zealand Inflation Linked Bonds (ILBs). These bonds, however, do not satisfy our 'simple and low cost' design principle for the Reference Portfolio because of their limited issuance and liquidity. Furthermore, the Fund purchasing inflation protection in the form of New Zealand government-issued ILBs arguably does not achieve risk reduction from a whole-of-Crown perspective. While US, UK and other ILBs are available in much larger volume, these instruments are less effective at hedging New Zealand inflation risk.

Currency Hedge Ratio

Investing in foreign assets introduces currency risk to a portfolio. We seek to reduce or remove this risk by hedging the Reference Portfolio's foreign currency exposures to the New Zealand dollar. This means that the Fund receives the actual return of the assets it is invested in without currency fluctuations adding or detracting from performance. The currency hedge ratio measures the proportion of the portfolio protected through currency hedging.

The Fund's objective of maximising return without undue risk provides a useful starting point for thinking about the optimal currency hedge ratio. We interpret this objective as requiring the Fund to earn a return that exceeds the government's cost of funding by as much as possible without incurring undue risk to the portfolio as a whole. Hedging foreign currency exposure back to the New Zealand dollar removes performance uncertainty relating to spot exchange rates. All else being equal, therefore, hedging means the Fund is better positioned to achieve this objective. However, fully hedging foreign currency exposure removes potentially useful diversification from the portfolio.

Historically, there has been a sizeable positive return from hedging the Reference Portfolio exposure back to the New Zealand dollar. We view this as a risk premium earned from taking exposure to the currency of New Zealand, a country with i) a heavy dependence on commodities (a volatile source of returns) and ii) a persistent large negative net international investment position, making it dependent on net inflows of foreign capital.

We have fully hedged the Reference Portfolio since its adoption in 2010. A fully hedged portfolio is not the minimum volatility portfolio, but our analysis suggested that the additional return from currency hedging has easily outweighed the additional New Zealand exposure risk.

In 2020 we expect the equilibrium NZD risk premium to be less than the historical average. In addition, our equilibrium correlation between the NZD and global equities is higher than the 2015 assumption, which reduces the diversification benefits from being fully hedged. Furthermore, full hedging increases the probability of large negative returns since it doesn't benefit from the relief provided by a (typically) weaker NZD when equities fall. In extremis hedging the currency can also introduce additional liquidity risks.

Based on the above, on balance, our model assumptions in the 2020 review were slightly less supportive of being fully hedged than in the 2015 review. Despite this, our modelling shows that the hedge ratio that maximises return is 100%, and that using long-term risk, the optimal hedge ratio lies in the range of 90-100%. Consequently we decided to retain a fully hedged Reference Portfolio.

BENCHMARKING

In order to operationalise the Reference Portfolio we must assign benchmark indices to each of the constituent asset classes. This not only facilitates unambiguous performance measurement but also allows the Reference Portfolio to become an investable alternative to the Fund's actual portfolio. We believe there are five desirable characteristics to be considered when choosing indices for benchmarking.

Desirable Characteristics of a Benchmark Index

Characteristic	Description
Objective selection criteria	Objective, well-defined and published rules subject to a transparent governance structure.
Representativeness	Broadly representative of the relevant universe and well-diversified so that the opportunity cost of active decisions is clear.
Relevance	An investor should be able to closely replicate the index performance, e.g. if the index is calculated using gross dividends but investors must pay withholding tax, any investor would have difficulty replicating the index returns.
Investability	An investor can readily trade the constituent stocks with minimum market impact and transaction costs.
Acceptance by investors	Well-recognised and widely used and that derivatives based on the index are traded in liquid markets.

Based on these characteristics, the following benchmark indices were chosen for the Reference Portfolio:

NZSF Reference Portfolio Benchmark Indices

Asset class	Proposed index
Global Equities	MSCI All Country World Investable Market (ACWI IMI) Total Return Index hedged to NZD
NZ Equities	S&P/NZX 50 Gross Index
Global Fixed Income	Bloomberg Barclays Global Aggregate Total Return Index hedged to NZD

The above equity indices are customised to reflect responsible investment exclusions and adjustments required to meet our carbon footprint targets.

SUMMARY

In 2020 we undertook a five-yearly review of the Fund's Reference Portfolio. Key considerations included portfolio composition, expected return and risk, interest rate and inflation risk hedging, currency hedge ratio and benchmark indices.

We retained the asset allocation of 80% to growth assets and 20% to income assets, and the 100% foreign currency hedge ratio. The main change from the 2015 review was the decision to combine developed and emerging market equities into a single building block, global equities.