
Strategic Asset Allocation Review

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Background and summary

The primary function of the New Zealand Superannuation Fund (Fund) is to act as a smoothing mechanism for the Crown to help meet future retirement income payments. New Zealand's population will progressively age through the next few decades. Over this time the cost of superannuation entitlements will roughly double as a percentage of GDP. The establishment of the Fund means that the fiscal cost of these entitlements will be borne more evenly through time, reducing the burden for future taxpayers. Current projections suggest that the Crown will make capital contributions to the Fund for approximately the next 20 years, followed by capital withdrawals to help finance the entitlements of retirees.

The Fund will succeed in this smoothing obligation if the money set aside in the Fund is sufficient to meet a proportion of the New Zealand Superannuation entitlements payable by the Crown. Thus we need to consider the future entitlement payments when determining the Fund's investment strategy. In this manner, the Fund faces similar investment issues to pension funds that have pension liabilities directly on their books.

The Guardians of New Zealand Superannuation (Guardians) have completed the third review of the Fund's Strategic Asset Allocation (SAA). The SAA specifies target asset class weights for the Fund, and in large part determines the overall level of financial risk. This latest review follows two previous SAA reviews in 2003 and 2005.

The Fund's SAA needs to be shaped by the purpose for which the Fund was established. The SAA is one of the most important decisions the Guardians make. It represents a critical step in the way we manage the balancing act between risk and return. For example, the SAA specifies the proportion of the Fund invested in growth assets, which offer higher expected returns for those able to ride out volatility along the way. The SAA also specifies how the Fund mitigates this volatility by diversifying across a range of asset classes.

The Fund's establishing legislation requires the Guardians to provide a Statement of Investment Policies, Standards and Procedures (SIPSP). The legislation specifies a number of things the SIPSP must cover. The SAA covers significant parts of these requirements, including the balance between risk and return in the Fund's overall portfolio, the classes of investments in which the Fund is to be invested, and some of the investment constraints and limits.

The Board of the Guardians must make the ultimate SAA decision, but in doing so considers recommendations from the Guardians' executive. The recommendations have come from in-house research and analysis, and external peer review.

A key issue considered in this latest review was whether a reduction in the risk profile is warranted, given the decline over recent years in the equity risk premium (the expected financial reward for investing in publicly listed equities). The Board has opted to maintain the existing risk profile. A significant factor in this decision was that updated projections of future Fund outcomes continue to suggest risk is likely to be rewarded over the long haul. Another factor was growing certainty in our belief that equity returns are more stable over long time horizons than might seem apparent from the high volatility on a year-to-year basis.

A key benefit arising from the SAA review is the introduction of a flexible mechanism for taking advantage of private market investment opportunities. The revised SAA enables private market exposures to vary over time, in a way that will maintain the risk profile of the Fund as a whole. The immediate changes in asset class weights following the review have been modest.

Overall, the SAA parameters can be summarised by a table of target asset allocation weights for the Fund, and a table that specifies how these target weights are to be modified at a given point in time – depending on the Fund’s actual exposure to the private markets at that time. The modified SAA uses public market asset classes to proxy for a greater or lesser exposure to private markets. We refer to the resulting modified weights as the Fund’s ‘(proxy adjusted) SAA’.

This table shows the new target SAA weights before the application of public market proxies for private market exposures.

Target SAA weights

Asset Class	SAA Weights (before proxies)	Ranges
Equity		
Global Large Cap	32.0%	
Global Small Cap	5.5%	
Emerging Market	3.0%	
New Zealand	7.5%	
Total Equity	48.0%	
Property	10.0%	
Private Markets		
- Private Equity	5.0%	0-10%
- Infrastructure	5.0%	0-15%
- Other Private Markets	5.0%	0-10%
- Timber	5.0%	0-10%
Total Private Markets	20.0%	10-30%
Commodities	5.0%	
Fixed Interest	17.0%	
Total Portfolio	100.0%	
Net Unhedged Foreign Currency Exposure	17.5%	

The table below shows the public market exposures that are used as proxies for a greater or lesser exposure to the private market asset classes¹.

Public market proxies for private market exposures

Proxies for Each Private Market Asset Class	Private Equity	Infrastructure	Other Private Markets	Timber	Unlisted Property
Global Equities*	125%	30%	25%	20%	0%
Listed Property	0%	0%	0%	40%	100%
Fixed Interest	-25%	70%	75%	40%	0%
Total	100%	100%	100%	100%	100%

* This percentage applies to the total of global large capitalisation equities, small capitalisation equities and emerging market equities, with the same proportional composition as in the SAA weights for these three asset classes.

The approach of using public market proxies for private market exposures is a key change compared with the previous SAA. We have introduced this approach to reflect our belief that the best way to invest in private markets is to do so flexibly. This flexibility allows us to vary the amount of exposure to the various private market asset classes depending on the resources we can bring to bear in this area – our ability to access them – and also the opportunities provided by these markets over time.

The new SAA target weights (before proxies) are similar to the long-term SAA weights established following the 2005 SAA review. The changes include:

- Some modest changes to the weights for the global equity components. We have continued to use market capitalisation as a basis for determining the proportional mix among large capitalisation, small capitalisation and emerging market equities. The changes in the weights reflect ‘rebalancing’ to reflect changes in market capitalisation.
- We have separated commodities out as a distinct group and made some definitional changes to the assets included under the heading of ‘private markets’.

A key implication of the Fund’s investment strategy is that we expect the Fund to add significant value over the long haul, but with significant ‘bumps along the way’.

We estimate the average 1-year excess return for the Fund is around 2.6% per annum relative to Treasury bills (including the benefit from active management, but after Fund costs and management fees). The volatility of Fund returns is estimated to be around 10.0% when expressed as an annual standard deviation. This means over time we expect the 1-year excess return (relative to Treasury bills) to fall in a range of around –7.4% to +12.6% two years out of three.

¹ The way that the (proxy adjusted) SAA is determined by these two tables is described more fully below in the section headed ‘New SAA’.

The longer-term picture appears more appealing. Over 30 years our expected 'net value added' (relative to the alternative of investing in Treasury bills) accumulates to 25% of GDP, or NZ\$74 billion when expressed in 2007 dollars (i.e. adjusted for inflation). We estimate that the probability that the actual value added turns out to be zero or less on this basis is only around 1%.

We estimate that the probability of the Fund beating its internally set objective – exceeding the return on Treasury bills by 2.5% over rolling 20-year periods – is close to 50%.

To be able to achieve the projected benefits over the long term, the Fund must be able to ride out the inevitable periods in which the investment markets deliver poor returns. For example, we estimate that the probability of having a negative Fund return for a given 3-year period is around 6%. Given that the Fund faces a large number of rolling 3-year periods over its life, the Fund has a high likelihood of experiencing a negative 3-year return at some time. We calculated that there is a 75% chance the Fund has at least one negative 3-year return at some time over the next 30 years.

The remainder of this document outlines the process by which the Fund's SAA was developed in more detail. We will review the SAA on a regular basis – every couple of years – recognising that it should be largely time invariant given its strategic nature.

Investing for the Fund's objective

The following distinguishing characteristics shape the way the Fund's assets should be invested:

1. **Long time horizon.** Given the Fund's smoothing role, the SAA must be appropriate for an investment horizon that spans several decades. The Fund needs to look beyond short-term volatility and evaluate the merits of investing in growth assets over the long haul.
2. **Little need for liquidity.** At this early stage of its life, the Fund can expect to receive net cash inflows from the Crown for many years. This means the Fund can invest in assets that are illiquid, such as timber plantations. Illiquid assets generally offer a return premium as compensation for illiquidity.
3. **Greater appeal for long-dated real (inflation proof) assets.** Given the Fund's smoothing role, assets are more appealing if they help 'lock in' the Fund's ability to meet a portion of the Crown's future superannuation entitlements. These superannuation entitlements stretch many years into the future and tend to rise with nominal wage inflation.
4. **Tax status.** Although we view tax paid to foreign jurisdictions as a cost, we are indifferent to the Fund paying local taxes. The Fund aims to maximise returns measured before New Zealand tax but after foreign tax and all expenses.

Our starting point for considering the investment implications of these distinguishing characteristics is the composition of a representative global portfolio of assets. Our estimate of the composition of this portfolio, which we call the 'global wealth portfolio', is shown in Table 1 in the Appendix. The logic is that, if investment markets were fully efficient, it would make sense for a representative global investor to hold a portfolio that resembles the composition of the global wealth portfolio. Our SAA should differ from the global wealth portfolio to the extent that the Fund's characteristics differ from those of a representative global investor.

Viewed this way, our SAA should have a greater proportion of growth assets than the global wealth portfolio, to reflect the Fund's long time horizon and willingness to take investment risk. The Fund should have a greater proportion of illiquid assets than in the global wealth portfolio, as compensation for illiquidity is something of a 'free lunch' for the Fund given it has little need for liquidity. The Fund should also take advantage of what opportunities there are to 'inflation proof' the portfolio and help lock in long-term returns. The Fund should have some preference for local assets, such as New Zealand equities, where these offer a tax advantage.

Much of the SAA review has involved translating this general approach into a specific asset allocation strategy.

Evolution of our SAA strategy

Given that the Fund's SAA is a long-term strategy, why do we need to review it every couple of years? There are four themes that help explain why our SAA has been evolving:

- (a) Investment in alternative assets;
- (b) Evolving risk and return assumptions;
- (c) Better linkage of investments to future entitlement payments; and
- (d) Bringing greater realism into our modelling of future returns.

These themes help identify some of the key issues addressed in the latest review.

(a) Investment in alternative assets

The Fund has been developing its ability to invest in what can be described as 'alternative assets'. We use this term for want of a better one, even though many of these assets have become increasingly 'mainstream' in recent years. The alternative assets include liquid assets that trade on listed exchanges, such as listed global property and collateralised commodity futures². Also included are generally less liquid asset classes such as timber, infrastructure and private equity, which we generally refer to as 'private market' asset classes.

When Mercer Investment Consulting conducted the first SAA review in 2003, the Fund was very new. At that time it had little capacity to invest in alternative asset classes. The initial SAA arising from this review had small weights for these assets.

The 2005 SAA review, which was done 'in house', demonstrated the potential benefits of increasing exposure to alternative assets. By then the Fund was better resourced to invest in these assets, but faced the reality that its capabilities in this area would increase over time. The solution was to set a long-term SAA, and also an interim SAA to reflect the Fund's ability to take an initial step towards the long-term SAA.

The latest SAA review takes a somewhat different approach to investing in private markets. This approach reflects our belief that the best way to invest in private markets is to do so flexibly, taking advantage of opportunities as they arise. The amount of exposure we should have to the various private market asset classes depends both on the resources we can bring to bear in this area – our ability to access them – and also the opportunities provided by these markets over time.

Our latest SAA addresses the need for this flexibility by specifying target weights for the private market asset classes, while providing latitude to deviate from these target weights. Key to this approach is that the latitude is provided in such a way as to maintain the broad risk profile of the Fund as private market exposures change over time.

² Commodity futures generate returns related to changes in prices of a basket of commodities. The Fund backs its holdings of commodity futures with collateral (money invested in short-term money market securities).

(b) Evolving risk and return expectations

Another reason for reviewing our SAA strategy periodically is that our expected return assumptions change gradually over time. For example, since the first SAA review in 2003, equity markets have performed strongly. While some of the rise in equity prices over this period reflects strong growth in company earnings, we believe that higher equity prices have also contributed to some compression in the equity risk premium. One of the main issues faced in this latest SAA review was whether or not the Fund should lower its risk profile in response.

(c) Better linkage of investments to future entitlement payments

The latest SAA review gave us an opportunity to re-evaluate the link between the Fund's investment strategy and the smoothing role of the Fund.

The focus of the first SAA review in 2003 was on Fund returns measured over a representative long horizon. These returns were not directly related to the Fund's ability to meet future New Zealand Superannuation entitlements.

The subsequent review in 2005 also considered Fund returns over a long horizon. But, to help evaluate the implications of higher or lower returns, it translated these returns into the impact on the net wealth of the Crown. The focus of the 2005 review was on the extent to which the Fund outcomes might be better or worse than the alternative of the Fund investing in Treasury bills. Treasury bills were chosen for this comparison for two reasons: (1) they have stable investment returns from one year to the next, and (2) they serve as a proxy for the alternative of the Crown repaying debt rather than building up assets in the Fund.

This latest review has picked up on the rapid evolution of what constitutes best practice for 'defined benefit' pension funds, in particular funds that have future pension payments that are long-dated and inflation sensitive. This evolution was given impetus by a 'perfect storm' in the early years of this century. At that time, many defined benefit pension funds were caught by falling values in their asset portfolios. At the same time, long-term interest rates fell, which drove up the value of pension liabilities as calculated by fund actuaries.

This experience has generated a much greater focus in recent years on developing techniques for managing assets in relation to defined benefit pension funds' underlying liabilities.

The New Zealand Superannuation Fund is unusual in this context, because New Zealand Superannuation entitlements are an obligation of the Crown, not the Fund itself. Nevertheless, we believe the Fund is best able to fulfil its smoothing role if the money set aside in the Fund is sufficient to meet a proportion of the New Zealand Superannuation entitlements payable by the Crown. Viewed this way, there is a need to link the Fund's investment strategy to the entitlement payments. We therefore believe the Fund faces similar investment issues to funds that have pension liabilities directly on their books.

Given this background, two key investment issues addressed in the latest review are reinvestment risk and inflation risk.

Reinvestment risk covers the possibility that returns generated from investments made in the future will be lower than expected. For example, Treasury bills provide a known return over their life, but over time need to be rolled over at rates that are unknowable in advance. Even though Treasury bills have very stable returns over short horizons, they do not 'lock in' returns over long investment horizons. If the Fund invested solely in Treasury bills, it would be vulnerable to the possibility of a fall in future Treasury bill yields.

Inflation risk arises because there is a link between the cost of meeting New Zealand Superannuation entitlements and nominal wage inflation. Inflation risk can be illustrated by the example of long-term conventional bonds. These bonds help lock in returns in dollar terms, but their ability to meet future pension payments is eroded whenever there is an unexpected rise in the rate of inflation.

We have addressed reinvestment and inflation risk in the latest SAA review by considering Fund outcomes relative to the alternative of investing the Fund in a 'minimum risk' portfolio. A true 'minimum risk' portfolio would generate with certainty the future payments required to meet a portion of the future New Zealand Superannuation entitlements. A true 'minimum risk' portfolio would therefore be immune to inflation and reinvestment risk. By comparing projected Fund outcomes with this 'minimum risk' portfolio we could identify the impact – for better or worse – of the Fund holding investments that do have inflation and reinvestment risk.

Unfortunately, the returns for a true 'minimum risk' portfolio are very difficult to model. For practical reasons we have therefore used a proxy for this true 'minimum risk' portfolio. To create this proxy we have modelled the returns for notional inflation indexed bonds – with cash flows matching the profile of projected New Zealand Superannuation entitlement payments over a rolling 40-year period³.

Key to this approach is that our proxy for the true 'minimum risk' portfolio would come close to 'locking in' a portion of the future New Zealand Superannuation entitlement payments⁴. In reality, it would not be possible for the Fund to invest in this proxy for the 'minimum risk' portfolio because suitable inflation indexed bonds are not available. Nevertheless, evaluating projected Fund outcomes against this notional 'minimum risk' alternative helps us to identify the impact of inflation and reinvestment risk.

(d) Bringing greater realism into our modelling of future returns

Our SAA reviews have each used the technique of projecting Fund outcomes into the future, so we can consider the implications of possible SAA strategies. For example, we can use the projections to evaluate the merits of a higher or a lower risk profile.

³ We have used the New Zealand Superannuation entitlements projected by the New Zealand Treasury. These are set out in the Treasury's New Zealand Superannuation Fund contribution model, available on <http://www.treasury.govt.nz/government/assets/nzsf/contributionratemodel>

⁴ The 'minimum risk' portfolio would not fully lock in these entitlement payments because: (i) the inflation linkage for the notional bonds is to general price inflation, not nominal wage inflation, and (ii) actual future superannuation payments may differ from the projected payments (owing to 'longevity risk' and other uncertainties).

These projections require returns for the various asset classes to be modelled over time. In all of our reviews the modelling of annual returns includes a random component (reflecting the volatility of returns) and an expected return (the middle of the range of possible returns). In the 2005 review we assumed that the expected returns for each asset class were constant from one year to the next. In the latest review we have relaxed this assumption. We did so to evaluate the impact of reinvestment risk and to bring greater realism to our modelling.

One of the key issues addressed in the latest review is the difference in risk and return characteristics over different time horizons.

As discussed above, Treasury bills offer more certain returns over shorter horizons than over long horizons, owing to uncertainty about the future rates when the bills are rolled over. By contrast, there is reason to believe returns for equities (and the other growth assets) tend to be less volatile over long horizons than would seem apparent from volatility year –to year. This phenomenon – referred to as ‘mean reversion’ in returns – arises when lower returns in the short term tend to be followed by higher returns thereafter (and vice versa). This property has been discussed in the financial literature⁵ and has been incorporated in the return modelling used by some other investment funds⁶.

We have incorporated risk characteristics that depend on the time horizon in a new return model we have developed for the latest review. For example, our model generates volatilities for the various asset classes that depend on the time horizon. This is illustrated in Figure 1 in the Appendix.

Even though we have attempted to model future returns in a realistic way, it is simply not possible to be certain that any return model is indeed realistic. For this reason, we have used a number of different return models in the latest review to identify the sensitivity of our conclusions to the choice of model used. In particular, we have continued to use the model we used in the 2005 review for this sensitivity analysis. We have also used a model that generates a greater likelihood of extreme outcomes (often referred to as ‘fat tails’).

Return assumptions

The expected returns assumed for the various asset classes underpin any SAA review. As in the 2005 SAA review, our 1-year return estimates are formed using the logic that it should make sense for a representative global investor to hold the global wealth portfolio. The resulting expected returns reflect the relative size and risk of each asset class. They are scaled in line with our estimate of the equity risk premium for large capitalisation equities (3.2%, expressed as an expected excess return relative to Treasury bills).

⁵ For example, Campbell, John Y. and Viceira, Louis M., ‘The Term Structure of the Risk-Return Trade-Off’, *Financial Analysts Journal*, Vol. 61 No. 1, pp.34-44, January/February 2005.

⁶ For example, Hoevenaars, Roy P.M.M., Molenaar, Roderick, Schotman, Peter C. and Steenkamp, Tom, ‘Strategic Asset Allocation With Liabilities: Beyond Stocks and Bonds’, February 2007. Available at SSRN: <http://ssrn.com/abstract=675681>

As in the 2005 review, we have used expected returns formed in this way as a starting point and then allowed for additional return premiums for some of the asset classes. For example, we have allowed for an additional illiquidity premium for the private market asset classes. However, in the latest review we have reduced the size of these assumed illiquidity premiums to reflect increased investor demand over recent years for illiquid assets. Our 1-year expected return and volatility assumptions are set out in Table 2 in the Appendix.

For our return projections we have assumed that active management within the various asset classes will add 0.5 percentage points on average to the total Fund return, net of management fees.

Method used for projecting Fund outcomes

While the Fund is currently receiving significant net cash inflows from the Crown, these will eventually turn into cash outflows. Under the funding formula⁷ in the Fund's establishing legislation, there is an interaction between the Fund's investment returns and the capital contributions from the Crown. Higher returns tend to generate lower subsequent net inflows, and vice versa.

Our projections capture this interaction using a technique called Monte Carlo analysis. Commonly used for financial modelling purposes, Monte Carlo analysis involves the use of repeated random sampling of possible future outcomes. We have done this by:

- modelling future returns with a random component to reflect the volatility in returns;
- using a random number generator to simulate a large number (60,000) of possible sequences of returns over a 30-year horizon; and
- for each 30-year sequence of returns we use the logic of the funding formula to calculate the corresponding cash flows between the Fund and the Crown.

This approach allows us to measure the extent to which the projected future value of the Fund reflects accumulated investment returns, as distinct from net cash inflows provided by the Crown. For each of the 60,000 sequences of possible future returns we calculate what we call the 'net value added'. By net value added we mean the projected value of the Fund in 30 years, compared with the projected value had these net cash flows been invested in 'minimum risk' assets.

⁷ The funding rate model is available on:
<http://www.treasury.govt.nz/government/assets/nzsf/contributionratemodel> . Background information is available from McCulloch, Brian and Jane Frances, 'Financing New Zealand Superannuation', New Zealand Treasury Working Paper 01/20, 2001, available on:
<http://www.treasury.govt.nz/publications/research-policy/wp/2001/01-20/>

Outcome of the review

Risk profile

One of the key outcomes of the latest SAA review was the Board's decision to maintain the existing risk profile of the Fund.

In reaching this decision, the Board considered the alternative of moving up or down the risk spectrum. The conclusion was the existing risk profile best met the Fund's objective of maximising return without undue risk to the Fund as a whole. This is one of three key objectives specified in Section 58 of the Fund's empowering legislation.

The SAA review provided a basis for evaluating the implications of a shift up or down the risk spectrum. We considered three risk profile alternatives:

- the current risk profile;
- a lower risk profile (10% less in growth assets); and
- a higher risk profile (10% more in growth assets).

We projected Fund outcomes corresponding to these alternatives over an arbitrary long horizon of 30 years. In each case the projections showed a distribution (range) of possible outcomes, reflecting the random component of returns. For example, Figure 2 in the Appendix shows the projected distribution of 'net value added' relative to Treasury bills over 30 years for the existing risk profile. Table 3 shows summary measures relating to this distribution.

We also evaluated the probability and severity of 'bumps along the way'.

There were offsetting considerations that the Board of the Guardians took into account when it agreed to maintain the existing risk profile.

The strongest consideration suggesting a decline in the risk profile might be appropriate was a fall in the estimated equity risk premium over the life of the Fund. This fall represents a reduction in the expected reward for taking a given level of risk for the Fund as a whole.

Figure 3 in the Appendix shows the equity risk premium had declined to around 3.2% (measured relative to Treasury bills), using our current estimation methodology. On this basis, the equity risk premium fell by around 1.25 percentage points between the 2003 review and the 2005 review, and fell a further 0.7 percentage points up to the latest review⁸.

A lesser consideration suggesting a decline in the risk profile might be appropriate was the potential for stresses 'along the way'. This was taken into account, but given less emphasis than the outlook for value added over the long haul, given the Fund's smoothing role and long time horizon.

⁸ The risk premium assumptions used in the 2003 and 2005 reviews differ from this owing to differences in the estimation methodologies (and in the case of the 2003 review, definitional differences).

We analysed the impact of volatility in returns over shorter horizons by projecting the probability of their falling below various thresholds, for periods such as 1 year or 3 years. There is a direct – but incremental – relationship between the Fund's risk profile and likelihood of adverse returns over shorter horizons. For example, we calculated the probability of having a negative Fund return in a given 3-year period of 5% for the lower risk profile, 6% for the current risk profile and 7% for the higher risk profile.

Given that the Fund faces a large number of rolling 3-year periods over its life, the Fund has a high likelihood of experiencing a negative 3-year return at some time. For example, we calculated that the chance of having at least one negative 3-year return at some time over the next 30 years is 68% for the lower risk profile, 75% for the current risk profile and 81% for the higher risk profile.

The main offsetting consideration was that the 30-year projections of 'net value added' did not suggest a reduction in the risk profile would be appropriate, despite the decline in the expected equity risk premium. Indeed, our projections suggested that a case could be made for increasing, not decreasing, the Fund's risk profile. Our 30-year projection results are summarised in Table 4 in the Appendix⁹.

Our projections suggested an increase in the risk profile would improve the distribution of the Fund's 'net value added' over a 30-year horizon. To magnify this effect visually, Figure 4 illustrates the improvement going from the lower risk profile to the higher risk profile option. Table 4 compares summary measures for the three risk profiles considered.

The conclusion was that a lift in the risk profile would improve the projected distribution of 'net value added' over 30 years. A lift in the risk profile would improve the expected (i.e. probability weighted) value added. Not only that, a shift up the risk spectrum would alleviate the possible bad outcomes. These results were not very sensitive to sensitivity analysis of changes to the key equity risk premium assumption.

Why did our 30-year projections make going up the risk spectrum look appealing? A key reason is that our new return model reflects our belief that returns for equities (and other growth assets) are more stable over long horizons than might seem apparent from volatility over shorter horizons. By contrast, the return model we used in our 2005 review did not reflect this belief. To see how much difference this different way of modelling returns made on the projections, we used our previous model for sensitivity analysis.

We found that our previous return model made the projected Fund outcomes over 30 years appear materially riskier than when we used our new return model. Critically, the case for going up the risk spectrum appeared much less appealing when we ran the projections using our previous return model.

Had we been fully confident that our new return model was realistic in the way that it portrays risk over long horizons, there would have been a stronger case for increasing the risk profile of the Fund.

⁹ For simplicity we have not shown the corresponding table of 'net value added' calculated using a notional portfolio of inflation linked bonds as a proxy for the 'minimum risk' portfolio. The projection results calculated on this basis also suggest that a lift in the risk profile would improve the projected distribution of 'net value added' over 30 years.

What is the consequence of the decision to maintain the existing risk profile?

We estimate the average 1-year excess return for the Fund is around 2.6% per annum relative to Treasury bills (including the benefit from active management, but after Fund costs and management fees). The volatility of Fund returns is estimated to be around 10.0% when expressed as an annual standard deviation. This means we expect the 1-year excess return (relative to Treasury bills) to fall in a range of around -7.4% to +12.6% two years out of three.

Over 30 years, the projected expected 'net value added' relative to investing in Treasury bills accumulates to 25% of GDP, or NZ\$74 billion when expressed in 2007 dollars (i.e. adjusted for inflation). We estimate that the probability that the actual value added turns out to be zero or less on this basis is only around 1%.

We estimate that the probability of the Fund beating its internally set objective – exceeding the return on Treasury bills by 2.5% over rolling 20-year periods – is close to 50%.

To be able to achieve the projected benefits over the long term, the Fund must be able to ride out the inevitable periods in which the investment markets deliver poor returns. For example, we estimate that the probability of having a negative Fund return for a given 3-year period is around 6%. Given that the Fund faces a large number of rolling 3-year periods over its life, the Fund has a high likelihood of experiencing a negative 3-year return at some time. We calculated that there is a 75% chance the Fund has at least one negative 3-year return at some time over the next 30 years.

New SAA

Following the latest review, the Board approved revised target SAA weights. These took effect from 1 November 2007. The Board also approved a new approach that provides flexibility for the actual weights to differ from these targets. This approach involves the use of the public market asset classes to proxy for private market exposures. Therefore, at each point in time, the Fund has a set of proxy-adjusted SAA weights.

The proxy-adjusted SAA weights for the private markets are equal to their actual weights at that time. The proxy-adjusted SAA weights for the public markets are adjusted to reflect the extent to which these private market weights are above or below their respective target SAA weights.

The way that the proxy-adjusted SAA weights for the public markets differ from their target SAA weights is pre-determined, using a table that specifies what public market exposures are to be used as a proxy for each private market asset class.

The following table shows the new target SAA weights (before the application of proxies):

Target SAA weights

Asset Class	SAA Weights	Ranges
	(before proxies)	
Equity		
Global Large Cap	32.0%	
Global Small Cap	5.5%	
Emerging Market	3.0%	
New Zealand	7.5%	
Total Equity	48.0%	
Property	10.0%	
Private Markets		
- Private Equity	5.0%	0-10%
- Infrastructure	5.0%	0-15%
- Other Private Markets	5.0%	0-10%
- Timber	5.0%	0-10%
Total Private Markets	20.0%	10-30%
Commodities	5.0%	
Fixed Interest	17.0%	
Total Portfolio	100.0%	
Net Unhedged Foreign Currency Exposure	17.5%	

The next table shows the public market proxies for private market exposures.

Public market proxies for private market exposures

Proxies for Each Private Market Asset Class	Private Equity	Infrastructure	Other Private Markets	Timber	Unlisted Property
Global Equities*	125%	30%	25%	20%	0%
Listed Property	0%	0%	0%	40%	100%
Fixed Interest	-25%	70%	75%	40%	0%
Total	100%	100%	100%	100%	100%

* This percentage applies to the total of global large capitalisation equities, small capitalisation equities and emerging market equities, with the same proportional composition as in the SAA weights for these three asset classes.

For example, this table shows that the public market proxy for X% of the Fund in infrastructure is a combination of 30% times X% in global equities and 70% times X% in fixed interest.

For example, consider the case in which the actual Fund weight in infrastructure was, say, 3% rather than the SAA target weight of 5%. In that case the infrastructure 'shortfall' of 2% would be corrected by lifting the weight for global equities and fixed interest in the proxy-adjusted SAA. These two public market asset classes would substitute for the 'missing' infrastructure.

In this example, the Fund weight for global equities in the proxy-adjusted SAA would be adjusted up by 0.6% (i.e., 2% times the 30% shown in the table above) and the weight for fixed interest adjusted up by 1.4% (i.e., 2% times 70%).

The same substitution principle applies when an actual private market exposure is above the SAA target weight. In that case, the proxy table above shows how the corresponding public market exposures would be reduced.

Although the example above focuses on infrastructure, the same principle applies to each of the private market asset classes. The resulting changes to the public market weights are aggregated to give the proxy-adjusted SAA weights.

Property is a special case in that the Fund's exposures are a combination of global listed property (a public markets exposure) and direct property (a private markets exposure). The total weight for property is determined as if all property were a public market asset class. Within the total weight for property, private market property substitutes 1:1 with listed property.

Rationale for use of proxies

With the public market asset classes, it is generally possible to determine a target exposure and then achieve this by gaining exposures that are broadly reflective of the asset class as a whole.

The picture is quite different for private markets. It is generally not possible to obtain a representative exposure to a private market asset class. For example, it is not possible to obtain exposure to a cross-section of the world's timber plantations or infrastructure assets. Private market exposures are generally less divisible than public market exposures. As a result, investors in private markets tend to hold larger,

more concentrated exposures. Access to private market assets is often subject to the availability of 'deal flow'. Private market opportunities frequently involve time lags, due to funding commitments given to managers that are then drawn down at their discretion.

For these reasons, it is in practice nearly impossible to maintain private market exposures at a precise percentage of the Fund.

We also believe that private market exposures are best assessed 'bottom up' (on a case-by-case basis, at a much less aggregated level than an asset class as a whole). The Fund neither wants to pass up attractive opportunities, nor accept inferior investments just to meet SAA targets.

Our preferred approach is to define the SAA with appropriate ranges, within which substitution between public and private market asset classes can take place depending on the availability of suitable private market assets.

Using public market exposures to proxy private market exposures gives us a mechanism for making sure the risk profile of the Fund remains broadly unchanged as exposure to private markets changes through time.

How the proxies were determined

The risk characteristics of the public market proxies in the table above have been designed to match the risk characteristics of the corresponding private market asset classes. This does not mean the volatility characteristics are identical. In general, returns for the private market assets have higher volatility than their public market proxy equivalents. Offsetting this higher volatility, returns for the private market asset classes are less correlated (less in synch) with the rest of the portfolio. The net result is that substituting private market asset classes with their public market proxies makes little impact on total Fund risk.

The construction of the proxies was not just an empirical exercise. Risk estimates and correlations attached to each asset class are necessarily imprecise. We also placed emphasis on common sense, so as to avoid excessive reliance on the accuracy of the risk assumptions.

Changes to the SAA target weights

The new SAA target weights are similar to the long-term SAA weights established following the 2005 SAA review. The changes include:

- Some modest changes to the weights for the global equity components. We have continued to use market capitalisation as a basis for determining the proportional mix among large capitalisation, small capitalisation and emerging market equities. The changes in the weights reflect 'rebalancing' to reflect changes in market capitalisation.
- Assets included as 'private markets' have been redefined:
 - We have separated out commodities as a distinct group, given that we obtain exposure from collateralised commodity futures.

- Absolute return strategies, which are funds that aim to generate positive returns in both rising and falling markets, have been removed as a separate category. We will instead determine the extent of the Fund's investment in absolute return strategies as part of our overall active management programme¹⁰.
- A new 'miscellaneous bucket' called 'other private markets' has been added to reflect a diverse range of possible future investments the Fund might consider.

How the SAA was determined

The review applied a similar approach to determining the SAA to that followed in the 2005 review. The starting point was the composition of the global wealth portfolio. The logic for this starting point is that, if markets were efficient, it would make sense for a representative global investor to hold the global wealth portfolio. The SAA weights were then adjusted to reflect the Fund's distinguishing characteristics.

This approach generated:

- a higher overall weighting to growth assets, to reflect the Fund's long time horizon and greater than average willingness to bear investment risk;
- a greater than market capitalisation allocation to New Zealand shares, as the Fund obtains a greater pre-tax benefit from imputation credits than a representative global investor; and
- an increased weight for 'alternative assets', including the generally illiquid private markets asset classes. These asset classes not only provide greater diversification, they also allow the Fund to take advantage of any premiums to compensate for illiquidity.

The target net unhedged currency exposure of 17.5% of the total Fund is higher than the 10% we consider an appropriate long-term target. We have maintained the 17.5% target on an interim basis to reflect the high New Zealand dollar, which makes foreign currency more attractive than normal.

In the review, we constructed three target SAA portfolios: one representing the existing risk profile as well as lower and higher risk profile alternatives. As discussed above, the Board decided to maintain the existing risk profile after evaluating projections of Fund outcomes for these alternatives.

Public markets benchmark

The Fund's strategy uses two key approaches: active management in its various forms and diversification into private markets. To help assess the resulting impact on Fund returns, we have developed a benchmark made up entirely of listed asset classes that could be invested in a passive (market tracking) fashion. We refer to this as the 'public markets benchmark'.

¹⁰ We manage this programme in such a way that the underlying market exposures remain consistent with the desired SAA weightings.

Following the latest SAA review, minor changes to the public markets benchmark took effect from 1 November 2007 to make it consistent with the new SAA target weights and the new public market proxies for private market exposures. This can be seen in the table below, which reconciles the public market benchmark on the left to the SAA target weights on the right.

Public market benchmark and reconciliation to new SAA weights

Asset Class	Public Market B'mark	Add Proxies For				= SAA
		Private Equity	Infra'ture	Other Private Markets	Timber	
Equity						
Global Large Cap	39.9%	-4.9%	-1.2%	-1.0%	-0.8%	32.0%
Global Small Cap	6.8%	-0.8%	-0.2%	-0.2%	-0.1%	5.5%
Emerging Market	3.8%	-0.5%	-0.1%	-0.1%	-0.1%	3.0%
New Zealand	7.5%					7.5%
Total Equity	58.0%	-6.3%	-1.5%	-1.2%	-1.0%	48.0%
Property	12.0%				-2.0%	10.0%
Private Markets						
- Private Equity	0.0%	5.0%				5.0%
- Infrastructure	0.0%		5.0%			5.0%
- Other Pvt Mkts	0.0%			5.0%		5.0%
- Timber	0.0%				5.0%	5.0%
Total Pvt Mkts	0.0%	5.0%	5.0%	5.0%	5.0%	20.0%
Commodities	5.0%					5.0%
Fixed Interest	25.0%	1.3%	-3.5%	-3.8%	-2.0%	17.0%
Total Portfolio	100.0%	0%	0%	0%	0%	100.0%

Conclusion

The latest evolution of our SAA review has allowed us to deal with a number of issues. In particular, we have:

- Considered the implication of the evolving outlook for future market returns and risk. For example, we have considered the implications of a declining equity risk premium since the establishment of the Fund. We have also endeavoured to bring greater realism into our modelling of future returns.
- Reviewed the appropriate risk profile for the Fund, taking into account our updated expected return outlook and a re-evaluation of the risk characteristics of returns over long horizons. Following this review, the Board decided to maintain the existing risk profile.
- Introduced a practical way of providing flexibility in investing in private markets, while maintaining the risk profile of the Fund as private market exposures change over time. Following this review, we have adopted a system of using specified public market exposures as proxies for private market exposures.
- Re-evaluated the link between the Fund's smoothing role and its investment strategy. In doing so, we have considered the implications of reinvestment risk and inflation risk for the Fund's asset portfolio. This review identifies the extent to which our Fund returns may differ from those of a notional 'minimum risk' portfolio designed to lock in future New Zealand Superannuation entitlement payments.

Appendix

Table 1: Approximate composition of the global wealth portfolio

Asset Class	US\$ trn	%	Source
Global Large Cap Equity	25.23	34.4%	MSCI Developed Markets Index capitalisation, March 2007 (excluding 85% of listed infrastructure and listed property shown below)
Global Small Cap Equity	4.45	6.1%	Estimate based on the MSCI Developed Markets Index including 85% of capitalisation (excluding 15% of listed infrastructure and listed property shown below)
Emerging Market Equity	2.48	3.4%	MSCI Emerging Markets Index capitalisation, March 2007
NZ Equity	0.06	0.1%	NZSX capitalisation, March 2007
Global Property	8.00	10.9%	RREEF (a member of the Deutsche Bank Group), value of all invested real estate (non-residential), December 2006, includes \$0.88trn listed property
Private Equity	1.30	1.8%	Private Equity Intelligence Limited, 2006 Limited Partner Universe, allocation to private equity by LPs
Infrastructure	3.00	4.1%	Listed and unlisted infrastructure, using estimate of listed infrastructure from Mercer Investment Consulting, March 2007, and assumption that market value of unlisted infrastructure equals value of listed infrastructure
Absolute Return	0.00		Not a separate group of assets
Global Timberland	0.17	0.2%	Hancock Timber Resource Group
Commodities	0.00		Stock data hard to obtain
Securitised Private Sector Debt	11.53	15.7%	Lehman Brothers Global Aggregate ex-Treasury and Government guaranteed, 31 March 2007
Non-Securitised Private Sector Debt	17.18	23.4%	Combined non-transaction balances (broad – narrow money balances) of the banking systems of the US, Eurozone, Japan and UK, March 2007
TOTAL	73.39	100.0%	

Table 1 shows our estimates for the composition of the global wealth portfolio.

Figure 1: Return volatility generated by our new return model

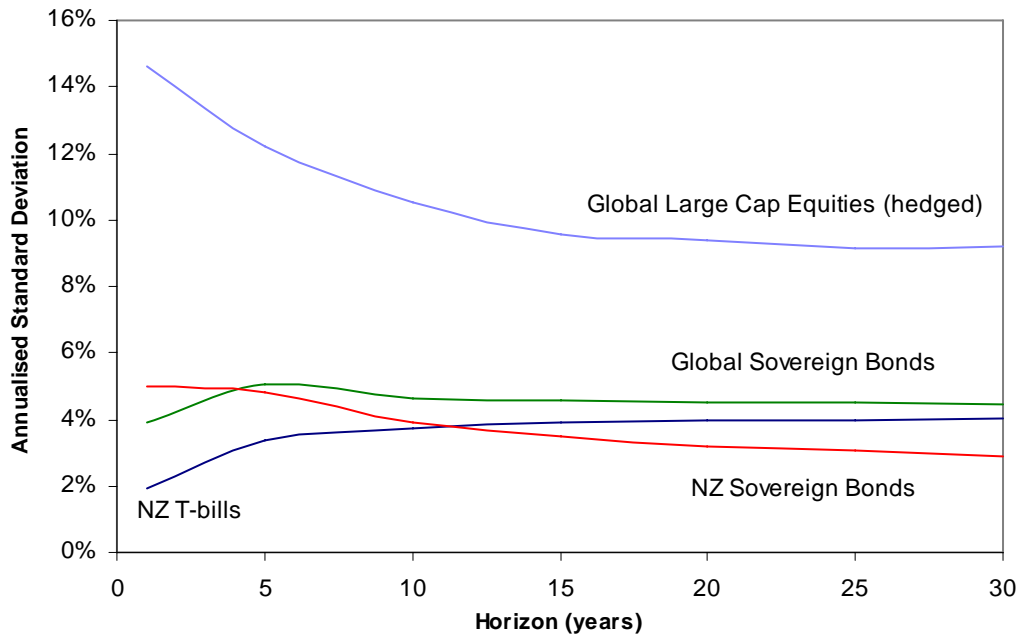


Figure 1 shows the volatility, over various time horizons, of returns generated by the model used in our latest SAA review. The volatility is shown on an annualised standard deviation basis. Although not shown here, the returns generated by our new return model also have correlations that are time-horizon dependent.

Table 2: 1-year expected return and volatility assumptions

	Equilibrium Excess Return	Additional Premium	Total Excess Return	One Year Volatility
Large Cap Equity	3.2%		3.2%	15.0%
Small Cap Equity	3.4%		3.4%	18.0%
Emerging Market Equity	4.6%		4.6%	27.0%
NZ Equity	2.3%	0.8%	3.1%	19.0%
Property	2.1%		2.1%	15.0%
Private Equity	4.0%	0.5%	4.5%	24.0%
Infrastructure	1.2%	1.0%	2.2%	12.0%
Other Pvt Mkts	0.9%	1.0%	1.9%	15.0%
Timber	1.2%	1.0%	2.2%	20.0%
Commodities	-0.6%		-0.6%	22.0%
Non-Sovereign Credit	0.3%		0.3%	2.5%
Duration	0.2%		0.2%	4.0%
Foreign Currency	0.0%	-2.0%	-2.0%	10.0%
Global Wealth Portfolio	1.98%		2.04%	8.82%

Table 2 shows the expected 1-year risk and return assumptions used in the review. The returns for global assets are all shown on a fully hedged basis. The excess returns are shown relative to the return for Treasury bills (except the foreign currency return which shows the outright return corresponding to 'negative hedging' of the New Zealand dollar). The expected return for New Zealand Treasury bills was 6.5%.

Figure 2: Net value added over 30 years (vs. Treasury bills)

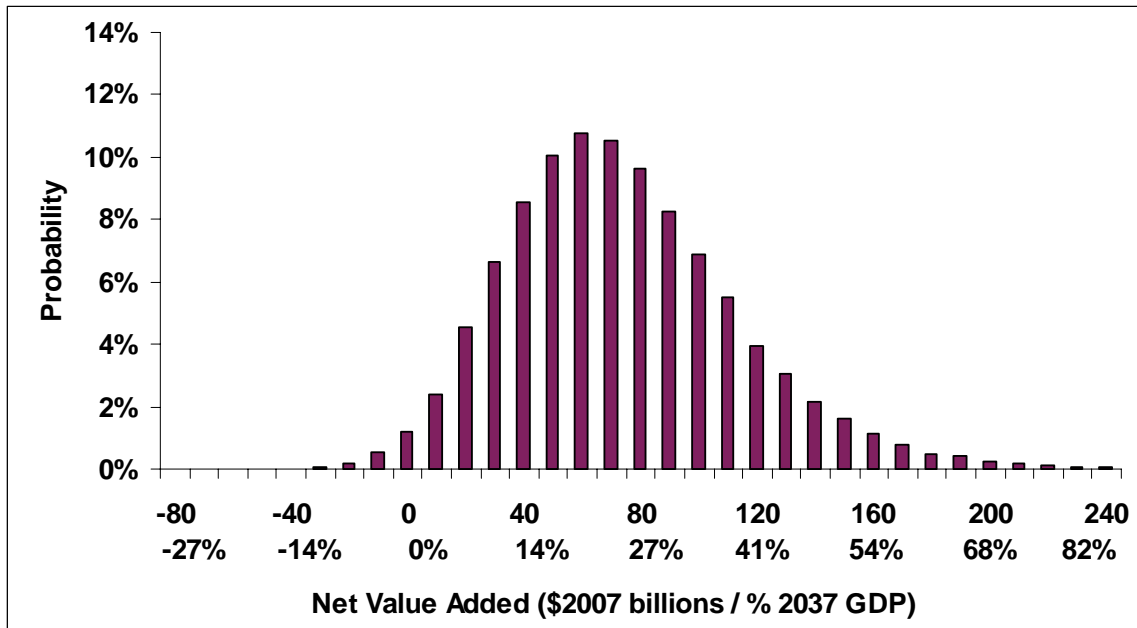


Figure 2 shows the distribution of the projected 'net value added', calculated from 60,000 random trials. The vertical axis represents the proportion of the total number of trials falling within the range of outcomes shown for each bar. The horizontal axis shows 'net value added' both in inflation adjusted terms (2007 dollars) and as a percentage of GDP in 2037.

Table 3: Net value added (vs. Treasury bills)

	Expected (probability weighted) Net value added (in 2007 dollars)	Probability of negative value added	Bottom 5th percentile Net value added (in 2007 dollars) i.e., 5% of outcomes are below	Bottom 1st percentile Net value added (in 2007 dollars) i.e., 1% of outcomes are below
Current risk profile	NZ\$74.0b	1.2%	NZ\$16.7b	-NZ\$2.1b

Table 3 shows summary statistics for the distributions shown in Figure 2.

Figure 3: Equity risk premium estimates

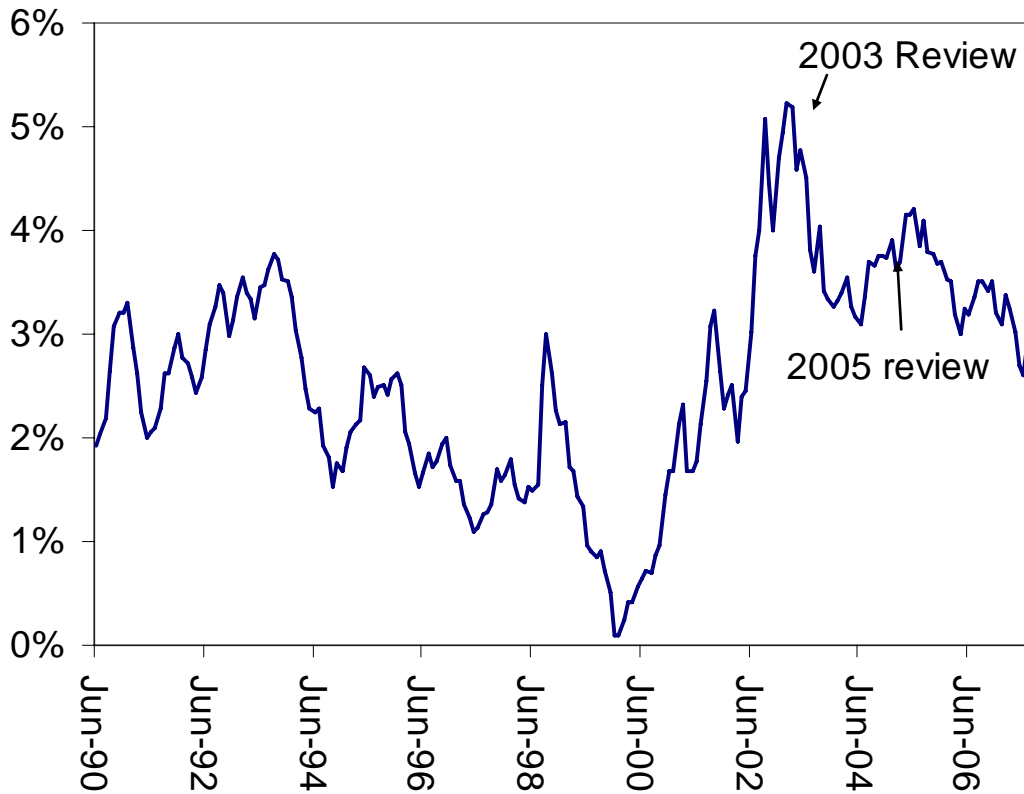


Figure 3 shows our estimate of the equity risk premium, using our current estimation methodology. The equity risk premium here shows the expected return for large capitalisation global shares relative to the expected return for Treasury bills. Note that the equity risk premium would be lower if we showed it on a geometric return basis or relative to bonds.

Figure 4: Net value added (vs. Treasury bills)

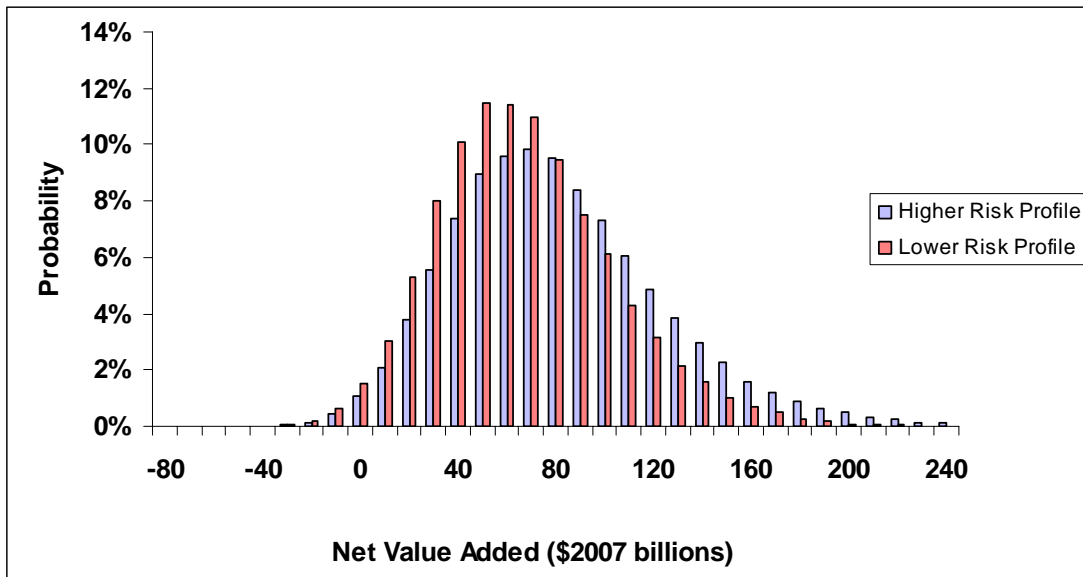


Figure 4 contrasts the distributions of projected 'net value added' over 30 years for the lower and higher risk profile alternatives. The distribution for the higher risk profile is wider and shifted to the right when compared with the distribution for the lower risk profile.

Table 4: Net value added (vs. Treasury bills)

	Expected (probability weighted) Net value added (2007 dollars)	Probability of negative value added	Bottom 5th percentile Net value added (2007 dollars)	Bottom 1st percentile Net value added (in 2007 dollars)
Lower risk profile	\$66.8b	1.6%	\$13.7b	-\$4.7b
Current risk profile	\$74.0b	1.2%	\$16.7b	-\$2.1b
Higher risk profile	\$81.2b	1.1%	\$18.7b	-\$1.0b

Table 4 shows summary statistics for the distributions of projected 'net value added' over 30 years for the three risk profile alternatives.