

Modelling changes to the New Zealand Superannuation (NZS) Fund model at the Half Year Economic and Fiscal Update 2018

Executive Summary

Two changes were made to the 2018 Half Year Economic & Fiscal Update (HYEFU) version of the New Zealand Superannuation (NZS) Fund model published [on the Treasury website](#). Neither change significantly affects outputs of the model. However, the NZS Fund is among the largest of the public financial assets, with a specific purpose of helping to fund increased future public pension costs, and so it is important to document any change to its modelling.

The NZS Fund model is used to calculate required capital contributions to the NZS Fund over forecast years and beyond, including capital withdrawals from around the mid-2030s. The model is also used to produce a projected track of the NZS Fund's earnings, tax payments and asset value out into the future. This projected track is an important component of the Treasury's fiscal projection models, such as the Fiscal Strategy Model (FSM) and the Long-Term Fiscal Model (LTFM).

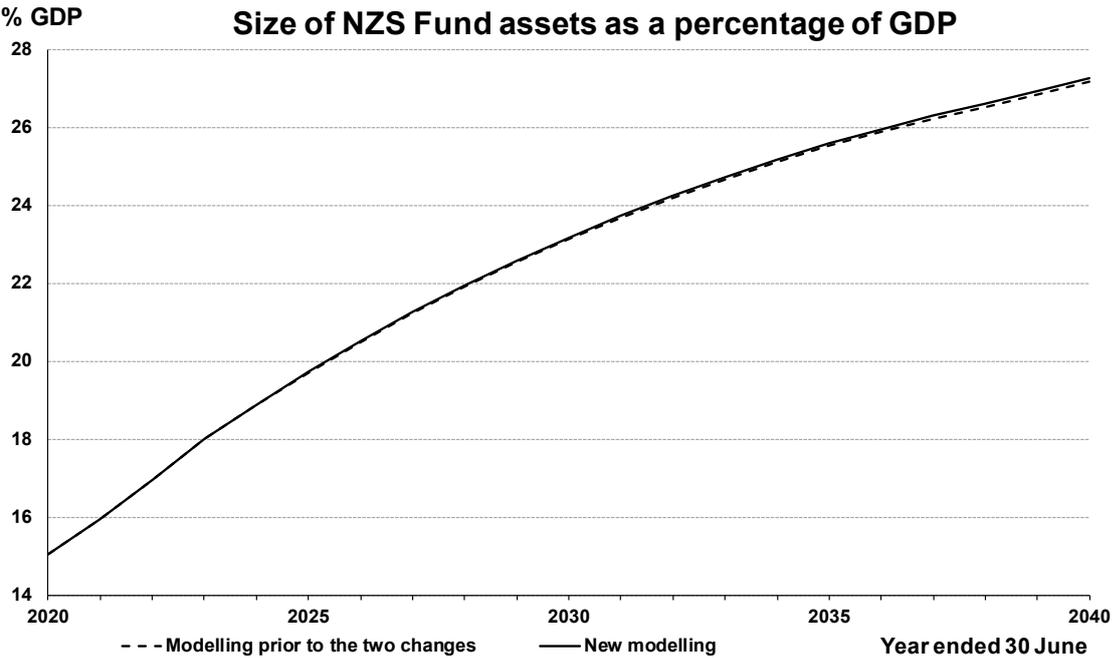
The two changes to the model arise from:

- The change in the timing of payments to the NZS Fund, since the Government re-established capital contributions, from the fortnightly schedule used in the past to the new monthly payment schedule now being applied.
- The use of forecasts, in years where they are provided by analysts at the NZS Fund, of the annual after-tax return rate on the Fund's assets, as an input to the model's discount rate.

The **contribution rate** calculation effectively determines all outputs of the NZS Fund model. Prior to these changes, it applied:

- A single sub-annual discount rate, based on a fortnightly schedule for both payments of NZS to pensioners and contribution payments to the Fund. Now it applies two sub-annual discount rates, based on fortnightly and monthly schedules respectively.
- A discount rate based on a relationship to the annual government 10-year bond rate. It still uses this formulaic approach in post-forecast years, but applies forecasts of annual gross return rates and tax rates, supplied by the NZS Fund, in forecast years.

The fairly small impact of these modelling changes on the projected size of the NZS Fund over the next twenty years is illustrated in the graph below.



Background: Modelling change to allow for a monthly payment schedule

Capital contributions to the NZS Fund restarted in December 2017, following the previous administration’s nine year suspension of contributions, which began in 2009. On resumption, the Treasury agreed to a request by the NZS Fund to pay the capital contributions to them on a monthly basis. Prior to the cessation of contributions in 2009, these payments had been made on a fortnightly basis. This had been done to align the contribution payment frequency with that of NZS payments to recipients by the Ministry of Social Development (MSD).

The NZS Fund model previously required a single sub-annual discount rate, related to a fortnightly schedule, which was applied in the contribution rate formula to both net-of-tax NZS payments and capital contribution payments to (or, in later years, capital withdrawals from) the NZS Fund. The change in the contribution payment schedule means that two sub-annual discount rates are now required, namely the existing fortnightly rate for the NZS payments and a new monthly rate for the capital contributions.

Background: Modelling change to use the NZS Fund’s forecasts of annual gross return rates and tax rates in forecast years

At each Economic & Fiscal Update (normally twice a year, Budget in May and HYEPU in December) the NZS Fund analysts provide the Treasury with annual forecasts of various Fund parameters. These include, over the five forecast years of each EFU horizon, annual gross returns (revenue and gains/losses) on Fund assets and expenses, both tax and non-tax. These are used in the NZS Fund model in forecast years, but, until now, the gross return rates and tax rates that lie behind these forecasts have not been utilised in the model.

The NZS Fund model previously applied the same formula-based after-tax return rate, as the contribution rate calculation’s discount rate, in forecast years as is used in post-forecast projections. This is based on the NZS Fund’s own [minimum performance metric](#), which is to

“return at least the Treasury Bill return + 2.7% p.a. over any 20-year moving average period”. (The Treasury slightly adapts this to 2.4% above the government 10-year bond rate, to utilise the main interest rate that is forecast and also projected in the Treasury’s Fiscal Strategy Model). An annual tax rate assumption of 24% is applied to this gross return rate to convert it to an after-tax return rate. This is very similar to the tax rate assumed by the NZS Fund in its own forecasts, in all but the first, partially complete forecast year where it can vary.

It is quite straightforward to calculate an assumed after-tax return rate in each forecast year from the NZS Fund’s forecasts of returns, closing Fund balance and tax payments. Given these are the NZS Fund’s best attempts at predicting outturns over the forecast horizon, it would seem sensible to apply the after-tax return calculated from these in the contribution rate formula, in the years in which they are available. In post-forecast projected years, there is no option but to return to the formula-based value described in the last paragraph.

Points to note about these modelling changes to the NZS Fund model

A few important points about these modelling changes that are worth noting are:

- These modelling changes only affect forecast or projected years in which the NZS Fund model is used to calculate the capital contribution. Hence for the last nine years, when no contributions were made, they would have had no impact on NZS Fund parameters in these years. The changes will also have no effect on Fund parameters over the next four years, where prescribed capital contributions from the Government are used. The only fiscal year affected in the 2018 HYEFU forecast is the final one, 2022/23. In later forecasts more years will be affected. However, the use of forecast after-tax return rates, can never affect more than the five year forecast horizon.
- Neither change significantly affects either forecasts or projections of the NZS Fund. This is illustrated in the graph of the NZS Fund balance on the first page of this note and in the graph of the capital contributions, if no prescribed values had applied, at the end of this note. As a further example, across a forty year projection, where no pre-set capital contributions were assumed in any years, the average annual increase in the NZS Fund’s closing balance, as a percentage of nominal GDP, was only 0.04 percentage points.
- The two modelling changes work in opposite directions, in regard to their effect on projected NZS Fund parameters. This is to be expected, as the change to a monthly schedule slightly reduces the denominator of the contribution rate formula, so leading to higher capital contributions and hence an increased closing NZS Fund balance. In contrast, the change to using the NZS Fund’s own forecasts of after-tax returns, because they will almost undoubtedly be more than the “minimum performance metric”, slightly reduces the numerator of the contribution rate formula. This initially reduces the capital contributions, although the lower Fund balances that result reverse this trend over time. Despite this, the closing Fund balance is lower in every year relative to the original modelling. The monthly payment change has the bigger effect in the long term, leading to higher Fund balances relative to those produced without the modelling changes. However, the fact that the two modelling changes offset one another to some degree contributes to why their overall impacts on forecasts and projections of the NZS Fund are quite small.

The graph below illustrates the combined effect of these two proposed modelling changes on capital contributions over a five year forecast horizon. In this scenario no capital contributions over the forecast horizon have been prescribed, meaning that they are all calculated by the NZS Fund model.

