

Long-Term Market Return Assumptions for the 2002 December Economic and Fiscal Update

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Summary and Conclusion

The fiscal forecasts included in the 2002 December Economic and Fiscal Update require projections to be made of the annual capital contributions to the New Zealand Superannuation Fund out to 2006/07. An input in preparing these projections is an assumption about the long-term expected annual market returns on the Fund. There is considerable uncertainty surrounding this variable. This uncertainty arises partly from the facts that capital market prices are volatile and that there is a range of views about the level of annual returns to expect from capital markets over time. In addition, the independent board administering the Fund has yet to establish its investment strategy, so it is not known what classes of investment it will pursue and in what proportions. This paper considers a characteristic portfolio of bonds and equities, identifies reasonable ranges for the variables that determine the expected annual portfolio return and makes ballpark assumptions. This gives a ballpark estimate for the expected portfolio return of 8.7% before tax and 7.0% after tax. Sensitivity analysis indicates that the resulting forecasts of capital contributions for the forecast years will be relatively robust.

Introduction

At regular intervals, the Treasury publishes “economic and fiscal updates”. These are required to include forecast economic and fiscal information for the coming financial year, as well as for the following two years.² One significant item of fiscal information is the forecast of capital contributions that the Government will be making to the New Zealand Superannuation Fund under the *New Zealand Superannuation Act 2001*. This legislation prescribes the calculation of the required contributions on the basis of a forty-year rolling horizon (section 43). The calculation is a function of both expected future payments of New Zealand Superannuation and the expected annual return on investment of the Fund’s assets.³ In particular, a forecast of the contribution for the next year depends on expectations about the Fund’s returns on investment for the next forty years. Other information about the evolution of the Fund that is included in the 2002 December Economic and Fiscal Update (in particular, projections of the tax paid by the Fund each year and of the Fund balance at the end of each forecast year) also depends on an assumption about expected future Fund returns.

Assessing future expected annual Fund returns is not a straightforward forecasting task. Many uncertainties surround the future returns on the Fund. These uncertainties arise from three sources. First, different classes of assets in which the Fund could be

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² Publication of economic and fiscal updates is a requirement under the *Fiscal Responsibility Act 1994*. Copies of past economic and fiscal updates are available at www.treasury.govt.nz.

³ The calculus is examined in detail in McCulloch and Frances (2001).

invested exhibit different characteristics of risk and return. The Guardians, who have the independent capacity to administer the Fund, have yet to establish their investment strategy. Therefore we do not yet know in which asset classes and in what proportions the Fund will be invested.

Second, all asset classes (including Government stock) are subject to volatility in their market. Thus, even if the composition of the Fund's portfolio of investments was known, significant uncertainty about actual future portfolio return would remain.

Third, the parameters of the distribution of annual returns (primarily expected return and volatility) are not directly observable. There are various views about how expected returns will evolve over the next few decades in the different asset classes.

Notwithstanding these inherent uncertainties, meeting the obligation to prepare the forecasts included in the economic and fiscal updates requires the Treasury to take some view about the expected long-term annual market returns on the Fund's investment. The economic and fiscal updates therefore necessarily include a technical assumption about the future expected return on the Fund over at least the next forty years. This technical assumption is not a guaranteed rate of return. The Treasury certainly does not expect that the Fund will achieve a constant rate of return every year, and it is not a short-term forecast of immediate prospects. In these respects, it is like other variables that underlie the Budget projections, such as GDP, inflation, government stock rates, and so on.

This paper derives a technical assumption about the long-term expected annual return on the New Zealand Superannuation Fund to be used for forecasting the required contribution rates in the 2002 December Economic and Fiscal Update. Given the early stage of the implementation of the Fund, a broad-brush approach has been necessarily adopted. It is the same approach that was adopted for the 2001 December Economic and Fiscal Update and the 2002 Budget. The approach is to represent the Fund as a simple portfolio comprising two assets – bonds and equities. The expected return of the portfolio is then analysed as a function of a few underlying variables – nominal bond rates, equity risk premium, portfolio weighting, management fees and tax. Assumptions are made about each of these variables, from which an expected return can be calculated. In the absence of more precise information, this result is adopted as the technical assumption for the expected return on the Fund.

Of course, the reality is a lot more complicated than a simple and static two-asset portfolio. For example, the Fund is likely to be invested in more than two distinct asset classes, the investment allocation strategy is likely to change over time, there would be a yield curve of expected returns for each asset class, and average tax rates and management fees would vary by asset class and management style. However, adding more structure to this analysis would simply add an illusion of precision that is not warranted given the limited information available at this stage. As the Fund becomes more established over time, and there is more certainty about the future shape of the Fund, more precise analysis may become worthwhile.

The next section provides the analysis described above to arrive at the technical assumption for expected return on the Fund. The following section then examines the sensitivity of the forecast required contribution levels to that assumption.

Analysis

Consider a characteristic portfolio comprising two asset classes – bonds and equities. The expected return on the portfolio as a whole can be expressed as:

$$\begin{aligned} E[R_{\text{portfolio}}] &= (1 - \alpha)E[R_{\text{bonds}}] + \alpha E[R_{\text{equities}}] \\ &= E[R_{\text{bonds}}] + \alpha E[R_{\text{equities}} - R_{\text{bonds}}] \end{aligned}$$

Thus, the expected return for this characteristic portfolio is a function of three variables:

- the expected long-term nominal bond rate ($E[R_{\text{bonds}}]$),
- the premium of expected equity returns over expected bond returns ($E[R_{\text{equities}} - R_{\text{bonds}}]$) and
- the proportion of the value of the portfolio that is invested in equities (α).

In addition, the Fund will bear the cost of the management and administration of the portfolio. Further, the Fund is a taxpayer so, while the Crown as a whole benefits from the gross returns of the Fund, the Fund itself only retains the after-tax returns. The calculation of the required contribution rate requires the net expected rate of return, after fees and taxes.

Each of these variables affecting the net expected return on this simple characteristic portfolio is analysed in the following subsections. The expected values of these variables are not observable so estimates are required to be made for each.

Expected Nominal Bond Rate

An assumption about the expected long-term return on 10-year government bonds of 6.2% underlies all of the forecasts included in the 2002 December Economic and Fiscal Update. For the purpose of making an assumption about the long-term market returns on the Fund for inclusion in those forecasts, this is adopted as the expected nominal rate of return on bonds ($E[R_{\text{bonds}}]$).

The fixed-interest component of the Fund will not necessarily be invested (either wholly or at all) in 10-year New Zealand Government bonds. However, this instrument provides a traditional benchmark of “risk-free” New Zealand dollar returns. Lally (2000) reports that a real interest rate differential against the United States of about 2% appears to exist for New Zealand. This is attributed partly to default and liquidity considerations (½%) and partly to currency risk (1½%). If expected returns on an overseas bond, for example a US Government security, were to be adopted as the benchmark for this assumption, additional allowance would need to be made for currency risk and an assumption made about the proportion of domestic and international, bringing the expected return up to within ½% of the New Zealand bond rate. For the purpose of this analysis, this added precision is not warranted given the uncertainties involved.

Expected Risk Premium

The expected equity risk premium is the expected annual difference between the return on a market equity portfolio and the nominal bond rate. Estimation of this variable is

discussed in detail in the document *Estimating the Market Equity Risk Premium* (McCulloch 2002). On the basis of that analysis, an expected annual equity risk premium of 4% is assumed. This further reduction from the 5% that was assumed for the 2001 December Economic and Fiscal Update reflects our assessment that a consensus of expert opinion is forming at about this level for the long-term expected risk premium. As noted in the above document, the decision to revise this assumption in the space of one year was not taken lightly. In the normal course of events, we would expect this assumption to stay stable over long periods of time.

Portfolio Composition

Although the board could possibly adopt any investment strategy ranging from 0% to 100% equities, the general consensus amongst industry participants who made submissions to the Finance and Expenditure Committee was that the portfolio would be dominated by risky assets, perhaps somewhere in the range of 50% to 90% of the portfolio.⁴ The reason for the greater weighting on equities is that this is a very long-term investment. No capital withdrawals are expected to be made for at least twenty years, and it will be a further decade or two after that before the fund size starts to decline in real terms. It is reasonable to expect the board of the Fund to take the view that, although there is a significant probability that an equity portfolio will provide lower returns than a bond portfolio over a short term (and even up to a decade), the likelihood of a risky equity portfolio under-performing a bond portfolio over this long timeframe is low. For the purpose of this calculation, 70% is assumed.

Management Fees

The level of management fees will depend on the investment strategy adopted by the board. In particular, it will vary according to both the portfolio composition and the investment style adopted for each class of investment. Typical fees range from less than 0.1% to 0.5% of the assets under management. For the purpose of this calculation, an average rate of 0.3% is assumed.

Tax Rates

The Fund is subject to New Zealand tax as if it were a body corporate. The current marginal rate of tax on assessable income is 33%. However, depending on the portfolio composition and investment style, a significant proportion of the returns might not be subject to tax. For the purpose of this calculation, an average rate of 20% is assumed.

Comparison with Previous Assumptions

These assumptions compare with the assumptions used to prepare previous estimates of expected return as follows:

⁴ Practice varies for similar public funds internationally. The Canada Pension Plan Investment Board which manages the investments of the state pension system in Canada, has a policy of investing exclusively (100%) in equities. The Irish National Pensions Reserve Fund is being invested 80% in equities. The Norwegian Petroleum Fund, which manages the Norwegian government's oil revenues, is required to invest 40% in equities. In New Zealand, the Government Superannuation Fund, which is a defined benefit scheme for public servants that was closed to new members in the early 1990s, has an equity benchmark of 65%.

	2002 DEFU	2001 DEFU, 2002 Budget & 2002 PREFU
Expected Nominal Bond Rate	6.2%	6.2%
Equity Premium	4%	5%
Portfolio Composition (Equities)	70%	70%
Management Fees	0.3%	0.3%
= Expected Return Before Tax	8.7%	9.4%
Tax	20%	20%
= Expected Return After Tax	7.0%	7.5%

The formula for calculating the required capital contribution has the effect of smoothing the total Budget impact of New Zealand Superannuation (current year entitlement payments plus required capital contribution) over time, as a percentage of GDP. As well as the assumption about expected returns, changes in current year and long-term forecasts of New Zealand Superannuation entitlement payments and New Zealand GDP also affect the calculation. Holding all else equal:

- a **decline** in the expected annual after-tax return will result in a **higher** required capital contribution rate;
- a **decline** in the long-term forecast track of New Zealand Superannuation entitlement payments as a proportion of GDP will result in a **lower** required capital contribution rate as a proportion of GDP; and
- a **decline** in the current year forecast of New Zealand Superannuation entitlement payments as a proportion of GDP will result in a **higher** required capital contribution as a proportion of GDP. This is because the total Budget impact of New Zealand Superannuation is being smoothed and so the capital contribution component absorbs year-by-year variation in entitlement forecasts.

Each of these declines occurred between the 2002 Pre-Election Economic and Fiscal Update and this 2002 December Economic and Fiscal Update. Their respective effects on the forecast required capital contributions were:⁵

%NZS/GDP	2004/05	2005/06	2006/07
2002 PREFU	1.47%	1.48%	1.45%
Return Assumption: 7.5% → 7%	+0.10%	+0.10%	+0.10%
NZS/GDP Forecast Track Decline	-0.13%	-0.12%	-0.12%
Current Year NZS/GDP Decline	+0.09%	+0.11%	+0.16%
2002 DEFU	1.53%	1.57%	1.59%

⁵ This table was prepared by first applying the new expected return assumption (7%) to the 2002 PREFU data to obtain the return assumption effect. The difference in total contribution (that is, required capital contribution plus that year's New Zealand Superannuation entitlement payments) as a percentage of GDP between this "return adjusted" model and the 2002 DEFU results gives the effect of the change in the forecast track. The remaining difference reflects the direct effect of a change in the forecast cost of New Zealand Superannuation entitlement payments for the year on the required capital contribution for that year.

The change in the assumption of expected return and the changes in the forecast track of NZS/GDP have effects of about the same magnitudes (but of varying signs) on the forecast required capital contributions.

Sensitivity

The forecasts of capital contributions for 2004/05 to 2006/07 exhibit sensitivities to the various assumptions made above as follows:⁶

Variable	Marginal Change (%age points)	Effect on Net Return After Tax (%age points)	Effect on Capital Contribution (\$bn)		
			2004/05	2005/06	2006/07
Nominal Bond Rate	+1%	+0.80%	-0.187	-0.202	-0.218
Equity Premium	+1%	+0.56%	-0.133	-0.144	-0.155
Portfolio Composition (Equities)	+5%	+0.16%	-0.038	-0.041	-0.045
Management Fees	+0.1%	-0.08%	+0.019	+0.021	+0.022
Tax	+5%	-0.44%	+0.105	+0.114	+0.123

These sensitivities are well within the bounds of reasonable forecasting accuracy three to four years ahead.

Other Issues

The Guardians have not yet developed or implemented an investment strategy for the Fund. In the meantime, the capital contribution is being retained in a Crown bank account, and is being credited interest at the Official Cash Rate. The Official Cash rate is changed periodically by the Reserve Bank and currently is 5.75%. The calculations of the projected contribution rates are being made on the assumption that the Fund's investment strategy will be implemented at about the beginning of the 2003/04 financial year, with interest compounding at the Official Cash Rate until then. Because the calculation is based on long-term (forty year) projections, the contribution rate forecasts are not materially affected if the actual start date is a few months on either side of this date.

References

- Lally, Martin (2000) "The real cost of capital in New Zealand: Is it too high?" New Zealand Business Roundtable. <www.nzbr.org.nz>
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⁶ The effects shown in this table are the marginal effects (that is, all else held equal). This overstates the effects for some variables that are interdependent. For example, if bonds and equities have different average tax rates, changing the portfolio weighting would also imply a change to the average portfolio tax rate.