

The Influence of an Older Population Structure on Public Finances

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JEL CLASSIFICATION

JEL classification codes:
H2 – Taxation, subsidies and revenue
H5 – National government expenditures and related policies
I00 – Health, education and welfare
J00 – Labour and demographic economics

KEYWORDS

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Introduction

This paper draws on material produced by the Treasury for the 2013 Statement on New Zealand's Long-term Fiscal Position [Affording Our Future](#). It focuses on scenario projections of the public finances of New Zealand (NZ) over the next half century. In particular it looks at how the ageing of the population structure might impact and via what main channels.

When reading about and viewing the projections, it should be kept in mind that they are not forecasts. In other words, they do not represent a best attempt to predict future outcomes, unlike, for example, the forecast base from which they arise. Rather they should be thought of as “*what if?*” scenarios that are heavily dependent on the assumptions that generate them.

As an example, in the *Cost Pressures* scenario net debt rises to nearly 200% of nominal Gross Domestic Product (GDP) by the year ended 30 June 2060, or 2059/60. In reality successive governments would not allow such a debt path to unfold. Even if they wished to, eventually foreign lenders would view NZ as too risky and withdraw their funds. The purpose of this is not to predict such an improbable outcome, but rather to signal that, as debt begins to rapidly rise, fiscal settings have become unstable and policy change is required.

Long-term Projections – three scenarios of net debt to GDP

Core Crown net debt is one of the main indicators used in NZ public finance reporting. Core Crown (CC) refers to all of the Govt. departments, but excludes the more autonomous Crown Entities and State-owned Enterprises. Net debt is borrowings less financial assets, with the significant exclusions of the New Zealand Superannuation (NZS) Fund and Student Loans.

The fiscal projection modelling requires one fiscal variable to be the **residual variable** that, when all other factors are individually projected under various assumptions, closes the accountancy relationship:

$$\Delta \text{ Assets} - \Delta \text{ Liabilities} = \text{Operating Balance} \quad (\Delta \text{ stands for annual change})$$

Given that gross borrowings (debt) is one of the public liabilities, and the operating balance consists of revenue plus valuation gains/(losses) minus expenses in the year, the relationship above can be re-arranged to make debt the subject, via:

$$\Delta \text{ Debt} = \Delta \text{ Assets} - \Delta \text{ Non-debt Liabilities} - \text{Revenue} - \text{Gains/(losses)} + \text{Expenses}$$

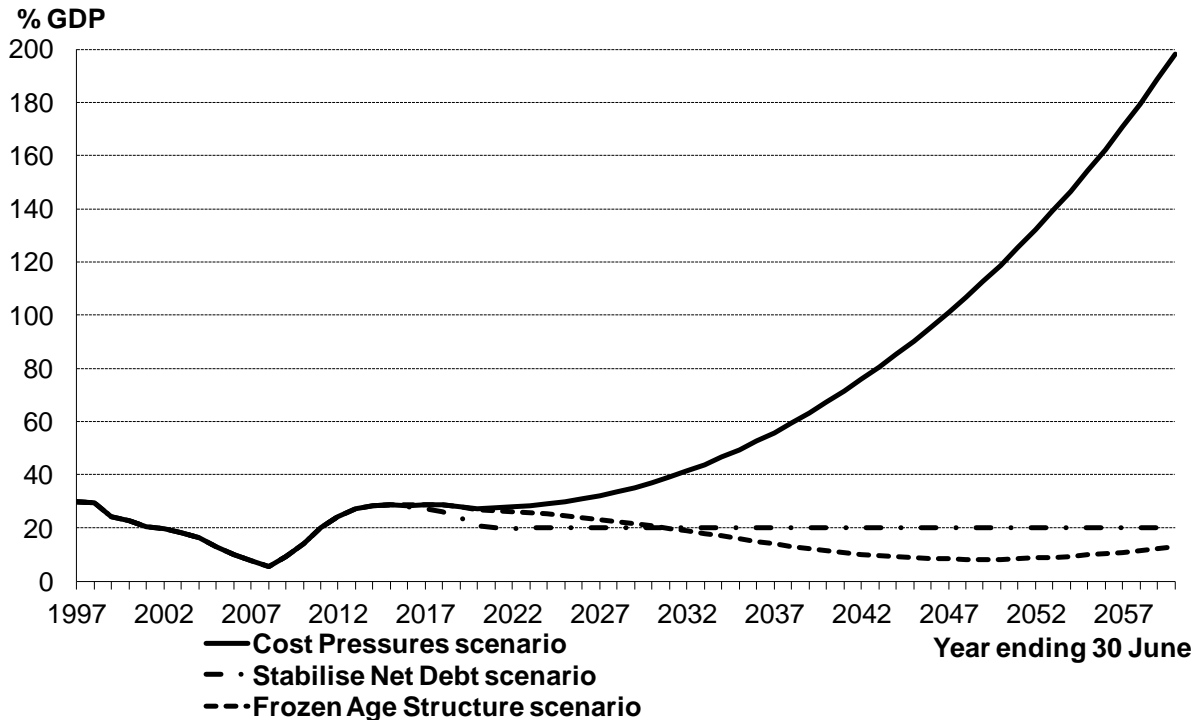
If a fiscal projection scenario is used to portray the consequences of funding ongoing operating shortfalls (i.e. a situation where each year expenses exceed revenue plus gains), then debt is the residual variable of the modelling via the re-arranged expression shown. Net debt can obviously be calculated from the gross debt that is output.

On the other hand, if the scenario’s purpose was to illustrate what kind of expense growth could be accommodated while keeping net debt to GDP stable, then expenses can be made the residual of the modelling. In fact, this approach can be even more targeted to a subset of expenses that derive their growth from allowances for new operating spending (OAs), as is done under a Budget process in forecast years. Dividing assets into those financial assets that are subtracted from gross debt to give net debt and all other assets, and expenses into finance costs and welfare spending, which are not covered by the OAs, and all other expense types, the expression can be re-arranged yet again to:

$$\begin{aligned}
 & \text{OA-controlled Expenses} + \text{Welfare spending} + \text{Finance costs} = \\
 & \Delta \text{ Debt} - \Delta \text{ Financial Assets used in Net Debt measure} - \Delta \text{ Other Assets} \\
 & \quad + \Delta \text{ Non-debt Liabilities} + \text{Revenue} + \text{Gains/(losses)} = \\
 \rightarrow & \quad \text{OA-controlled Expenses} = \Delta \text{ Net Debt} - \Delta \text{ Other Assets} + \Delta \text{ Non-debt Liabilities} \\
 & \quad + \text{Revenue} + \text{Gains/(losses)} - \text{Welfare spending} - \text{Finance costs}
 \end{aligned}$$

With the required annual change in net debt known (it will simply grow in line with nominal GDP growth if it is required to remain at a stable level of GDP) and all the other variables individually projected under their individual growth assumptions, the combined size of the OA-controlled expense becomes the residual of the modelling in each projected year.

Figure 1: Three long-term core Crown net debt to nominal GDP scenarios



In Figure 1 the *Cost Pressures* (CP) and the *Frozen Age Structure* (FAS) scenarios both use debt as the residual of the modelling, while the *Stabilise Net Debt* (SND) scenario uses the OA-controlled expenses in this role. Apart from that, and despite their very different profiles, all three of these scenarios have the vast majority of their inputs and assumptions in common. These shared characteristics include:

- A Budget 2013 forecast base, which is exactly the same up until 2014/15 and differs only in CC expenses, and their ensuing impact on debt, in 2015/16 and 2016/17;
- Identical projections of all economic and fiscal variables, other than CC expenses and debt, from 2017/18 to 2059/60 for the CP and SND scenarios. This means the projection of tax and other revenue, all asset types, non-debt liabilities and all economic variables, such as GDP, bond rates and inflation, is exactly the same in both scenarios. Apart from the impact of different demographic inputs, the same is true of the FAS scenario.
- Projected welfare spending, including the NZS public pension and working-age benefits and transfers, is the same (other than the demographic effects under FAS).
- No incorporated feedback from fiscal outcomes to economic variables e.g. the long-run labour productivity growth assumption in all three scenarios is 1.5% per annum and this remains constant no matter what is unfolding in terms of public debt, or any other fiscal variable, in the scenario.

What differs between the CP and SND scenarios, from 2015/16 onwards, is the manner in which the majority of CC expense classes are grown. These are the expense types that, under a Budget process, would derive any forecast growth from the annual OAs. They include Health, Education, Law & Order, Core Government Services, Defence, Economic & Industrial Services and several smaller spending categories. The main exceptions are the demand-based forecast expense types, which is the majority of welfare and finance costs.

Under CP and FAS these expenses are grown from their 2014/15 values with individual drivers. The drivers are labour costs; inflation; productivity growth; recipient growth; and a non-demographic volume factor. The first two of these normally use the same economic projections in all spending classes, and productivity is also generally an across-the-board assumption. It is the final two that differ between expense types. Recipient growth is based on demographic projections from Statistics NZ. Often just the growth of the adult population is used, but where identifiable, a more finessed approach of weighting to the main recipient age groups is applied. For example, NZS is aligned to the growth of the “65 and older” age group, while the recipient growth of Early Childhood Education is based on the “0 to 5” ages. The non-demographic volume factor (NDV) is based on the particular expense’s historical growth. This is because it is an aggregate of numerous factors that have impacted on the path of that spending, above and beyond those that have already been modelled. These include policy changes, labour and price inputs that have consistently differed from the general economy-wide estimates, and the impacts of one-off or temporary factors. Health, in particular, has a significantly higher NDV than other expense classes. This is due to public health spending having grown markedly more than most other expenses in recent decades.

The SND scenario grows most CC expenses, other than welfare and finance costs, under a different approach. It effectively extends the logic of five-year Budgets, with their OAs, out for a further 40+ years. This is a capped expenditure method. It ignores the recipient, labour input, NDV etc characteristics of individual spending categories and simply applies a total increase to the combined spending categories covered in each projected year. Until 2019/20 the OAs used in the [2013 Fiscal Strategy Report](#) are applied, which brings net debt close to

20% of GDP. Beyond this annual OAs are used that stabilise net debt at 20% of GDP, given all the other factors that impact on borrowing, such as tax, asset growth, welfare spending etc. There is nothing optimal about 20%. It was chosen as some relatively low level of net debt to GDP is needed for the scenario; it aligns with the current administration's long-term fiscal objective; and is around the average attained over the last 20 years. While the level targeted does affect the OAs required to attain it, stabilisation beyond that depends more on balancing against the revenue available.

What differentiates the CP and FAS scenarios? The answer is one thing, and one thing only, and that is the demographic driver of the projections.

More specifically, the FAS scenario is a theoretical one where NZ's population structure remains as it is in 2014/15, the last "common year" among the three scenarios. The overall population growth is no different to that used in the CP and SND scenarios, which both utilise Statistics NZ's 2011-base median National Population Projections (NPP). However, while a combination of relatively low fertility and increasing longevity causes the population structure to get progressively older in the median NPP, it stays fixed in the FAS scenario.

While it has been emphasised that projections are not forecasts, the NPP are probably their most reliable aspect. This is partly due to fertility and mortality usually changing quite slowly, but is mostly because many in the projected population are alive now and will be for many years. Migration could alter the outlook, but it has not impacted greatly over the last 50 years.

So if the unchanging population structure of the FAS scenario will not occur, why model it? The answer is to emphasise the main reason for producing long-term fiscal projections. This is to signal the need to prepare for fiscal pressures that an ageing population will produce. Longer and healthier life spans are a cause for celebration and will bring benefits both on an individual and national level. But they are also the sole cause of difference between the CP and FAS net debt projections, indicating that they entail increased drivers of expense growth.

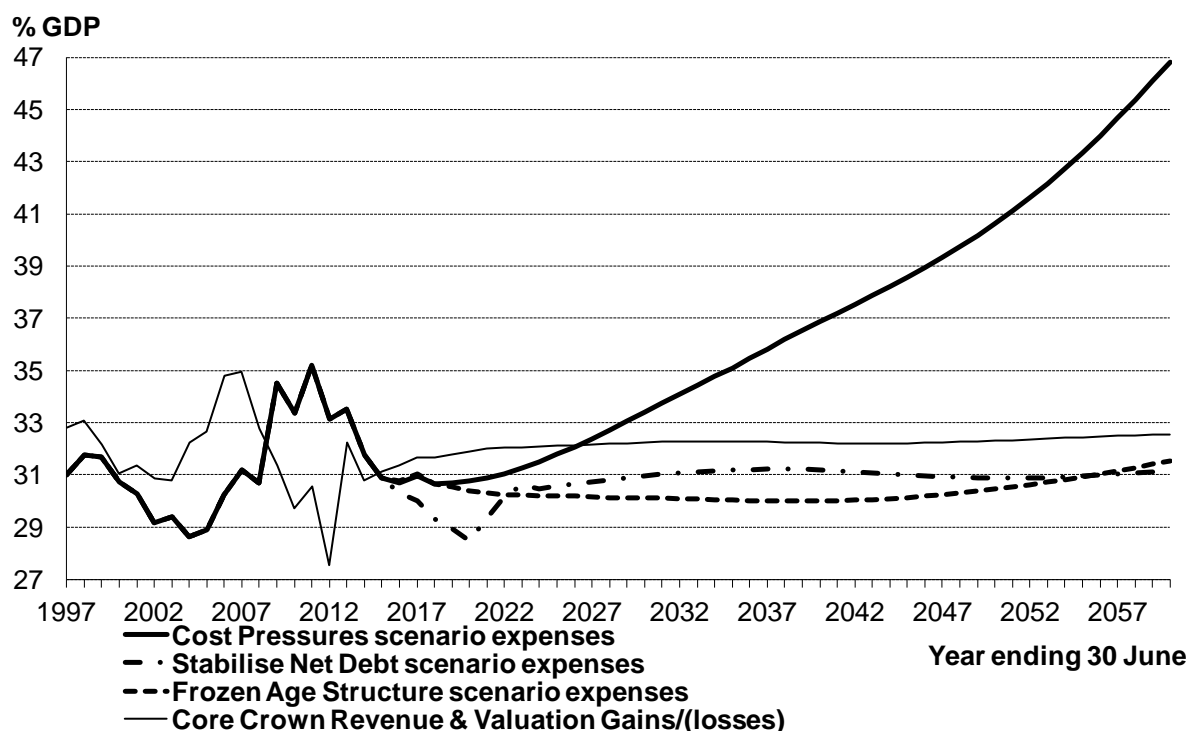
Long-term Projections – expenses (and revenue) under the three scenarios

The paths of CC expenses under the three scenarios, and the common revenue (including valuation gains) to GDP track that they share, are illustrated in Figure 2.

Under the FAS scenario nominal dollar levels of revenue plus gains differ to the other two scenarios. This is because the different demographic projection leads to a different GDP projection, and it is this which drives most revenue types, including the major revenue source of tax. However, as a ratio to GDP, the differences in the FAS scenario are very small.

Two features of Figure 2 are notable. The first of these is the steep rise in expenses in the CP scenario over projected years. The second less obvious but equally important feature is that, beyond 2014/15, expenses never exceed revenue and gains in the other two scenarios.

Figure 2: Core Crown expenses scenarios & revenue plus gains to nominal GDP



Furthermore, as the SND scenario stabilises core Crown net debt to GDP, Figure 2 indicates what is necessary in order to do this once the desired percentage of net debt to GDP has been attained. From the long-run gap between the revenue and expenses tracks for the SND scenario, it appears that this can be achieved by running a permanent core Crown operating surplus of around one and a half percentage points of GDP.

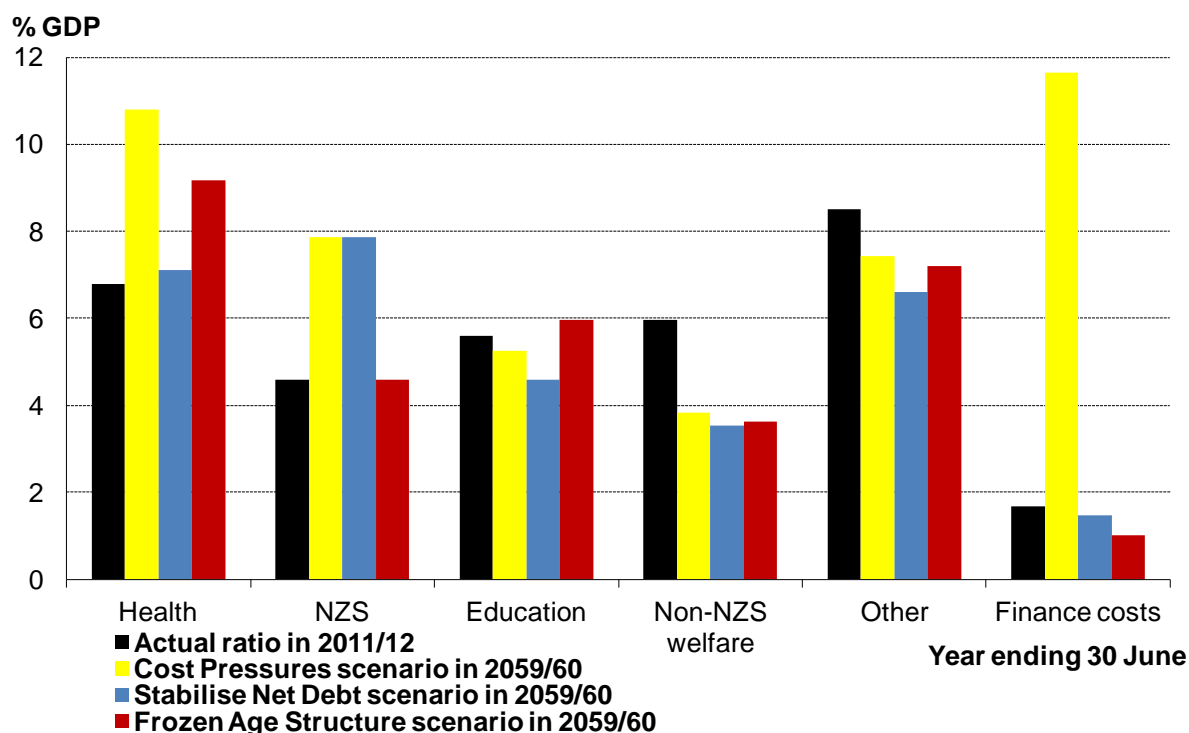
What drives expense differences between the three long-term scenarios

Figure 3 depicts CC expenses to GDP, broken into six major categories. The most recent historical year (2011/12) is depicted, along with the CP, SND and FAS scenarios in 2059/60.

Figures 1, 2 and 3 show, in reverse order, a series of “cause and outcome”. Figure 3 depicts which spending areas increase (or lessen) from current (2011/12) ratios to GDP under the different scenarios. Figure 2 then translates this to an overall track against revenue and gains. As long as expenses stay below the revenue track, operating surpluses are generated that can be used to decrease debt. But once the expense line surpasses revenue plus gains, deficits occur and borrowing has to increase to cover them. For each scenario the ongoing relationship between revenue and expenses is portrayed as a stock, or cumulative, measure in Figure 1. While this depicts net debt, the path of financial assets in each scenario is not very different, and it is the different borrowings tracks that dominate the various outcomes.

What leads to the varying outcomes of Figure 3 that cause the large differences between net debt tracks in Figure 1? This depends both on the expense types and the scenarios involved.

Figure 3: Core Crown expenses to nominal GDP – now & projected scenarios



The most obvious difference is the enormous lift, by 2059/60, in finance costs for the CP scenario relative to 2011/12, which is not reflected in either of the other two scenarios. This is a product of deficits and how long, over the projection horizon, they have to impact on debt. Figure 2 shows that, under CP, expenses outstrip revenue and gains by the mid-2020s. With no policy response modelled to arrest the growth of borrowing a kind of “debt cycle” occurs. As deficits lead to more borrowing and higher debt, the finance costs generated by the debt grow and add to the annual deficits fuelling the stock of debt. The longer that this cycle has to proceed, both the greater the finance costs generated and the quicker that they grow.

In fact, the lift in finance costs in the CP scenario is probably an understatement, as the scenario utilises no feedback loop between the level of public debt and the interest rate applied i.e. all three scenarios assume a long-run nominal interest rate on public debt of 6% per annum. In reality, with debt rising to the kind of levels portrayed in the CP scenario, it is almost certain that lenders would require a higher interest rate to compensate them for the increased risk of default. As was mentioned in the Introduction section, it would probably reach a point where the NZ government could no longer access overseas funds. However the scenario is designed to outline an unsustainable path, not portray a realistic outcome, so the omission of feedback loops to interest rates does not impair the scenario’s message.

For both the SND and FAS scenarios, Figure 2 shows that deficits never occur between 2014/15 and 2059/60. Without ongoing deficits adding to debt, by 2059/60 finance costs to GDP are little changed from 2011/12 levels. However, over the last 20 years of the FAS scenario the gap between revenue and expenses continually shrinks, suggesting expenses will outstrip revenue at some point beyond 2059/60. When it does, the debt cycle of the CP

scenario will begin. As CP and FAS differ only in the demographic structure underlying them, this indicates that population ageing adds to fiscal pressures but is not its sole cause. Only a scenario targeting balancing costs against revenue, as SND does, prevents debt from rising.

While the huge growth in finance costs under CP is the major driver of that scenario's rapid lift in net debt, this is more of a symptom than a root cause. To clarify, if the deficits did not initially occur, neither would the increased borrowing and the "debt cycle" would never get underway. So what causes the deficits under CP to arise around the mid-2020s? Comparing the 2059/60 bars in Figure 3 between CP and the other two scenarios provides the answers.

Total spending versus available revenue is what matters. Hence, finance costs aside, it is the overall difference in the other five big spending categories between the scenarios that needs to be compared. All three scenarios have at least one expense class where the ratio to GDP by 2059/60 is much higher than in 2011/12. But only CP has two, namely NZS and Health.

The SND scenario has an identical NZS projection to CP, because this is demand-based and so, like most welfare spending, is not subject to OA-based expense control. However SND has Health expenditure, for which growth is limited to shares of the OAs under a budgeting approach, only marginally higher by 2059/60 than 2011/12 levels.

While not as high as for CP, Health spending under FAS is well above 2011/12 levels by 2059/60. In this case, it is NZS that is virtually unchanged between the two years.

For the three major spending classes, Education, Non-NZS Welfare and the aggregate Other (comprising areas like Defence, Law & Order, Core Govt. Services and several others), all three scenarios have 2059/60 ratios to GDP below those in 2011/12, with the exception of Education under FAS where it is a little higher. For non-NZS Welfare, the assumption of mainly just inflation adjustment of payment rates sees costs to GDP fall over the projection. This suggests that it is not these areas that are considered to be the source of future fiscal pressure. Particularly in the case of the reduced Welfare ratio, they may even allow some reallocation of funds to help compensate for growth in areas like NZS and Health.

Health and NZS are the main areas of pressure and Figures 1 and 2 indicate that current revenue settings, especially in regard to tax, may be able to accommodate projected growth in one of these, but not both. However, the source of that projected growth is not identical.

NZS is a fairly simple story. With payment rates indexed to wage growth, the "per recipient" growth is likely to largely keep pace with that of per capita GDP. It is NZS's recipient growth, that of the "65 and older" age group, that is projected to grow considerably faster than the labour force, the demographic driver of GDP. The FAS projection, under which NZS to GDP hardly changes, illustrates that an ageing population is the source of cost pressure for NZS.

Health spending is more complicated. Between 2011/12 and 2059/60, the increase in Health to GDP under FAS is about 60% of that under the CP scenario. This indicates that, while the

ageing population does contribute to Health spending pressures, it is not the only factor. The ongoing availability of new and more effective treatments, with a corresponding expectation of access to them; a correlation between higher incomes and higher spending on health (certainly not unique to NZ); and significant labour input and accompanying costs that may exceed general economy averages; are all factors contributing to Health outstripping GDP over recent decades. Between 1996/97 and 2011/12 Health to GDP rose from 5.0% to 6.8%.

With no relief in the demand-based NZS costs, the SND scenario needs to find significant reductions in other expense types to stay below the revenue and gains track and so prevent deficits starting. While the ratios to GDP are lower than those in the CP scenario in all areas other than NZS, it is Health where the truly significant reductions can potentially occur.

The role of revenue, especially tax, in “balancing the books”

It is important to keep in mind that all of the discussion so far has assumed a given track of revenue and gains. Obviously, reducing costs is not the only way of keeping expenses below revenue. Lifting the revenue track is also an option, with tax settings being the most likely way of implementing this. Tax is not only by far the biggest component of revenue and gains (CC tax revenue averaged over 91% of CC total revenue and gains for the last five years), it is also the revenue source most easily altered by policy settings and legislation.

It is quite likely that future NZ governments will respond to fiscal pressures with a mixture of spending reductions and tax increases. Figures 1, 2 and 3 all assume a stable long-run projection of tax revenue at 29% of GDP, reflecting the current tax regime under an economy growing on-trend and cycle-free. However, the average tax to GDP ratio for NZ over the last 40 years is 30%, meaning that there is some room to move on tax without taking it to unseen levels. Also, as future generations receive higher incomes via productivity growth, they may be willing to pay a little more tax to maintain levels of publicly-funded goods and services.

The 2013 Long-Term Fiscal Statement discusses potential options for tax changes to assist in attaining fiscal stability, including both positive and negative impacts on growth, income distributions, asset values etc. An even fuller coverage is provided in the background paper [The Role of Tax in Maintaining a Sustainable Fiscal Position](#).

Potential options for turning Cost Pressures into Sustainable Net Debt

The FAS scenario delays the need to change any fiscal settings for 40 years or more, but that is of little comfort as it is a theoretical concept only. It serves to illustrate that NZ's ageing population is a source of expenditure pressure, particularly in the areas of NZS and Health.

By contrast, the SND scenario is not only possible but some variation of it needs to unfold as the CP projection does not represent a viable future. While keeping net debt at 20% of GDP is by no means the only option, managing public debt at reasonably low ratios of GDP aligns with current and past governments' fiscal goals and the practical constraint of sourcing funds.

[Affording Our Future](#) discusses methods of helping to achieve a future fiscal path like that of the SND scenario. While there are many ways of doing this, three particular options are examined in some detail. One of these is based around raising more tax revenue, as discussed above. The other two focus on the areas of expense pressure that have been highlighted here, namely NZS and Health. None of the options discussed completely close the gap between CP and SND, but they do emphasise where there is potential to make a significant contribution that can be supplemented by smaller changes in other areas.

Conclusion

NZ will undergo many societal, technological, ecological etc changes over the next 50 years. Good and bad will occur, but it is impossible to accurately forecast over such a long horizon. The ageing of our population, however, is one factor that is more dependable than most.

This will bring opportunities and challenges, but we have time to plan for these. In order both to reap the maximum benefits and mitigate the pressures of this demographic change, the nation needs to debate the steps that we wish to take. Such a discussion should consider equity among age groups, impacts on growth and social infrastructure, and managing risk.

References

The following list of papers, publications or Excel spreadsheet models have either been directly referenced in this paper, or provide greater detail around topics that have been discussed. Most are connected to the 2013 Statement on New Zealand's Long-term Fiscal Position [Affording Our Future](#) and hence are available from the same website.

Available from: <http://www.treasury.govt.nz/government/longterm/fiscalposition/2013>

Affording Our Future – Statement on New Zealand's Long-term Fiscal Position (New Zealand Treasury, 2013)

Long-term Fiscal Projections: Reassessing Assumptions, Testing New Perspectives (New Zealand Treasury, 2013)

Fiscal Sustainability under an Ageing Population Structure (New Zealand Treasury, 2013)

The Role of Tax in Maintaining a Sustainable Fiscal Position (New Zealand Treasury, 2013)

Planning for the future: Structural change in New Zealand's population, labour force, and productivity (Bascand G, 2012)

Fiscal Strategy Report 2013 *Available from:* <http://www.treasury.govt.nz/budget/2013/fsr>

Long-term Fiscal Model for the Statement of the Long-Term Fiscal Position 2013

Available from: <http://www.treasury.govt.nz/government/longterm/fiscalmodel>