

Reference: 20240726



11 October 2024

Dear [REDACTED]

Thank you for your Official Information Act request, received on 13 September 2024. You requested the following:

Can I please have copies of the following documents that were mentioned in the document Briefing Budget 2024: Proposed health cost pressure planning parameters

- *The literature review by Treasury on wider health cost drivers*
- *The NZIER work on health inflation commissioned by Treasury*

The second part of your request for *The NZIER work on health inflation commissioned by Treasury* was transferred to the Ministry of Health on 25 September 2024.

Information being released

Please find enclosed the following documents:

Item	Date	Document Description	Decision
1.	22 November 2023	Piece on health expenditure residual 22 Nov	Release in full

Please note, that this document is a draft internal note and is not formal advice.

You can find more information on health expenditure trends and the Budget 2024 cost pressure funding on the Ministry of Health’s Website:

<https://www.health.govt.nz/about-us/new-zealands-health-system/vote-health/health-expenditure-trends>

<https://www.health.govt.nz/about-us/new-zealands-health-system/vote-health/budget-2024>

Please note that this letter (with your personal details removed) and enclosed documents may be published on the Treasury website.

This reply addresses the information you requested. You have the right to ask the Ombudsman to investigate and review my decision.

Yours sincerely

Caitlin Andrews
Acting Manager, Health and ACC

Table of Contents

1.	Piece on health expenditure residual 22 Nov	1
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The 'Residual' in Healthcare Expenditure Modelling: Summary

1. Purpose and work completed

To support the Health funding track work for B24, the purpose of this paper is to:

- Define what the 'residual' is by looking at international and New Zealand sources, where the 'residual' represents costs over and above demographic, inflation and labour cost growth; and
- Conclude or provide judgements which contribute to how the residual should be approached for the Health funding track.

We have reviewed analytical papers prepared and/or published by domestic and international institutions (eg. the Treasury, Ministry of Health, OECD, the OBR and others) which cover the technical aspects and considerations underpinning modelling work for health care expenditure.

As part of reviewing those papers, we have considered the following, documented in parts 3 & 4 below:

- 1) Background and purpose of the modelling work/analytical paper – a high level summary.
- 2) Factors underpinning the modelling – quickly captures the factors which go into the modelling to help put the discussion of residual into context.
- 3) What is the residual and how it is being described – factors which are attributed to underpinning or driving the residual.
- 4) How big is the residual – where information is available, capturing how large the residual is and noting any key limitations.

Where applicable, we have referenced the source document and included an appendix which summarises the documents we have reviewed and included hyperlinks.¹

The focus of this paper is identifying commentary on the 'residual' and while described (slightly) differently across the sources we have reviewed, the residual cost driver exists and should be considered and included in setting a cost pressure envelope for health system operational funding.

2. Overview

Modelling Health expenditure is challenging; there are demographic, economic, fiscal, social and behavioural factors which need to be considered. Actual and forecast growth in Health expenditure is a significant cost pressure for New Zealand (and internationally), growing more quickly than income over time.

The drivers of Health spending are a combination of volume changes (health systems are expected to do more) and price increases (providing care costs more over time). Key drivers include:

- demographic factors – the effect of population growth, the changing age structure of the population, health status at given ages and death-related costs.
- price effects – inflation and labour costs
- income effects - the fact that health care is a 'normal good', meaning people demand more as incomes rise.
- other *residual factors* – also known as other growth factors

¹ Note that some documents are only available to Treasury staff, where applicable this has been noted and is linked to where the document is stored on iManage.

There appear to be two broad approaches to healthcare modelling:

- those that approach modelling more from a **cost drivers/supply side lens** (e.g. NZ Tsy LTFM, NHS modelling) and was the approach used to underpin the Budget 2022 cost pressure bid. These models tend to include assumptions for demographics, price (both inflation and labour), as well as other residual factors. They don't include an explicit assumption around an income effect, but this will overlap with price effects and the residual factor that are included.
- those that focus more on the **relationship between health spending and national income** (e.g. OECD, OBR). These models tend to include assumptions for demographics, inflation (although numbers are often presented in real terms), income effect and other residual factors. Labour costs that align with economy wide movements will be at least be partially picked up as part of the income effect (depending on the assumption), with anything above this picked up as part of the residual.

As noted above, in practice there are significant overlap between the two approaches to modelling, but it does make comparisons of individual components of modelling, including residual impacts more challenging.

Our main focus in this paper is on the 'residual' growth factors, and as part of this work, we've looked at published material from the OECD, NZ Treasury, the UK's OBR, the New South Wales Treasury, and others institutions overseas which demonstrate that the residual is a longstanding trend and is something observed internationally.

2.1 The 'residual' cost driver – what is it?

Residual cost drivers, also referred to as 'other growth factors', are non-demographic factors which have had an observable effect on health expenditure growth. Descriptions and explanations for the cost drivers varies slightly across the different materials we have reviewed, but what they do have in common is that the residual is well considered (comes through in all the modelling we have reviewed) and is a 'real' cost driver.

Across the material we have reviewed, it has featured and discussed as a key cost growth driver, and in most cases has been factored as forward modelling. Factors within the residual cost drivers include:

- Technological change – ie. product, knowledge or process innovation, and its ability to extend the scope of health services, with wellbeing benefits realised over the longer term.

Exposure to new or better technologies can lead to improvement in healthy life expectancy but, unlike in other industries, technological innovations in the health sector have generally been observed as cost-escalating rather than cost containing.

There are several reasons why technology may be a source of cost pressure in the health sector. New technologies often treat conditions for which there was previously no, or no effective, treatment (eg. renal dialysis and coronary artery bypass grafts), or expanding existing methods to wider patient populations (known as 'treatment expansion'). Even if an advance leads to lower cost of a treatment, spending can increase if that treatment finds wider medical uses and hence addresses unmet demand for care.

- Productivity constraints – impact of lower measured productivity growth in the health sector relative to other sectors of the economy, particularly because it is a labour-intensive industry and does not benefit from labour-displacing technological advancements as much as other sectors do (ie. Baumol theory), and also because of difficulties in measuring productivity in a quality-adjusted way.

As a general expectation, pay growth within the health sector must keep up with other sectors, despite having lower productivity gains. So, in effect, as productivity and wage rises rise together in other sectors, the health sector will experience only wage increases in order to keep up with rest of the economy.

Productivity in the health system is hard to measure because of the difficulty in making quality adjustments to what is produced. Methodologies that measure complexity and case-weights are an attempt to control for this but typically focus on differences in inputs (eg, the state of the patient) rather than outputs or outcomes (eg recovery time, quality of life post-intervention, need for further treatment). Without adjusting for the quality of outcomes, more costly or longer-duration therapies will automatically result in lower measured productivity, even if they significantly improve patient outcomes.

- Other factors including policy changes, socioeconomic factors and rising prevalence of chronic health conditions

2.2 Size of residual growth factors included in forward modelling

The table below is a summary of annual health expenditure growth factors included as part of forward health expenditure modelling, across the materials we have reviewed. A more detailed comparison table across all components of modelling is included in Appendix 2.

Ref	Source	Growth	Type	Notes
3.1.4	The Treasury: (a) 2021 LTFM (b) Updated LTFM post BEFU 2022	(a) 1.1% (b) 0.5%	Annual Annual	Residual based on average Core Crown health expenditure growth above demographics, inflation and real wages. 2021 LTFM based on 96/97-19/20, 2022 LTFM based on 2006/07 to 2023/24 (so greater weighting to post GFC period). 2022 LTFM also 0.1% lower due to change in methodology.
3.2.4	Ministry of Health	0.8%	Annual	Included in Health Fundex Index developed as part of B22 and included in B22 health cost pressure budget bid.
3.3.4	OECD	0.6%	Annual	Based on Baumol and time effects (residual including technology) for NZ, all health costs (public & private). OECD average ~0.8% (higher if just public health).
4.1.4	OBR	1.2%-2.7%	Range of annuals	Based on NHS England estimates for non-demographic cost pressures in 2015/16. Modelling also appears to assume health system productivity same as rest of the economy.
4.2.4	NHS	1%-3.4%	Range of annuals	Based on residual capturing other pressures after demographics and price assumptions accounted for.
4.3.4	NSW Treasury	0.6%	Annual	Residual based on average health expenditure above demographics and assumed income effect. 1978/79-2018/19 with greater weighting given to more recent years.
4.4.4	UK Health Foundation	-	-	No specific figure or range identified. Includes scenario analysis based on different assumptions for pay costs, productivity, policies.

Key messages and considerations regarding the residual, and the size of the residual is discussed in more detail below.

2.3 How should the residual be factored in as part of the Health funding track work

The following are key points to consider for the residual, as part of factoring in the health funding track:

- Residual growth factor is real – it comes through in all the modelling and analysis we have reviewed and should be included in setting a cost pressure envelope for health system operational funding.

- It is difficult to estimate and disaggregate the residual into its components and there can be overlap between different components or drivers (e.g. between technology and health productivity). This means a single residual rather than different factors is generally likely to be more sensible.
- The residual includes some factors for costs that are not about maintaining the cost of current policy settings, so we wouldn't want to include the "full residual" in any cost pressure envelope.
- The level of the residual varies across models and across years. This means that judgement is required in determining what the right level/range is. Further information that can't be provided by a top down cost pressure index is also needed. Providing low and high budget planning parameters based on a range of residual values is likely to be useful, with decisions then taken on the basis of the bottom up information on actual costs and health planning. This was the intention in Budget 2022, but information on internal entity budgets was not available. Upcoming decisions on Budget 2024 preconditions and stage gates will be important in ensuring that information is available in a timely way to inform budget decisions.
- There is a minimum residual that must be funded to allow an efficient system to continue to produce stable outcomes, but no upper limit on what can be spent. The amount and quality of healthcare being delivered will always expand to make use of all available funding, and expectations will rise to ensure there is always unmet demand.

The ‘Residual’ in Healthcare Expenditure Modelling: Further information on different models

3. New Zealand related sources

3.1 Treasury’s Long Term Fiscal Modelling

3.1.1 Purpose of modelling

At least every four years the Treasury produces a Statement on the Long-term Fiscal Position of the government, looking at least 40 years into the future to examine the potential effects on New Zealand’s economy of long-term macroeconomic trends. The statement is based on the Treasury’s Long Term Fiscal Modelling (the ‘LTFM’), which includes a section on the Health sector.

The LTFM is produced to describe trends and pressures on spending, revenue, the fiscal operating balance, and public debt over this period, based on current policy settings, recent history, and likely long-term developments in key areas. It helps inform commentary and discussion on New Zealand’s significant long-term fiscal challenges and helps decision makers assess the long-term impacts of policy options that might be considered in these areas.

3.1.2 What factors underpin the Health expenditure modelling in the LTFM

The following are the most significant factors and assumptions were considered for health expenditure in the LTFM:

- Demographic categories – growing and ageing population puts increasing pressure on the health system. Expenses are allocated into different age and gender groups.
- Modelling uses six health service spending categories being Personal health – primary; personal health – hospital & community services; mental health; health of older people – aged residential care; health of older people – other; and unmet need.²
- Healthy ageing – to mitigate modelling constraints of fixed demographic percentages, the model includes a “healthy ageing assumption” which reflects, at least in recent decades, that people (on average) have retained better health into older age groups.³
- CPI based inflation to represent price growth
- Annual labour productivity growth, acting as a proxy for real wage growth and representing the impact of the real (ie. before inflation) cost of labour inputs.⁴
- There is also consideration of a residual growth factor, which we discuss in more detail in 3.1.3 below.
- To calculate the residual growth, no health productivity growth was assumed (as it is not in the main projections).⁵

3.1.3 How is the residual described?

In the LTFM, there is a growth factor that remains after attempting to account health expense numbers, for demographic or recipient growth, inflation or price growth, and labour input cost growth. It is likely comprised

²The Treasury (2021), 2021 Statement on the Long-Term Fiscal Position, Demographic, Economic and Fiscal Assumptions and Logic in the Long-Term Fiscal Model, page 33.

³Above, pages 33 and 34

⁴Above, page 35.

of multiple factors, including policy change, expansion of services or treatments, and the fact that price inflation and/or labour costs in the health sector may not mirror those in the general economy.

He Tirohanga Mokopuna 2021, the Treasury's combined Statement on the Long-term Fiscal Position and Long-term Insights Briefing, includes the following cost drivers which we can categorise as part of the 'residual':

- *Socioeconomic factors* – wider determinants of health and wellbeing can affect health costs such as poverty, housing, employment and social support systems.
- *Technological change* - technology and its ability to extend the scope of health services, with significant wellbeing benefits, but often coming at higher costs (for example, providing more specialised training and resources to benefit from the new technology).⁶

The background discussion paper for the 2021 LTFM also notes the following to be part of, or affect, residual growth/activity:

- expansion of services and policy changes around eligibility for or access to health services would have influenced the residual growth factor.
- price inflation and real labour costs in the health sector may not have been the same as in the wider economy (productivity).

In a separate presentation facilitated by Matthew Bell (Economist within the Treasury who is one of the main authors of the LTFM) with the Health team, the following was also noted as being part of the residual growth factor:

"Likely many contributing reasons for this, including: expansion of services as technology improves; lumpy nature of major wage settlements; uneven allocation of OA from year-to-year; real wage growth in sector \neq economy-wide value; price growth in sector \neq economy-wide inflation; sector productivity growth being erratic (negative?); past wdg not matching actual recipient growth; miscellaneous factors model not accounting for"⁷

NB: OA = operating allowance, wdg = weighted demographic growth.

3.1.4 How big is the residual?

2021 LTFM (published)

The 2021 LTFM has assumed a spending growth rate for non-demographic factors of 4.15% per year, from 2025 to 2061.⁸ This includes a 1.1% annual growth factor applied to 'residual growth' factors.⁹

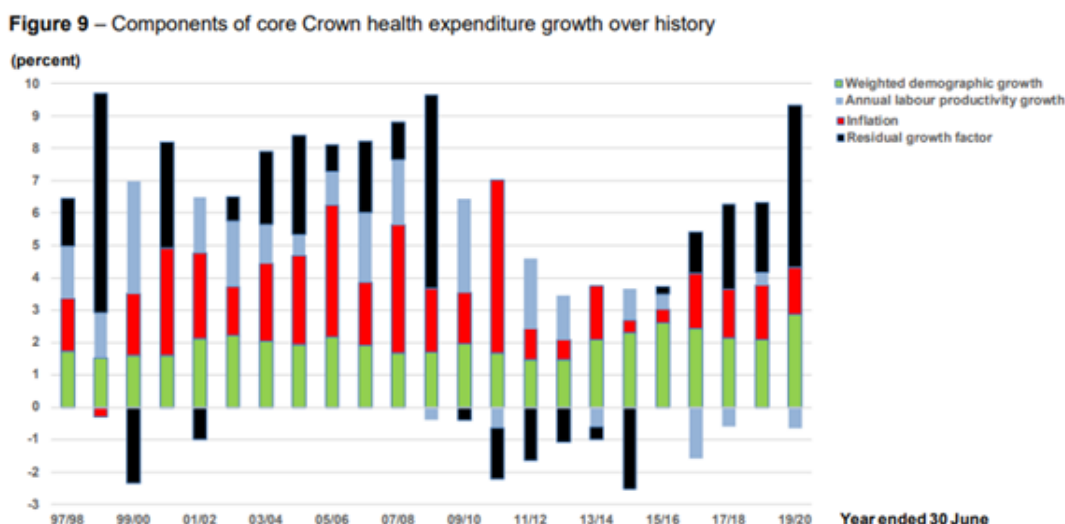
⁶ The LTFM notes for technological change: Noting that this driver is more complex and there are several interdependencies with other cost drivers. For example, technological change may have an impact on demographic change and life expectancy and shapes productivity and to some extent consumer demand as income increases.

⁷ Matthew Bell (August 2022), Health expenditure modelling in the Treasury Fiscal Models – presentation to the Treasury Health Team, slide 9.

⁸ The Treasury (2021), He Tirohanga Mokopuna 2021, page 87.

⁹ 2021 Statement on the Long-Term Fiscal Position, *Demographic, Economic and Fiscal Assumptions and Logic in the Long-Term Fiscal Model*, page 36.

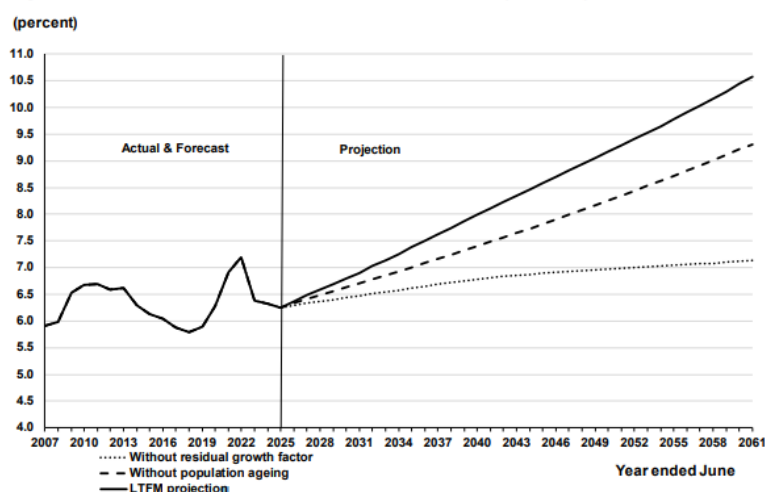
To calculate the residual growth factor, historical data was used – a data series from 1996 to 2020, depicted in the graph below. Basing the value used in the LTGM projections on an average calculated from a longer period is designed to better represent what the residual growth factor would be in an economy growing on trend and free from cycles.¹⁰



The residual growth is quite erratic, but averages to 1.2% per year over the 23-year outturn. It accumulates to a considerable portion of the total growth over the period, meaning that recipient point growth and economy wide price and wage growth are not enough to adequately explain past publicly funded health expenditure growth.

The following graph also illustrates the effect on the projections if no residual growth was factored:¹¹

Figure 11 – Core Crown health expenses to GDP in history and projection scenarios

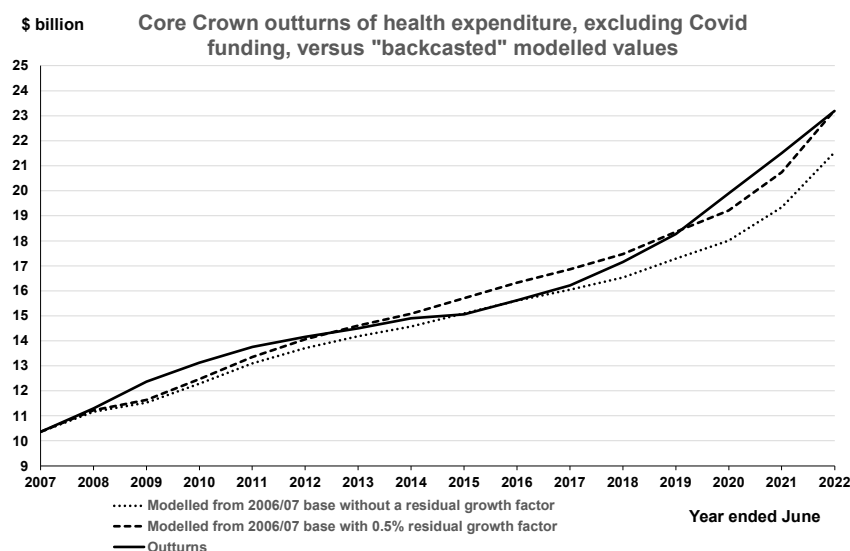


¹⁰ Above, page 36.

¹¹ Above, page 38

Figure 11 depicts how health projections would look without the impact of, in one case an ageing population structure, and in the other, the residual growth factor. For the former scenario, the “demographic driver” of GDP, annual labour force growth, is applied to each health service category, rather than its own demographic driver, and no healthy ageing is modelled.

From Matthew Bell’s presentation to the Health team, the following is an analysis of Core Crown health



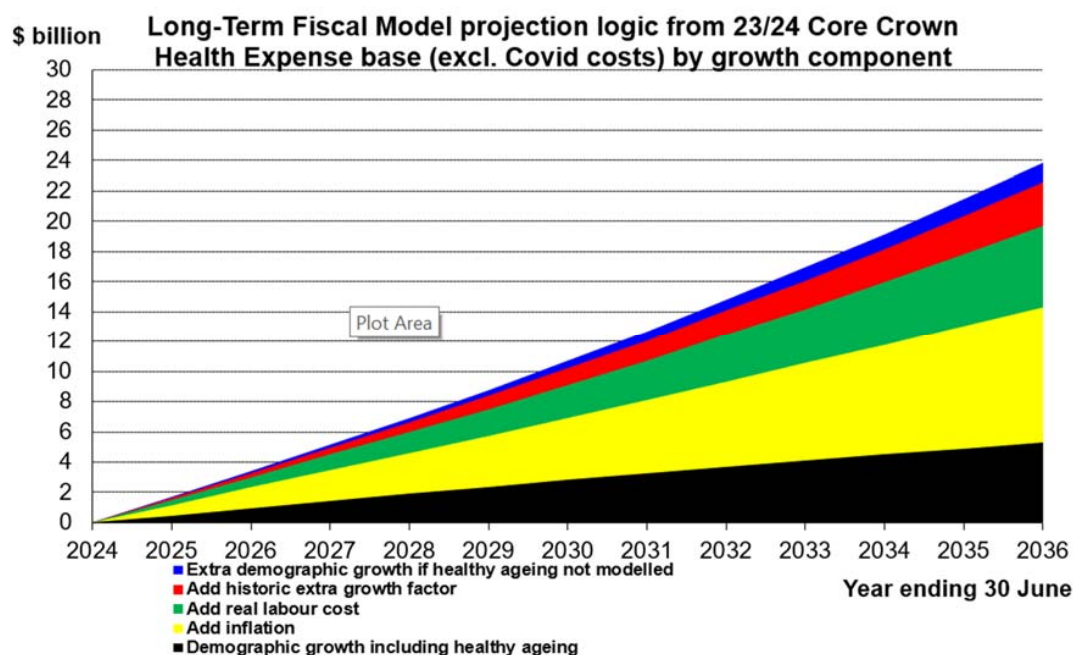
expenses versus “back casted” modelling for different residual growth factor analysis:¹²

Updated August 2022 LTFM

Matt Bell updated the health projections in August 2022 to reflect the Budget 2022 health funding settlement (including contingency funding). The residual in that work is 0.5% pa based on data from 2006/07 to 2023/24. It is significantly lower than the 2021 published modelling. There is also a small difference in the residual (0.1% lower in updated numbers) due to a change in methodology for calculating it – the value that minimises the least squared error of the modelled values has been used to make it less sensitive to year-on-year fluctuations in the numbers.

The below chart shows the relative components of the health projections in the updated August 2022 projections:

¹² Matthew Bell (August 2022), Health expenditure modelling in the Treasury Fiscal Models – presentation to the Treasury Health Team, slide 11.



3.2 Ministry of Health – Health Funding Index

3.2.1 Background and purpose of the Health Funding Index

To support Budget 2022 ('B22'), the Ministry of Health ('MoH') prepared an interim Health Funding Index (the 'HFI') which was one of four components in the approach to developing the B22 package. The other three components were a rebase to eliminate DHB deficits, new initiatives and a health capital envelope bid.

The HFI underpinned the "top down" approach to the cost pressure bid for all of Vote Health operating funding (excluding pharmaceuticals).

3.2.2 What factors underpin the Health Funding Index

An internal memo, prepared by MoH for the interim HFI for the B22 package, recommends four main factors: demographics, labour costs, price and an additional adjustment for 'residual' cost drivers which reflects and acknowledges the observed variation between health expenditure growth and the wider economy. Key points to note:

- For general cost increases, where applicable, use economy wide factors but for more significant and specific cost increases (eg. wage settlements) could be managed through the residual or as separate budget bids.¹³
- Uses a cost weighted demographic change model (currently used for DHB cost pressure bids).¹⁴
- Preferred option to reflect labour cost increases is to use the QES average ordinary weekly earnings growth as forecasted by the Treasury.¹⁵

¹³ The Ministry of Health (2021), *Memo – Interim Health Funding Index to support Budget 22 Transitional Funding Package – Budget Sensitive*, at 17 & 18.

¹⁴ Above, at 22

¹⁵ Above, at 24 to 29.

- Use CPI for general health price increase, captures economy-wide trends in pricing.¹⁶
- Also includes residual growth factor which is discussed in more detail below.

3.2.3 What is the residual or how was it described?

The following were discussed as contributors to the residual growth factor:

- costs of wage settlements
- the cost of technology to the sector
- other demographic related theories such as Baumol's cost disease theory (relates to productivity where health is categorised as a productivity non-progressive sector, where it displaces labour through productivity at a slower rate relative to other parts of the economy)

The memo notes that an index absent of an additional residual/margin over and above core components would have placed pressure on the system in the face of changing policy settings and growing cost pressures. The memo notes that whilst research provides supporting rationale for a residual, estimation is complex and variation in historical results can often be dependent on the input data. One challenge for example is when considering non-demographic drivers of cost growth, there can be overlap between the different drivers captured in the estimation results eg. technology and its relationship to productivity.

To factor in the residual growth in the HFI, the memo proposed to start with an 0.8% factor which:

- 1) could be scaled up and down, reflective of preferred investment into the sector that was over and above the wider economy; or
- 2) could be scaled up and down across two or three year periods to reflect preferences of phasing investments ie. funding could be front loaded into the first two years, with a lower path indicated over the next three years (link with any decisions regarding scaling as part of the wider strategy Health funding).

3.2.4 How big is the residual?

The proposed residual growth factor of 0.8% was included in the Budget 2022 bid.¹⁷ This number was based off the DPMC's Transition Unit's model for cost of maintaining clinical best practice.

What "level of residual" was funded in Budget 2022?

In Treasury's bilateral advice, its central recommendation for a cost pressure uplift was 6.4% (which built in a ~0.5% residual) based on HYEPU assumptions, but Treasury recommending giving Te Whatu Ora and Te Aka Whai Ora "planning parameters" (ie. a range of funding levels) with the intention that information from Te Whatu Ora's budget could be used to help inform final recommendations and decisions on the cost pressure level. This didn't happen; information on Te Whatu Ora's internal budget was not available in time to inform final budget decisions.

In the end a 6.4% cost pressure uplift was provided to Te Whatu Ora and Te Aka Whai Ora.

¹⁶ Above, at 34.

¹⁷ **Note:** The 0.8% residual growth factor adjustment was also included in a slide pack prepared by MoH called "Vote Health Budget 2022 – Rebase and Cost Pressures (slides for discussion with the Minister of Finance and Minister of Health)"

3.3 OECD – Public spending projections

3.3.1 Background and purpose of modelling work

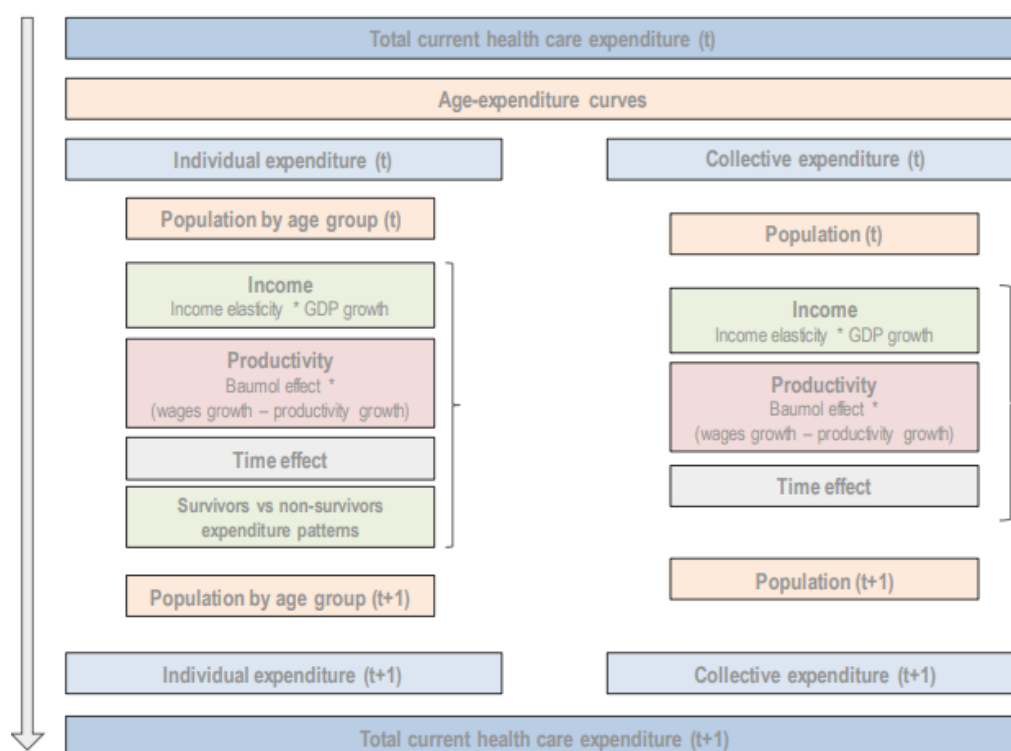
In 2019, the OECD published its *Public spending on health and long term care: a new set of projections* as part of gaining a better understanding of financial sustainability challenges for its member countries. It includes a health spending projection for New Zealand. The projections are from 2015 to 2030.

3.3.2 What factors underpin the modelling?

The OECD identified key drivers of the increase in expenditure to rising income (demand for higher quality services and accessibility), demographic change (rapidly ageing populations) along with other factors – discussed in 3.3.3 below. It modelled a range of policy situations, including a “base” scenario and alternative scenarios.

The following is a table which summarises the different factors considered in the model:¹⁸

Figure 2.1. Model flow of the new OECD health spending projection framework



¹⁸ OECD (2019), Health Spending Projections to 2030 – Health Working Papers, page 10.

3.3.3 What is the residual or how was it described?

The following are other factors identified in the OECD modelling which we can attribute as being part of the residual:

- Rising income – demand for higher and more accessible services, rising incomes have elevated expectations of what health systems should deliver.
- Productivity constraints – health spending has generally been driven by rising costs and productivity gains are made more challenging by the labour-intensive nature of the healthcare sector
- Technological advancement – technological progress takes different forms ie. product, knowledge or process innovation, and represented the most complex driver to model. The OECD noted that its effect is clearly interlinked with each of the other cost drivers, it affects demographic change, shapes productivity and both reflects and drives consumer demand as income rises.

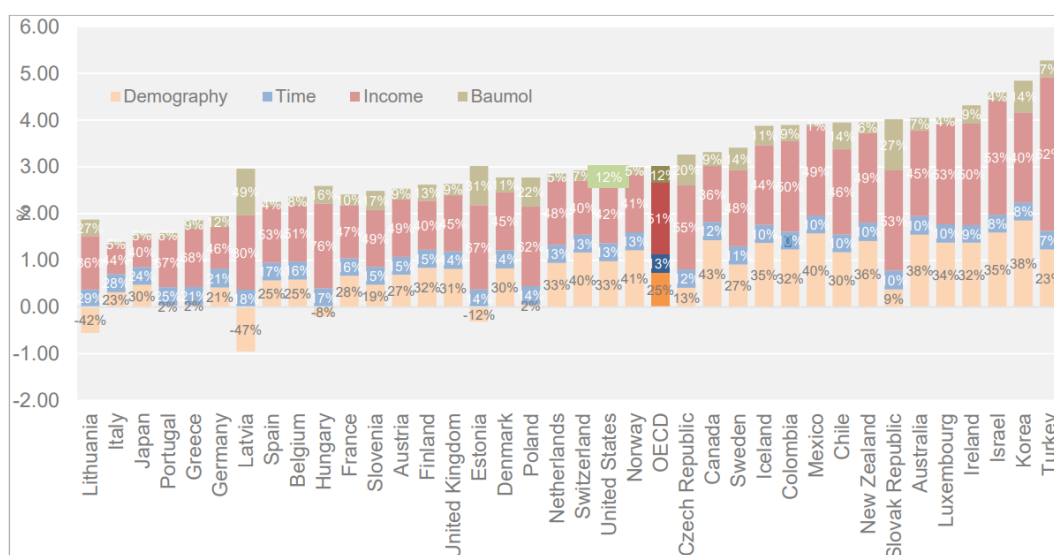
An example is where a country's wealth increases, there are typically more advances in medical technologies that extend the scope of the health services, but at a cost. New technologies influence demographic change, extend life expectancy and changing patterns of morbidity. Also, the inefficient use of new technologies may also increase health spending without corresponding improvements in health status.

The OECD modelled the potential effects of the different cost driver scenarios through different policy situations which include a “base” scenario – estimates of health spending growth in the absence of major policy changes against (and included adjustments factors for):

- a number of alternative scenarios that model the effect on health spending of policies that increase productivity or contribute to better lifestyles; or
- ineffective policies that contribute to additional cost pressures on health

3.3.4 How big is the residual?

The OECD's projections include assumptions for the key drivers' that contribute to the average annual real health spending growth to 2030 by country:



Note: “Demography” sums “pure age” and “healthy ageing” (dynamic death-related costs) effects. The relative contribution of each driver to growth is reported in percentage within each bar.

Productivity constraints in health (the Baumol effect) and the time effect included in the OECD's modelling are impacts over and above price and demographic effects (so effectively part of what is often called a residual in other modelling). The annual average growth rate for the Baumol and time effects for the OECD and New Zealand are set out below:

Country	Baumol (productivity)	Time effect – includes technology
OECD average	0.4% (all health costs)	0.4% (all health costs) 0.5% (public health costs)
NZ	0.24% (all health costs)	0.40% (all health costs)

The numbers above don't capture any increased costs due to increased expectations for better and more accessible services that will be picked up via the income effect.

4. Other international resources

4.1 The UK – Office of the Budget Responsibility modelling

4.1.1 Background and purpose of the analytical review

In September 2016, the UK's Office of Budget Responsibility (the 'OBR') published its analytical paper, *Fiscal sustainability and public spending on health*. The paper discusses some of the detailed considerations underpinning its long-term projections for health spending in the UK. The OBR's health (& other public spending) projections are updated regularly as part of its Fiscal Risks and Sustainability reports.

Overall, the review found that demographic effects have explained only a small part of the increase in health spending over past decades and that they are likely to remain a relatively small, although growing, driver of spending in the future.

4.1.2 Factors underpinning the modelling and analytical review

The analytical papers discussed three drivers of health spending:¹⁹

- Demographic factors – the range of age structure of the population including health status at given ages and death related costs. The model includes assumptions such as spending increases relative to age, and death related costs, discussed in more detail in the *Age specific spending on health care* section of the analytical paper.
- Income effects – health care is a 'normal good' ie. people demand more services as their income rises. However, whether spending rises or falls as a share of GDP depends on whether the 'income elasticity of demand' is greater or less than one. An income elasticity of one (1% rise in income, 1% rise in health care spending) is built into the OBR's modelling.
- Other cost pressures – non-demographic factors such which we discuss in 4.2.3 below.

One important thing to note is that the other cost pressures include consideration of productivity (ie. noted that lower productivity growth in the health sector relative to the rest of the economy). This acts as an "offset" to the general assumption in the modelling that health sector productivity growth is the same as economy wide productivity growth.

¹⁹ Office for Budget Responsibility (2016), *Fiscal sustainability analytical paper, Fiscal sustainability and public spending on health*, page 5

Within the model, health spending is broken down into four elements: hospital and community health services, family health services (excl drugs), pharmaceutical services, and capital spending.²⁰

4.1.3 What is the residual and how is it being described?

The OBR defined other residual factors as the “non-demographic factors such as technological advances, relative price/productivity effects and policy or lifestyle changes”.

The analytical paper also discusses a review of reports completed by the OECD and the EU (in 2013) which found that in both cases, if the results were expressed in terms of changes in spending as a share of GDP, where an income elasticity of one is consistent with no change – rather than real growth rates, the majority of the change would be assigned to non-demographic factors.²¹

The paper notes that other cost pressures cover a multitude of factors, but noted that it is generally accepted that the main drivers are:

- increasing relative health care costs (for example, resulting from lower productivity growth in the health sector relative to the rest of the economy).
- technological advances (eg. medical equipment, techniques and procedures).

The following are key points regarding technology costs:²²

- Exposure to new or better technologies can lead to improvement in healthy life expectancy, unlike in other industries, technological innovations in the health care sector have been cost-escalating rather than cost-cutting.
- If, however, the uptake of new technologies leads to better health outcomes, part of this higher spending may be recovered in lower spending further in the future (although this depends on assumptions about “healthy ageing”).
- To the extent that those better health outcomes lead to higher employment rates, they would boost GDP and thereby reduce pressure on spending as a share of GDP.
- Reasons for cost pressures from technological advance include novel treatment for conditions, new treatment for conditions that never existed, or expanding existing methods increasing effectiveness ie. if an advance leads to lower cost per treatment, spending increases if there are wider medical uses and availability for unmet demand.

4.1.4 How big is the residual?

Since 2017 (following the analytical report discussed above), the OBR’s health spending projections in its Fiscal Risks and Sustainability Report has included an explicit adjustment for other growth factors (ie. the residual). In its most recent set of projections (August 2022) the OBR used NHS England estimates for non-demographic cost pressures in 2015/16, noting these were intended to reflect pressures such as technology and the rising prevalence of chronic diseases. Assumptions were 2.7% pa for secondary care and 1.2% pa for primary care²³ – see chart below²⁴. It appears that the OBR assumed that health productivity was the same as the rest of the economy but its report includes some sensitivity analysis around productivity levels (beyond just health).

²⁰ Fiscal sustainability and public spending on health, pages 7 and 8

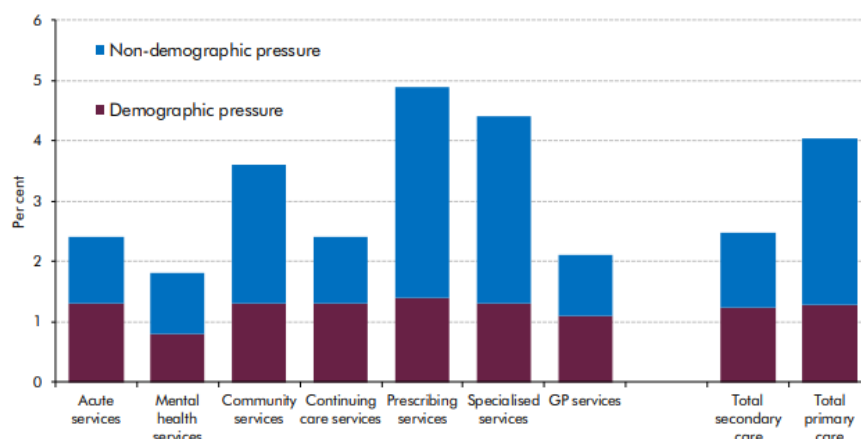
²¹ Above, page 12.

²² Above, pages 15 and 16

²³ See p139 Jul 22 OBR FSR [Fiscal risks and sustainability – CP 702 \(obr.uk\)](https://obr.uk/fiscal-risks-and-sustainability/)

²⁴ Fiscal sustainability and public spending on health, page 31

Chart 3.6: Demographic and non-demographic pressures (2015-16)

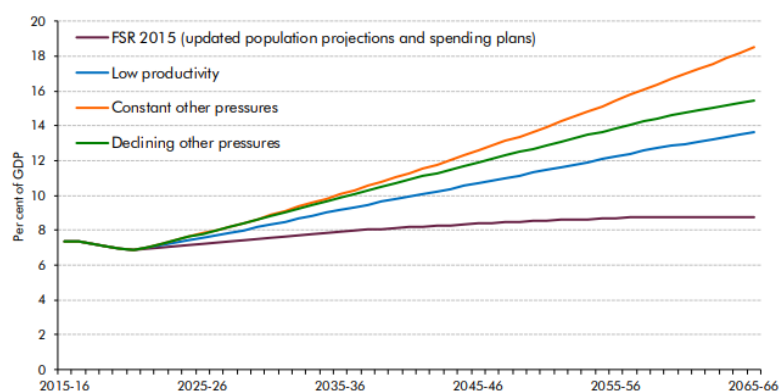


The OBR's 2015 analytical note also included a sensitivity analysis which compares its approach to projecting health spending in its 2015 Fiscal Sustainability Report (no allowance for non-demographic cost pressures growth) to two scenarios:²⁵

- Constant other pressures – assumes that the additional pressures remain unchanged from 2021-22 onwards. In this scenario, our primary and secondary health spending projections grow by 2.7 and 1.2 per cent a year faster than in our central projection.
- Declining other pressures – assumes a linear convergence towards a 1 per cent annual increase by the end of the projection period in each activity. This reflects the significant uncertainty over how pharmaceuticals, medical procedures and technology might evolve over the future.

The following illustrates the effect of the growth factors above to total projected health expenditure against a percentage of GDP:²⁶

Chart 3.7: Long-term projections and other cost pressures



Note that the original projection assumes no growth in other cost pressures.

²⁵ As above, page 31.

²⁶ As above, page 31

4.2 The UK – National Health Services Modelling

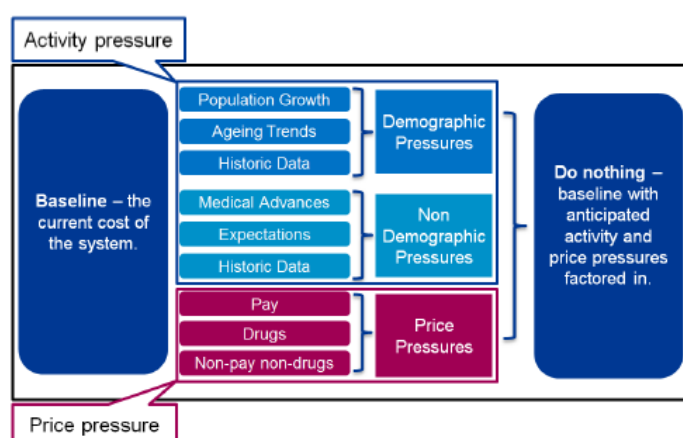
4.2.1 Background and purpose of the modelling work

In May 2016, the UK National Health Services (the 'NHS') prepared a recap briefing for the Health Select Committee on technical modelling and scenarios of the NHS's *Five Year Forward View* which was published in October 2014.

4.2.2 Factors that underpin the modelling

A baseline was developed based on planned expenditure for 2014/15 and was broadly categorised into the following types: acute services, mental health services, community services, continuing care services, prescribing services, specialised services, GP services.²⁷

The baseline was then projected after considering the following cost pressures and factors:²⁸



Factors under 'non-demographic pressures' are what we consider to be part of the 'residual' which we discuss in more detail below.

4.2.3 What is the residual and how is it being described?

The NHS's modelling work considered the following non-demographic pressures which we can attribute as being part of the 'residual' cost driver:²⁹

- Increasing expectation and demand for healthcare services;
- Improving access to care;
- Changes in healthcare technology;
- Medical practice; and
- Changes in disease profile.

To approximate the non-demographic pressures, the NHS used historic activity trends and from these, removed the effect of demographic pressures to calculate a historic non-demographic trend.

²⁷ National Health Service (2016), NHS Five Year Forward View, *Recap briefing for the Health Select Committee on technical modelling and scenarios*, at 2.1 Modelling methodology.

²⁸ Above, at 2.1 Modelling methodology.

²⁹ Above, at 2.3.2 Non-demographic pressure

2.2.4 How big is the residual?

To calculate the residual, the NHS used historic pressures from historic activity trends and removed the effect of demographic pressure to calculate a historic non-demographic trend – noted that this has been split by the different cost categories.³⁰

Table 2.3 – the unmitigated non-demographic pressure base case (as of 2014)

	2015/ 16	2016/ 17	2017/ 18	2018/ 19	2019/ 20	2020/ 21
Acute services	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
MH services	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Community services	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%
Continuing Care services	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Prescribing services	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%
Specialised services	3.0%	3.0%	2.8%	2.9%	2.9%	2.9%
GP services	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%

4.3 AUS – New South Wales Treasury Modelling

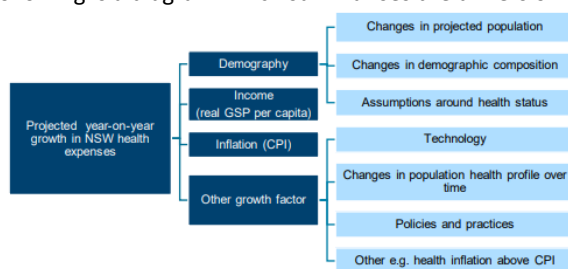
4.3.1 Background and purpose of the modelling

In 2021, the New South Wales Treasury (the 'NSW Treasury') published its 2021-22 NSW Intergenerational Report (the 'IGR') which presents a snapshot of the future of the NSW to inform the policies for New South Wales. The report is underpinned by projections for 40 years to 2061 to understand how the state's population, economy and finances may change based on global, and local trends, and current policies. The report examines key long-term challenges associated with an ageing population, a widening fiscal gap between the revenue raised by the government and growing expenditure pressures, and rapid transformation in the economy.³¹

The projections include a chapter on Health expenditure, and the NSW Treasury also published its technical research paper *Ageing and health expenses – revisiting the long-term modelling approach* which accompanied its latest long-term health projections.

4.3.2 Factors underpinning the modelling

- The following is a diagram which summarises the drivers of health expenses in the model:³²



NB: It includes other growth factors which we can attribute into our category of 'residual', discussed in more detail in 4.3.3 below

- Assumes the real income elasticity of government expenses is one. This means that public sector expenses (per capita) increase in line with income growth (per capita).³³

³⁰ Recap briefing for the Health Select Committee on technical modelling and scenarios, at 2.3.2 Non-demographic pressure

³¹ NSW Treasury (2021), 2021-22 NSW Intergenerational Report, viewed August 2022 at <www.treasury.nsw.gov.au/nsw-economy/2021-22-nsw-intergenerational-report>

³² NSW Treasury (2021), 2021 Intergenerational Report – Treasury Technical Research Paper Series, *Ageing and health expenses in New South Wales – revisiting the long-term modelling approach*, page 11.

³³ NSW Treasury (2021), 2021 Intergenerational Report, *Technical note and sensitivity tables*, page 11.

- The demographic changes contain assumptions about fertility, mortality and life expectancy, and migration. The impact of population ageing on long-run health expenses was modelled by assigning assumption of relative costs to each age cohort, which are held constant over time and applied to the demographic projections.³⁴
- Implicit in the assumption is that increasing life expectancy will result in more people in ill health over time, holding other things constant, putting upward pressure on demand for health services and therefore health expenses over time.³⁵
- Model does not capture the impacts of the coronavirus pandemic.
- Health expenditure is categorised into the following functional areas: hospital services, outpatient services, community health services, other health.³⁶

4.3.3 What is the residual and how is it being described?

The NSW Treasury defined other growth factors as the cost pressures not captured through the demographic and economic drivers already considered in the methodology, based on historical trends. The other growth factor reflects:³⁷

- unidentified policy;
- changes in medical practice embedded with expenses eg. the impact of new theories and technologies;
- changes in delivery of health services over time;
- changes in population health profile over time (eg. increasing burden of chronic disease); and
- other factors eg. health inflation above CPI.

4.3.3 How big is the residual?

The residual was calculated using historical NSW government spending data for the period 1978 to 2019³⁸ and are held constant over the projection period (2019-20 to 2060-61). The residual (referred to as the other growth factor) built into the 2021 model is 0.6%.³⁹

Unlike the information available from the NZ Treasury, there is no (easily) available public information which further examines the residual eg. effect on projections if not included, adjusted, etc. However, there is a sensitivity analysis on projected expenditure available for healthy ageing:

³⁴ *Ageing and health expenses in New South Wales – revisiting the long-term modelling approach*, page 5.

NB: also see discussion regarding morbidity and life expectancy assumptions on page 6ff.

³⁵ As above, page 5.

³⁶ 2021 Intergenerational Report, *Technical note and sensitivity tables*, page 11.

³⁷ *Ageing and health expenses in New South Wales – revisiting the long-term modelling approach*, page 10 & 11.

³⁸ Greater weighting is given to more recent year data

³⁹ 2021 Intergenerational Report, *Technical note and sensitivity tables*, page 16.

Expense modelling sensitivities

The tables below show the sensitivity of the fiscal gap to changes in morbidity.

Table 6: Morbidity sensitivity¹²

	Units Time period(s)	% CAGR 2018-19 to 2060- 61	Per cent 2060-61	Per cent of GSP 2060-61	Per cent of GSP 2060-61
Sensitivity		Health expenses	Health expenses share of GSP	Fiscal gap (ex-NGF)	Net debt (incl-NGF)
<u>Base case</u> Dynamic age cost indices		5.38	5.58	2.6	99.9
<u>High case</u> Unhealthy ageing ¹³		5.60	6.09	2.9	106.4
<u>Low case</u> Healthy ageing ¹⁴		5.25	5.29	2.4	96.2

4.4 The UK – The Health Foundation funding projections

4.4.1 Background and purpose of the modelling

In October 2021, the Health Foundation in the UK prepared its *Health and social care funding projections 2021* which includes a projection of longer-term funding to 2030/31 to help answer the question of how much funding the health and social care system may need over the next decade. The projection includes Department of Health and Social Care (DHSC) budgets, day-to-day NHS funding and the funding made available to local authorities for adult social care.

4.4.2 Factors underpinning the modelling

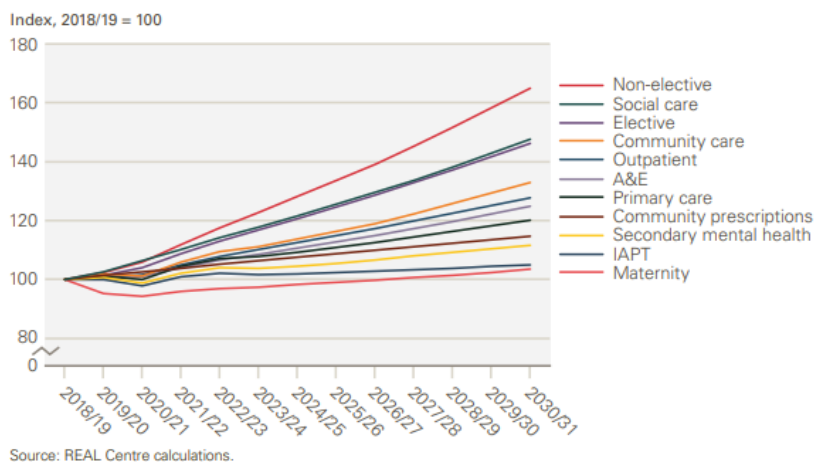
The projections are based on underlying funding pressures:⁴⁰

- Demographics – size and age structure of the population, births and deaths, changes in morbidity.
- Price increases – wage growth (based on the OBR's long term forecast for all-economy earnings), drug costs (the effect of medical innovation on drug prices is ambiguous), non-pay non drug costs, inflation
- Productivity – emphasising that productivity gains are an important determinant of the future path of health and social care spending. Assumes 0.8% pa productivity based on ONS long-term average non-quality adjusted productivity growth rate for public service health care in England (1998-2018)
- Additional pressures which we discuss in 4.4.3 below.

The model examines and projects cost at the activity level, see example below:⁴¹

⁴⁰ The Health Foundation (2021), REAL Centre Projections, *Health and social care funding projections 2021*, part 3

⁴¹ As above, page 43

Figure 19: Funding projections by service area

4.4.3 How is the residual described?

The paper discusses the following examples of ‘additional cost pressures’ which we can attribute as being part of the residual:








- Population demands more or better quality health and social care, particularly as the country gets wealthier.
- Clinicians who might push for more care needs to be met.
- Ranges of available treatment might increase, either for existing or new existing conditions – this is part of what we have considered to be technological change which falls within the residual.
- Government may react to public expectations by increasing the supply of care.




The paper does not limit additional pressures to those noted above.

4.3.4 How big is the residual?

No useful information in this paper on this. A range of scenarios are presented.

Appendix 1: Key documents reviewed

Source	Notes	Links
The Treasury (2021), 2021 Statement on the Long-Term Fiscal Position, <i>Demographic, Economic and Fiscal Assumptions and Logic in the Long-Term Fiscal Model</i>	Background technical paper, discussion around key assumptions and logic underpinning the model	
The Treasury (2021), He Tirohanga Mokopuna 2021 – Health Chapter.	The Treasury's combined Statement on the Long-Term Fiscal Position and Long-term briefing	
Matthew Bell (August 2022), Health expenditure modelling in the Treasury Fiscal Models – presentation to the Treasury Health Team Emailing: Health expenditure modelling in the Long-Term Fiscal Statement - Presentation to health policy team August 2022.pptx (Treasury:4688585v1) Add to worklist	Special presentation to the Health team, prepared by Matt Bell. HL is to the file on iManage.	
The Ministry of Health (2021), <i>Memo – Interim Health Funding Index to support Budget 22 Transitional Funding Package – Budget Sensitive</i> The memo: FW: Cost Pressure methodology paper (Treasury:4688584v1) Add to worklist The powerpoint: RE: Rebase and Cost Pressures Paper for Joint Ministers Meeting 1 November (Treasury:4595423v1) Add to worklist	Internal memo prepared by MoH to inform B22 package. Copy of memo filed in iManage.	
OECD (2019), Health Spending Projections to 2030 – Health Working Papers	Includes projections for individual countries including New Zealand.	
National Health Service (2016), NHS Five Year Forward View, Recap briefing for the Health Select Committee on technical modelling and scenarios	Internal paper sources from Mat Parr – available on iManage only.	
NSW Treasury, 2021 Intergenerational Report – Treasury Technical Research Paper Series, <i>Ageing and health expenses in New South Wales – revisiting the long-term modelling approach</i>	Technical paper and specific discussions around health care expenditure modelling	

NSW Treasury (2021), 2021 Intergenerational Report, <i>Technical note and sensitivity tables</i>	Same modelling as source above, but has more discussion around inputs and assumptions	
Office for Budget Responsibility (2016), Fiscal sustainability analytical paper, <i>Fiscal sustainability and public spending on health</i>	OBR modelling but also includes discussion around modelling completed by other institutions	
Office for Budget Responsibility (July 202), Fiscal risks and Sustainability Fiscal risks and sustainability – CP 702 (obr.uk)	Latest OBR report including spending projections (including health)	
The Health Foundation (2021), REAL Centre Projections, <i>Health and social care funding projections 2021</i>	Nice and easy explanations about the factors, but quite different from the rest and couldn't find residual annual growth factor as used scenarios	

Appendix 2: Comparison of composition and assumptions in different health funding projections/models

The table below attempts to compare the key components and assumptions used in six models of health cost projections, including health cost projections/models from the OECD, NZ Treasury (long term fiscal model), the UK (OBR, NHS, Health Foundation), and NSW Treasury. There appear to be two approaches to the models; those that focus more on the relationship between health spending and national income (e.g. OECD, OBR) and those that approach modelling more from a cost drivers/supply side lens (e.g. NZ Tsy LTFM, NHS). In practice there is significant overlap between these approaches, but it does make comparisons of individual components more challenging. \

Key

Demographic

Income effect

Price – CPI, labour costs

Baumol effect

Other costs

Model	Demographic	Approach to income effect and price changes		Baumol effect	Other costs	Notes
		Income effect	Price changes			
Tsy LTFM 2021 (updated in Aug 22)	✓ ~1.5% pa average. ⁴² Based on MoH info from PBFF model: <ul style="list-style-type: none">• Popn growth – Stats NZ population forecasts• Demo changes – age, gender, cost weights• Healthy ageing factor (reduces demographic growth from 1.72% to 1.5% pa on average).• Modelling based on 6 expense categories.		✓ 1% pa - annual labour productivity growth. Proxy for real wage growth, represents impact of real cost of labour inputs. 2% pa inflation (CPI)		✓ Residual based on historic spending growth above other factors. <ul style="list-style-type: none">• 2021 LTFM: 1.1%. Based on data from 96/97-19/20.• Updated LTFM (Aug 22): 0.5% pa.⁴³ Based on data from 06/07 to 23/24. Residual reflects: expansion of services & policy changes, price inflation & real labour costs differing from wider economy	
OECD 2019	✓ 0.7% pa increase on average across OECD (1.1% less 0.3% for compression of morbidity) <ul style="list-style-type: none">• Change in size & structure of popn• Change in share of popn close to death• Change in life expectancy	✓ Income elasticity 0.79 public costs, 0.73 all health costs. In 2019 paper: 1.5% pa increase on average across OECD (presumably based on 2% real income growth).	(Figures are in real terms)	✓ 0.4% pa increase due to productivity constraints Based on: 1% increase in wage growth in economy means 0.309% increase in public health costs (0.265% all health costs).	✓ 0.5% pa increase (0.5% for public costs, 0.4% for all health costs). Due to “time” ie a residual capturing other factors including technology.	Figures are average % increase for all OECD countries, central projection, real terms.
OBR (UK) 2022	✓ <ul style="list-style-type: none">• Popn growth• Demo changes• Morbidity / healthy ageing - assume expansion of morbidity.⁴⁴	✓ Health costs rise in line with GDP. Assume normal good ie income elasticity 1 for central projections (but sensitivity analysis).	(Figures are in real terms)	(Assumes productivity same as rest of economy, but includes sensitivity analysis for lower productivity. ⁴⁵)	✓ 2.7% for secondary care, 1.2% for primary care. Based on NHS England estimates for non-demographic cost pressures in 15/16. ⁴⁶ Intended to reflect pressures such as technology & rising prevalence of chronic diseases. (Historically these costs weren’t included in OBR projections but that changed in 2017 following 2016 analytical work).	Approach in this table is approach to projections from 27/28 in Aug 2022 OBR publication. ⁴⁷ Earlier years based on agreed SR totals (up to 24/25) and annual average growth (25/26 and 26/27).
NHS (UK) 2016 for 5 yr fwd view	✓ 0.8%-1.5% depending on type of service. <ul style="list-style-type: none">• Popn growth• Demo changes• Modelling based on 7 service types.		✓ Assumptions for: <ul style="list-style-type: none">• Pay: OBR whole economy av earnings growth updated for known employer costs changes• Drugs: DH/NHS• High cost drugs: DH/NHS• Non-pay non-drugs• Devices: DH/NHS• Litigation Weighted by service		✓ 1%-3.4% depending on type of service. Based on residual capturing other non-demographic pressures. Covers: <ul style="list-style-type: none">• Increasing expectation & demand for healthcare services• Improving access to care• Technology• Medical practices• Changes in disease profile	

⁴² From Matt B's 30/8 email & s/s. This is the average % pa with healthy ageing.

⁴³ Uses value that minimises the least squared error of the modelled values – reduces residual from 0.6% pa to 0.5% pa. This approach makes it less sensitive to year on year fluctuations in numbers.

⁴⁴ Based on 2016 OBR paper.

⁴⁵ Based on 2016 OBR paper. Productivity assumption for economy was 2.2%, alternative health productivity assumption of 1.2% was modelled.

⁴⁶ See p139 Jul 22 OBR FSR [Fiscal risks and sustainability – CP 702 \(obr.uk\)](#)

⁴⁷ See p137 for approach in other years. [Fiscal risks and sustainability – CP 702 \(obr.uk\)](#)

Model	Demographic	Approach to income effect and price changes		Baumol effect	Other costs	Notes
		Income effect	Price changes			
NSW Tsy	✓ <ul style="list-style-type: none">• Popn growth• Demo changes• Healthy ageing – a small allowance	✓ Assume real income elasticity of 1. Public sector expenses (per capita) increase in line with income growth (per capita). Reflect healthcare driven by an income effect – community expectations rise as incomes rise & govts tend to respond with higher service levels.	✓ Inflation (CPI)		✓ 0.6%, historic residual between 1978/79 to 18/19 with greater weighting given to more recent years. ⁴⁸ <ul style="list-style-type: none">• Technology• Changes in population health profile over time• Policies & practices• Other e.g. health inflation above CPI	
Health Foundation (UK) 2021	✓ -0.3% to 2.6% depending on service ⁴⁹ <ul style="list-style-type: none">• Popn growth• Demo changes• Modelling based on 11 services		✓ Price increases <ul style="list-style-type: none">• Pay: OBR’s long term forecast for all-economy earnings (1.3% in real terms). Pay costs apply to 64% of acute care services and 73% for non-acute care services.• Drugs⁵⁰ - hospital drugs 5.9% in real terms, community drugs flat in real terms.• Non-pay non-drugs – flat in real terms.• Inflation: 2.1%, OBR long term GDP deflator forecasts• Specialised services (rare & complex conditions) – 4.6% pa real growth	(Assumes 0.8% pa productivity based on ONS long-term average non-quality adjusted productivity growth rate for public service health care in England (1998-2018))	Includes scenario analysis focused on different assumptions for pay costs, productivity, policies.	Not useful for purposes of looking at residual compared to other sources given approach taken.

⁴⁸ P13 [2021 NSW IGR - Technical Note and Sensitivity Tables](#)

⁴⁹ -0.3% represents maternity services

⁵⁰ Paper notes that historically drug prices have grown faster than inflation

Appendix 2: Productivity and efficiency related comments and sources

The following is a quick summary of different comments about productivity and efficiency, and any other related sources.

- OECD – page 12
- NHS – point 5/chapter 4
- OBR – page 28 – the sensitivity analysis section might also be good for how much the health cost curve can be bent

Other sources that might be useful to look at for efficiency/productivity

[Health productivity \(nzno.org.nz\)](http://nzno.org.nz)

[Patterns and Drivers of Health Spending Efficiency \(imf.org\)](http://imf.org)