Analytical Report: Sensitivity of Child Poverty Projections to Economic Forecasts

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Disclaimer

The results in this paper are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI) which is carefully managed by Statistics New Zealand (Stats NZ). For more information about the IDI please visit https://www.stats.govt.nz/integrated-data/. The results are based in part on tax data supplied by Inland Revenue to Stats NZ under the Tax Administration Act 1994 for statistical purposes. Any discussion of data limitations or weaknesses is in the context of using the IDI for statistical purposes and is not related to the data's ability to support Inland Revenue's core operational requirements.

Access to the survey data used in this study was provided by Stats NZ under conditions designed to give effect to the security and confidentiality provisions of the Statistics Act 1975. The results presented in this study are the work of the author, not Stats NZ or individual data suppliers.

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Introduction

A key function of the New Zealand Treasury's Tax and Welfare Analysis (TAWA) model is to estimate the effects of potential policy or economic condition changes on future rates of child poverty. However, COVID has introduced higher uncertainty when forecasting future economic conditions, such as growth in housing costs, wage growth, and benefit take-up. Also, TAWA directly uses Household Economic Survey (HES) data on household and family structures, demographics, housing costs, regions, and material hardship, but the most recent HES survey (HES2019/20) was pre-COVID. There is thus value in understanding the degree to which changes in economic conditions may break modelling assumptions.

To help illustrate these issues the analysis in this paper investigates the sensitivity of child poverty projections to different hypothetical economic forecasts and policy settings, which provides a picture of how significant heightened economic uncertainty could be when forecasting child poverty. The analysis consists of experimental estimates for isolated variations in particular macroeconomic variables and tax and welfare transfer policy settings. It is important to note that these estimates are not robust or realistic alternative forecasts of child poverty, but instead give an indication of the change in child poverty resulting from a change in an isolated model parameter.

In this analysis, the TAWA model is used to project child poverty measures from tax year 2021, which is the most recent year of Stats NZ's official measures (Statistics New Zealand [Stats NZ], 2021), up to tax year 2025[1]. The policy settings

[1] Here we refer to the tax year from 1st April 2020 to 31st March 2021 as tax year 2021, and so on.

following Budget 2021 are used as the status quo. Two of the ten official child poverty measures are modelled in this analysis, which are:[2]

1. The proportion of children living in households with incomes below 50% of the median equivalised[3] disposable household income, before accounting for housing costs (moving-line BHC50).
2. The proportion of children living in households with incomes below 50% of the median equivalised disposable household income in the base year, after accounting for housing costs (fixed-line AHC50).

Here, the moving-line approach examines a household's current income relative to the current median for all households; the fixed-line approach sets an income threshold for a particular base year[4] and keeps this threshold constant, while adjusting for inflation. Using the fixed-line approach, a household's situation improves if its income rises in real terms, irrespective of what happens to the incomes of other households (Stats NZ, 2019).

Following these projections, the paper concludes by summarising the key findings, discussing the limitations of the model and possible data improvements.

Methodology

Model and Data

The analysis in this paper uses the New Zealand Treasury's TAWA model, which is developed and maintained by the Treasury's Analytics and Insights team.

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[2] The Stats NZ official measures are defined relative to financial years, whereas TAWA models tax years.

[3] Equivalisation is a standard methodology in economics in which the household income is modified to account for the different financial needs of different household. We use modified OECD equivalence scale to be consistent with Stats NZ.

[4] We use 2018 to be consistent with Stats NZ.

TAWA is static arithmetic or non-behavioural microsimulation model, which means no allowance is made for the possible effects of tax and transfer changes on a modelled individual's consumption plan or labour supply (Creedy et al., 2002). It applies potential changes to tax and transfer settings to individual unit records and then aggregates the results so that they are representative of the New Zealand population. Projections for different tax years use various economic forecasts from the Treasury, social welfare transfer rates from the Ministry of Social Development (MSD) and demographic data from Stats NZ. TAWA is typically used to project up to five years into the future.

A processed dataset is used as an input to the TAWA model. It contains household and family structures, demographics, housing costs, regions, and material hardship from the HES, which is then linked with individual wage, salary or self-employment income, and core beneficiary status (i.e., whether the respondent receives Job Seeker Support (JSS), Supported Living Payment (SLP), or Sole Parent Support (SPS)) from the Integrated Data Infrastructure (IDI).

The IDI[5] is a large research database managed by Stats NZ, which contains survey and administrative data about people and households. These data come from government agencies and non-government organisations. For example, income and tax records from Inland Revenue; social benefit records from MSD; and Statistics New Zealand surveys, for example, the HES. Identifying information is removed from each individual and replaced with a unique identifier. This identifier is used to link the various IDI datasets to provide a comprehensive set of information that relates to the individual.

[5] Detailed information can be found at https://www.stats.govt.nz/integrated-data/integrated-data-infrastructure/.

In the TAWA input data, approximately 95% of the adult HES survey respondents are linked to the administrative data in the IDI. For the remaining records, we use HES survey responses.

Scenarios

In this analysis, the Budget 2021 policy settings are used as the status quo. Eight hypothetical scenarios were analysed, including modifications to the number of core benefit recipients, isolated adjustments to forecasted rent and wage growth, increases or decreases in core benefits and Working for Family rates, and changes to income tax settings. The eight scenarios can be generally divided into two groups, changes to macroeconomic variables and changes to tax and transfer policy settings. The details of all scenarios are:

- Status quo**:** the government Budget 2021 settings which will be implemented on 1 July 2021 and 1 April 2022.

Macroeconomic variables

- Adjust the number of JSS recipients: increase or decrease the forecasted number of JSS benefit recipients in each future year by 15% or 30%.
- Adjust the number of SPS recipients: increase or decrease the forecasted number of SPS benefit recipients in each future year by 15% or 30%.
- Adjust wage growth: increase or decrease the forecasted rate of wage growth in each future year by 15% or 30% (e.g., a 15% increase in wage growth is ($wage\ growth$) ×1.15) and account for the flow through to core benefit rates.[6] We

[6] The Government announced changes to the annual adjustment of main benefits in Budget 2019, indexing main benefit increases to the average wage, rather than the Consumer Price Index (CPI).

retain the standard TAWA modelling assumption that inflates rent at the same rate as wage growth.

- Adjust rent growth: increase or decrease the forecasted rate of rent growth in each future year by 15%, 30%, or 45%. In the default TAWA approach, rent is inflated at the same rate as wage growth, this link was separated in this scenario.

Tax and welfare transfer policy settings

- JSS, SPS and SLP benefit payment rates: increase or decrease JSS, SLP, and SPS rates by $25 per adult per week. This is a flat $25 change to all core benefit rates. Youth rates which were unchanged.
- Family Tax Credit (FTC) payments: increase or decrease the FTC rate by $25 per week. This is a flat $25 change to the first child rate.
- In Work Tax Credit (IWTC) payments: increase or decrease the IWTC rate by $25 per week. This is a flat $25 change to the first child rate.
- Income tax setting changes: change the lower tax threshold to be equivalent to a $25 per week increase or decrease in disposable income, and include flow through to superannuation rates.[7] In the $25 per week increase, a tax-free zone has been introduced on taxable income between $0 and $12,381. In the $25 per week decrease, a tax rate of 18.167% on taxable income up to $48,000 has been introduced.

Modelling Assumptions

[7] As New Zealand superannuation rates are calculated based on the average ordinary time wage after tax of the year, changes in earned income tax thresholds will have flow on impacts on superannuation rates.

The TAWA model is a simplified version of an individual, family or household's economic reality for a tax year, therefore all calculations in this paper should be considered as estimates. In particular, the most recent HES survey was pre-COVID and so respondents' current economic conditions may be significantly different to what they have experienced in the survey year. This analysis also does not account for any microeconomic behavioural responses which may result from these scenario changes, nor any macroeconomic feedback effects.

TAWA currently applies various take-up rates to different transfers. For example, we assume full take-up for Working for Families payments, use actual receipt from administrative data to determine the take-up of core benefits, and estimate Accommodation Supplement take-up based on probabilities derived by comparing aggregate TAWA estimates with aggregate MSD estimates. We are currently developing methods that make more used of unit record data in the IDI, which will ultimately result in a more consistent and comprehensive treatment across all transfers. The first stage of this development has been focused on Accommodation Supplement (Davis & Symes, 2021).

Statistics on household income and income inequality typically require comparing the relative positions of households and people on the income distribution. To do this, differences in household size and composition need to be accounted for (Office for National Statistics UK, 2020). Equivalisation scales are designed to account for this. We used the modified OECD equivalisation scale to calculate equivalised household disposable incomes in the model which is consistent with the approach of Stats NZ in their official child poverty series. This scale assigns a value of 1 to the household head, of 0.5 to each additional member age greater than or equal to 14

(GTE14) and of 0.3 to each child age younger than 14 (LT14) (Haagenars et al., 1994). The detailed formula is:

$$Modified\ OECD\ equivalence\ scale = 1\ +\ 0.5\ \times (GTE14\ -\ 1)\ +\ 0.3\ \times\ (LT14)$$

All child poverty modelling estimates in this paper have been aligned to agree with the official Stats NZ figures in the financial year 2019/2020, using a proportional adjustment method that is:

$$Aligned\ TAWA\ estimates = TAWA\ estimates \times (\frac{StatsNZ\ 2020\ measure}{TAWA\ 2020\ estimates})$$

All estimates use 95% confidence intervals, where the margin of error (MoE) is calculated as 1.96 multiplied by the standard error of the estimate:

$$MoE = 1.96\ \times Standard\ error$$

The 95% confidence interval (CI) is then calculated as the estimate plus or minus the margin of error (MoE). This means:

$$CI\ =\ estimate\ \pm\ MoE$$

Results

The modelling results are shown as plots in this section, in each plot a vertical dotted line separates the official child poverty estimates[8] (left-hand side) from the projections of the TAWA model (right-hand side). A ribbon around each line plot indicates the estimated margin of error.

Macroeconomic variables

Adjusting the number of JSS and SPS recipients

Intuitively, increasing(decreasing) the number of benefit recipients might be expected to produce an increase(decrease) in the percentage of children in poverty.

[8] For details see https://www.stats.govt.nz/news/latest-release-of-child-poverty-statistics.

Indeed, this is what is observed in Figure 1A and Figure 1B for changes to both JSS and SPS populations in the case of the fixed-line AHC measure. Moreover, the effects of varying the SPS population are more significant than those of varying JSS population, because SPS is specifically only available to sole-parent families with children, whereas JSS is also available to families without children. A similar pattern is observed for the effects of varying the SPS population under the moving-line BHC50 measure.

However, changes to the number of JSS recipients can have counterintuitive impacts on the moving-line BHC50 estimates. A decrease in the forecasted number of JSS recipients will increase the percentage of children in BHC50 poverty. This is because TAWA upweights (downweights) the entire working population, which includes families with and without children, when the forecast number of JSS recipients decreases (increases). Therefore, fewer JSS recipients implies increases to the working population, which in turn increases the moving-line BHC median and the poverty threshold. For example, in the case of a 15% reduction in JSS recipients, the equivalised moving-line BHC median increases from $44,100 to $44,700 in tax year 22 (Appendix A, Table A2). This means that the moving-line BHC50 poverty threshold increases from $22,050 to $22,350. The upweighting (downweighting) also occurs when we change the forecast SPS population. However, as previously mentioned, SPS is specifically offered to sole-parent families with children, so the impact on the median is not as significant as in the JSS scenario.

Figure 1A:

Child poverty estimates resulting from isolated increases or decreases to the forecast number of JSS recipients.

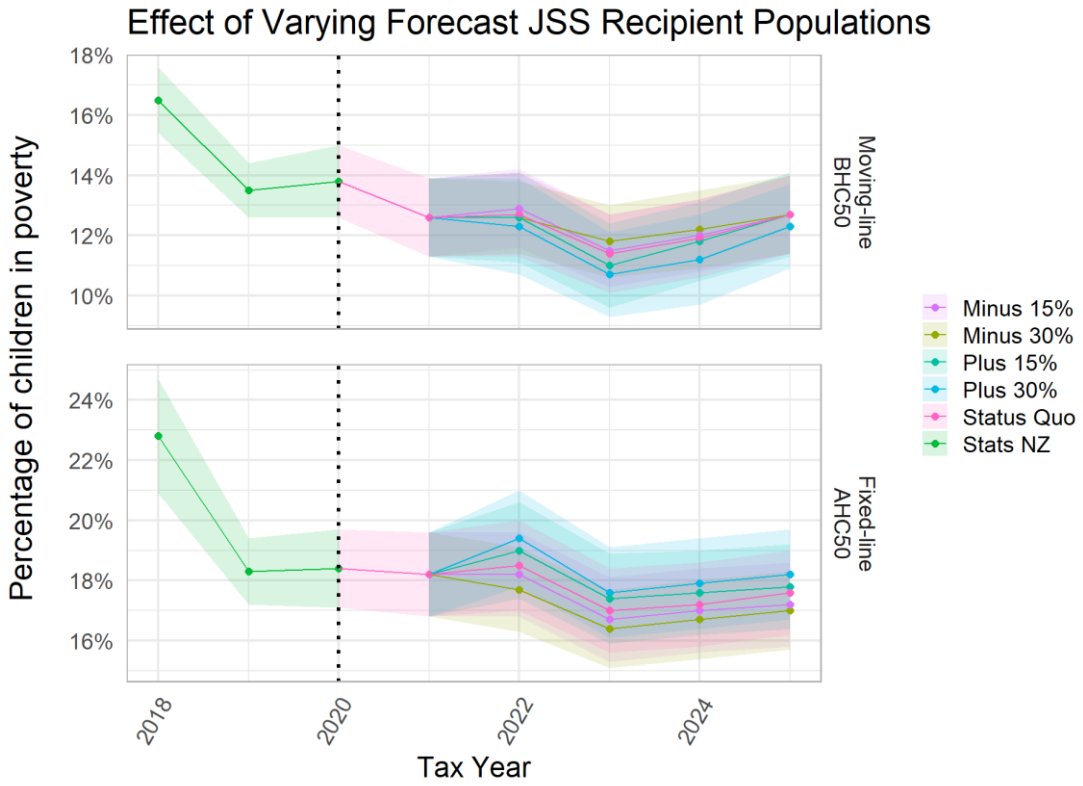
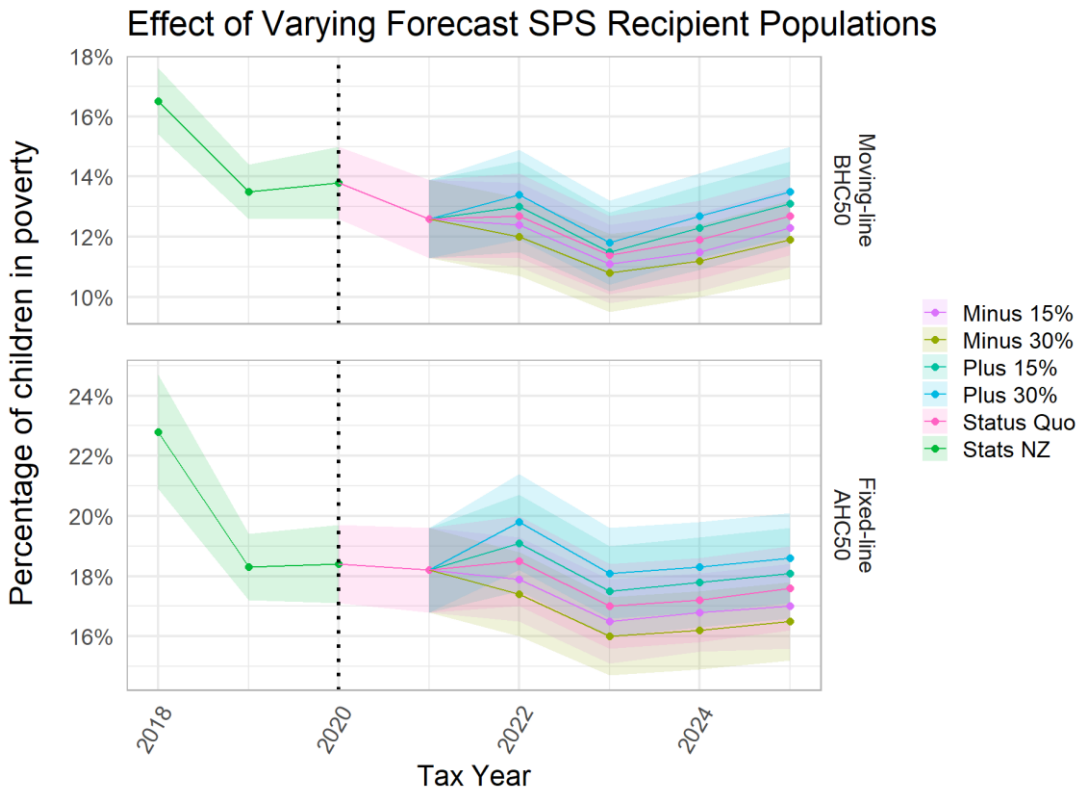


Figure 1B:

Child poverty estimates resulting from isolated increases or decreases to the forecast number of SPS recipients.



Adjusting Wage Growth

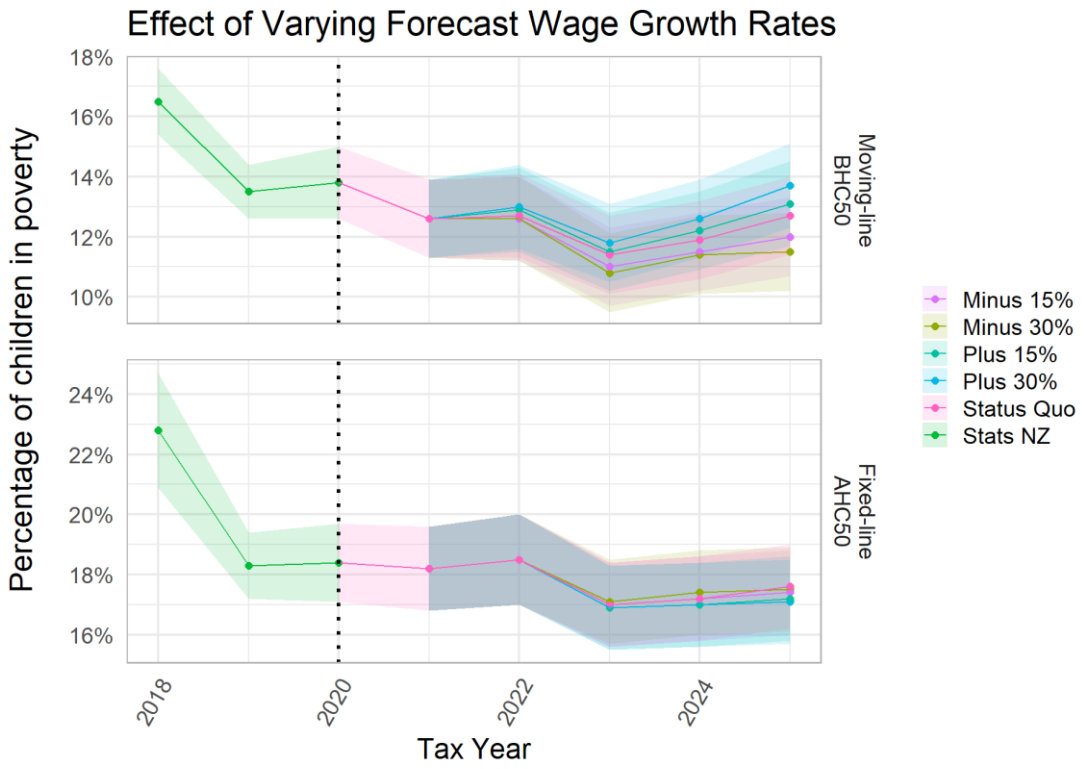
Figure 2 shows the sensitivity of child poverty projections to isolated increases or decreases in the wage growth rates. In TAWA, the wage growth rates are applied uniformly to all observed wages of individuals in the TAWA input data, which means the entire income distribution would either shift to the right or left.

TAWA modelling suggests that increasing wage growth will increase the percentage of children in moving-line BHC50 poverty. When wage growth rates increase, the equivalised moving-line BHC median increases. For example, it increases from $44,100 to $44,200 in tax year 22 when we model a 15% increase in expected wage growth, as shown in Appendix A, Table A4. This increases the moving-line BHC50 poverty threshold, and with a higher poverty threshold, more households fall into poverty.

However, TAWA modelling suggests that there are only small impacts on the fixed-line AHC50 measure due to changes in wage growth. There are two reasons for this. First, TAWA uses the same inflator for wages and rent in this analysis. As a result, when wage growth increases, rent increases as well, and the positive and negative impacts on child poverty offset each other. Second, AHC50 uses a fixed-line threshold, which means that the threshold does not change with median incomes.

Figure 2:

Child poverty estimates resulting from isolated increases or decreases to forecast wage growth rates



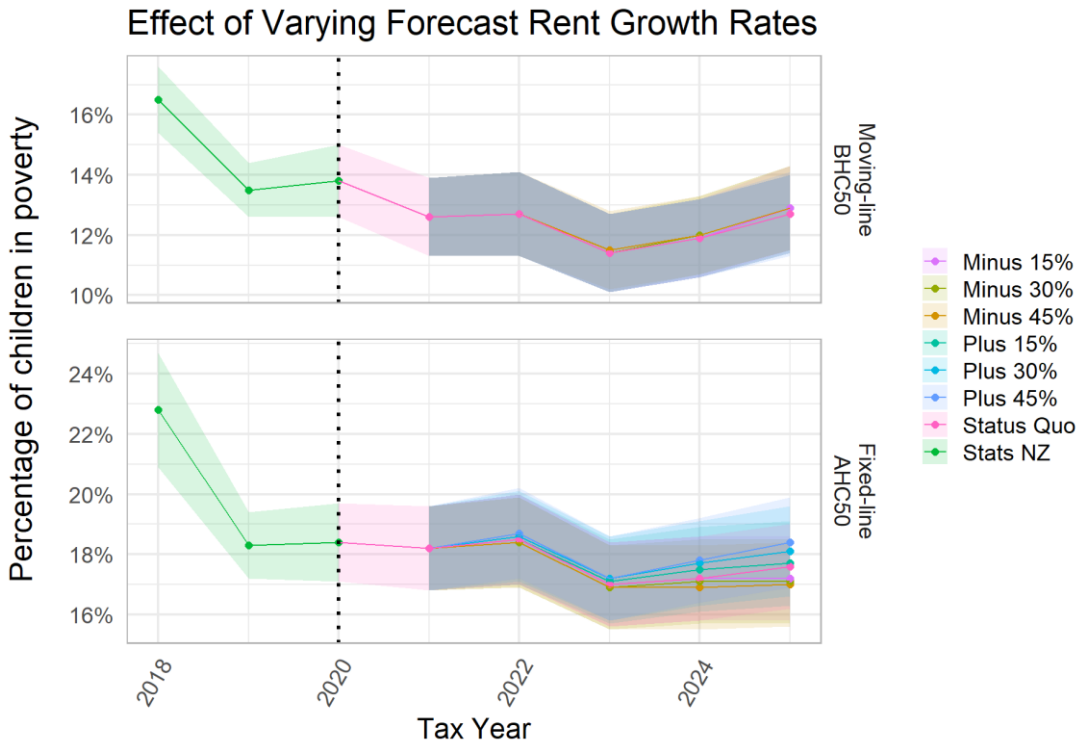
Adjusting Rent Inflation

The estimates of the impact of isolated changes to rent growth are shown in Figure 3. For moving-line BHC50, there is almost no impact on child poverty, which is

expected as this is a before housing cost child poverty measure[9]. For fixed-line AHC50, there is no significant impact on the child poverty projections for the first three tax years (tax year 2021 to 2023). However, in the longer-term (tax year 2023 onwards), this change in growth rate leads to impacts that become larger as time goes on, with lower proportional rent growth leading to a lower percentage of child poverty.

Figure 3:

Child poverty estimates resulting from isolated increases or decreases to forecast rent growth rates



Tax and welfare transfer policy settings

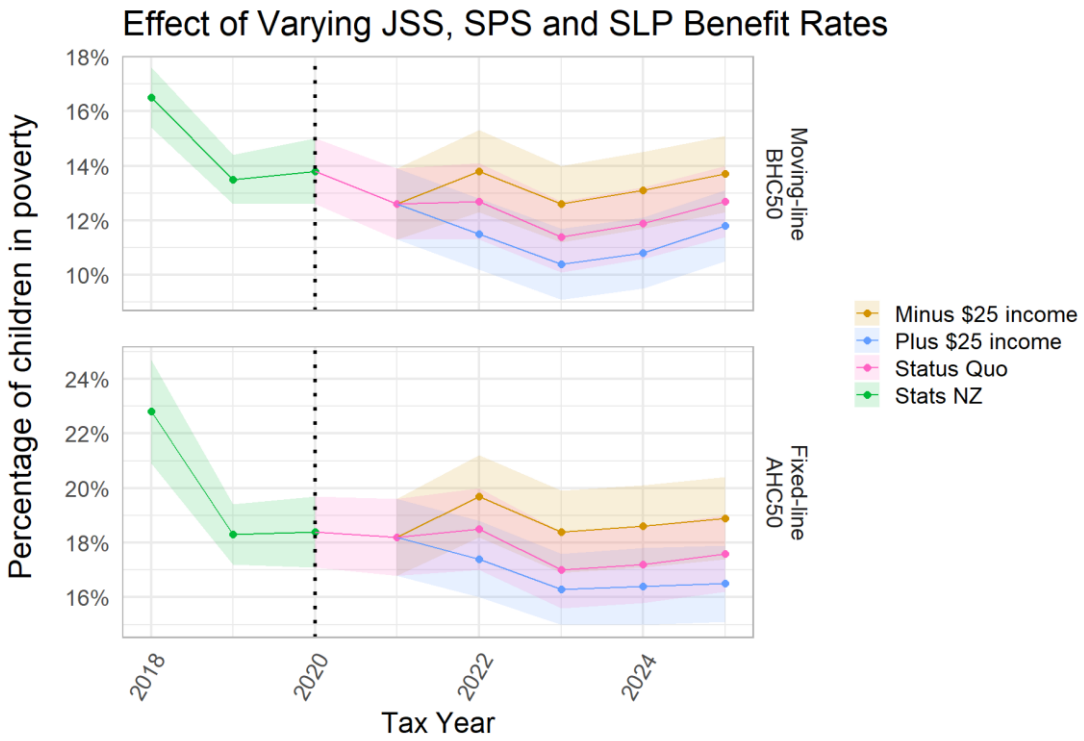
JSS, SPS, SLP Benefit Payment Rates

[9] Small effects are due to AS payment increases (decreases) when rent increases (decreases).

Considering changes to tax and welfare transfer policy settings, Figure 4 shows the impact on child poverty of increasing or decreasing core benefit rates. As expected, giving more money to beneficiaries will decrease the percentage of children in poverty in both moving-line BHC50 and fixed-line AHC50 measures, and vice versa.

Figure 4:

Child poverty estimates resulting from scenarios that increase or decrease of core benefit rates



FTC and IWTC Payments

Figure 5A and Figure 5B show the impact on child poverty when increasing or decreasing FTC and IWTC payments. As with core benefit changes, increasing these payments will decrease child poverty, and vice versa.

For the changes to the FTC rate, the impact on child poverty is significant for both the moving-line BHC50 and fixed-line AHC50 measures. In fact, the impacts here are almost as large as those seen for the changes to core benefit rates. The impacts of IWTC rate changes on child poverty are less significant when compared to core benefit and FTC changes.

This is because beneficiary families with children are eligible for FTC, so there are many households receiving FTC that are around the poverty threshold. Changing the payment moves these families above or below the poverty line. IWTC is only available to families that meet a work hours test. As a result, IWTC recipient households tend to have higher incomes than those who only receive FTC. There are fewer children in such households that are near the two poverty thresholds, as can be seen in Figure 6A and Figure 6B.

Figure 5A:

Child poverty estimates resulting from scenarios that increase or decrease FTC rates

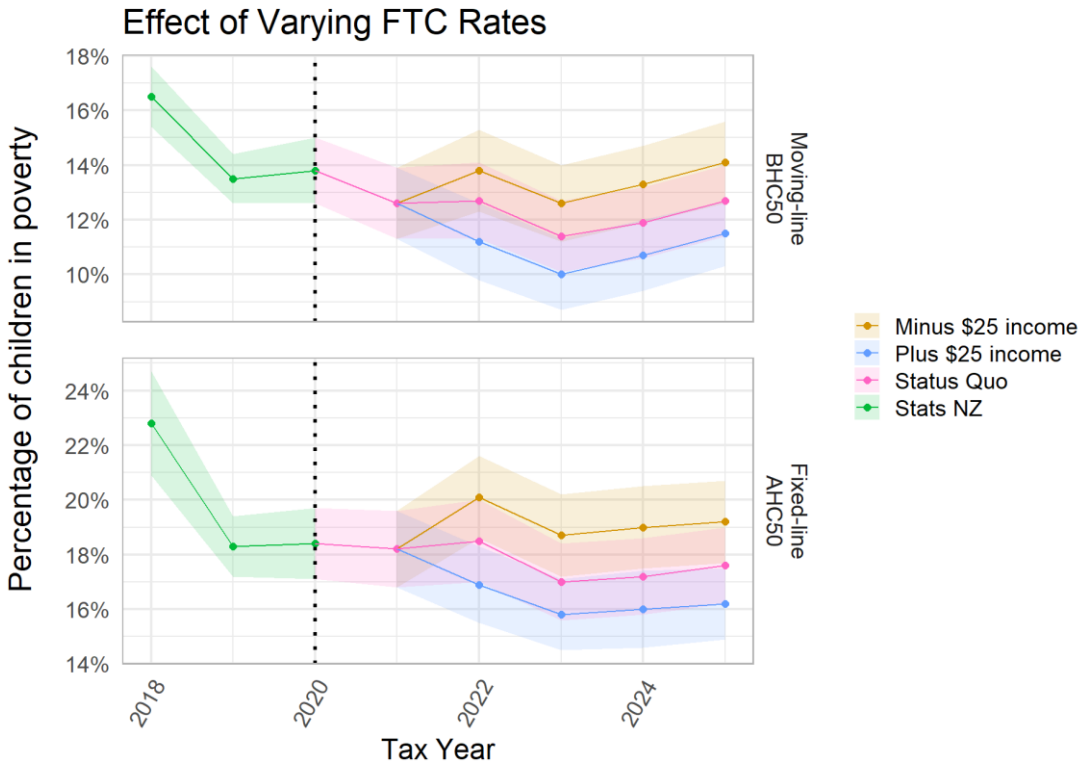


Figure 5B:

Child poverty estimates resulting from scenarios that increase or decrease IWTC rates

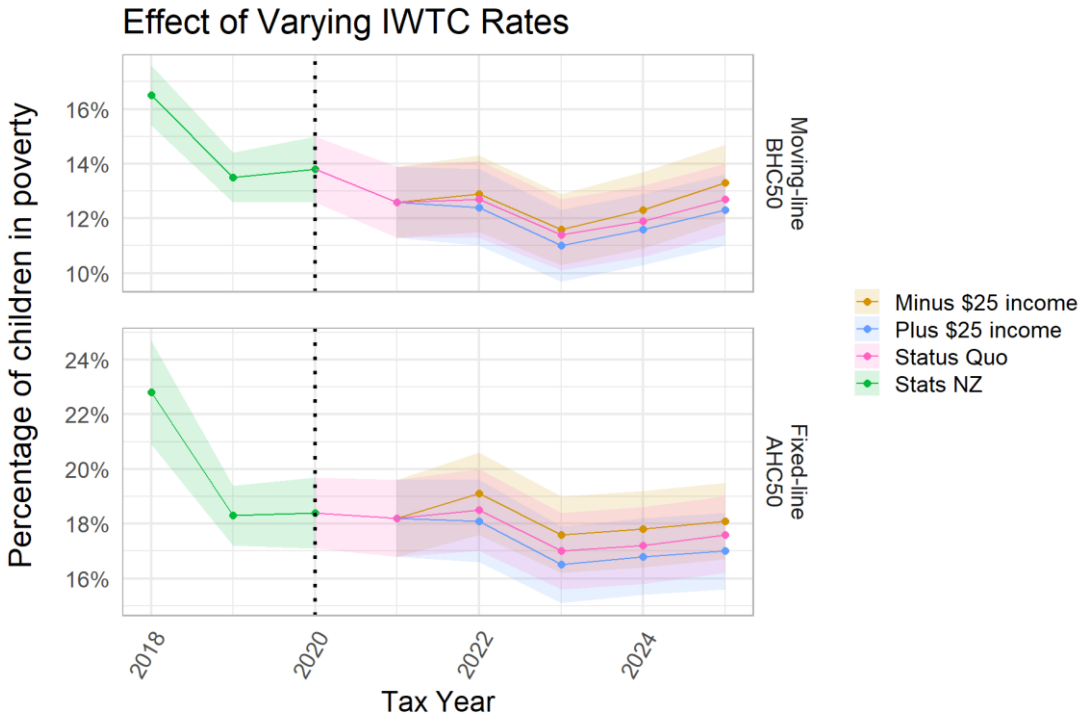


Figure 6A:

Distribution of children in FTC recipient households in tax year 2022, status quo policy settings.[10]

[10] The "S" in the plot stands for suppression under Stats NZ confidentiality rules

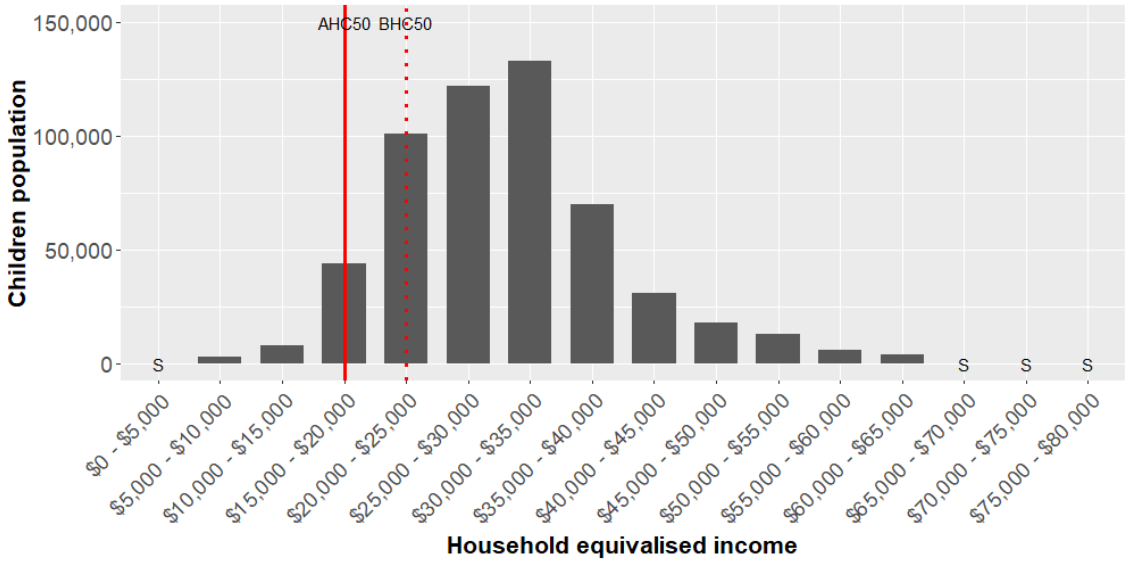
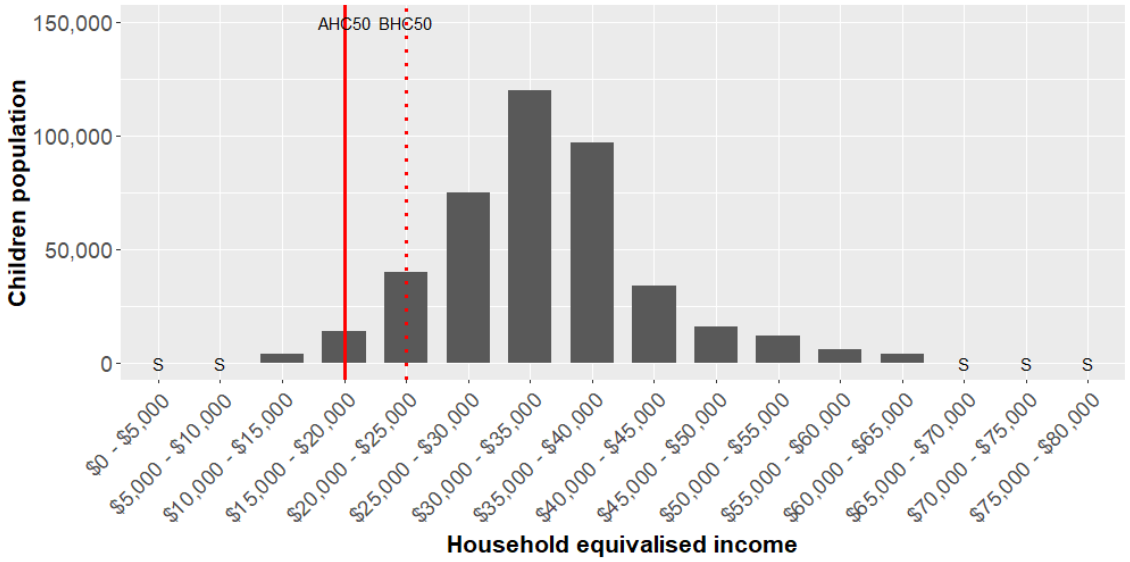


Figure 6B:

Distribution of children in IWTC recipient households in tax year 2022, status quo policy settings[11]



Income tax setting changes

Figure 7 shows the impact on child poverty of modifying the personal income tax settings such that disposable incomes increase (decrease) by $25 per week.

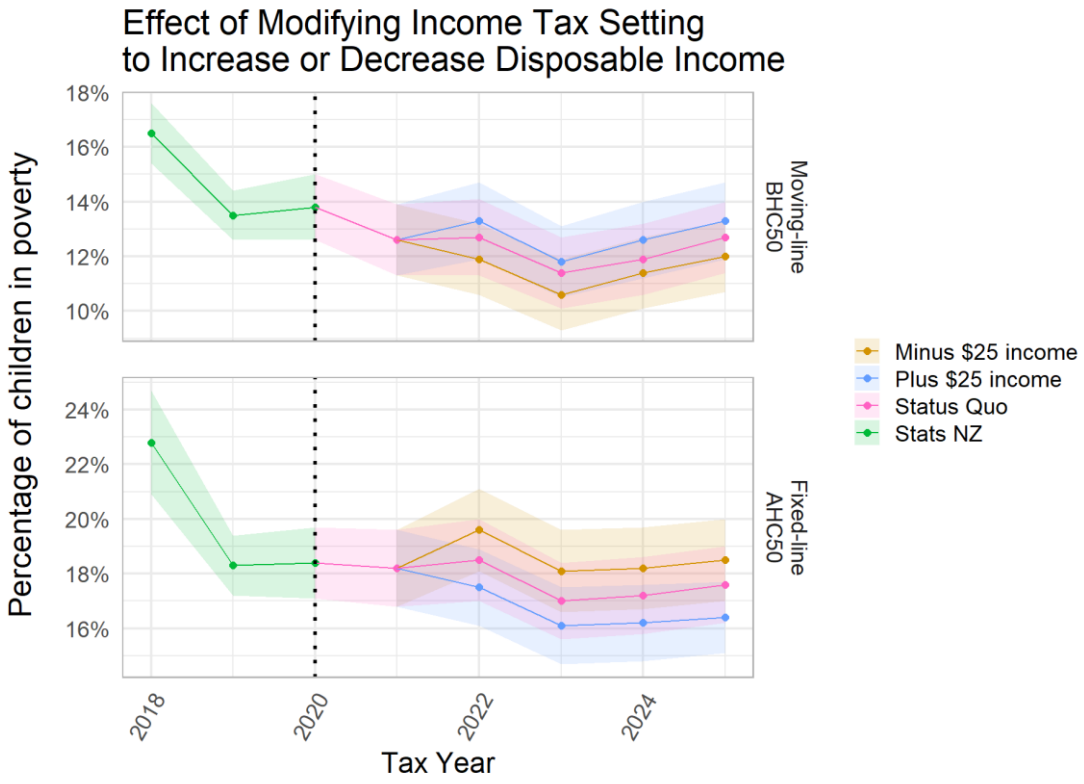
[11] The "S" in the plot stands for suppression under Stats NZ confidentiality rules

Specifically, to increase disposable income by $25 per week, a tax-free zone has been introduced on taxable income between $0 and $12,381. In the $25 per week decrease in disposable income, a tax rate of 18.167% on taxable income up to $48,000 has been introduced.

In the case of fixed-line AHC50 poverty, an increase (decrease) in disposable income due to these tax changes lead to a decrease (increase) in child poverty, as expected. This behaviour is reversed for the moving-line BHC50 measure. This is due to the increase in disposable income raising the median, as these tax changes apply to every individual who has income in the TAWA input data. Therefore, increasing everyone's income will increase the moving-line BHC50 poverty threshold. A $25 weekly disposable income increase through personal tax changes lifts the equivalised moving-line BHC median from $44,100 to $45,400 in tax year 22, as shown in Appendix A, Table A9. This means that the moving-line BHC50 poverty threshold increases from $22,050 to $22,700.

Figure 7:

Child poverty estimates resulting from changes to income tax that increase or decrease disposable income



Discussion and Summary

This paper presents an experimental investigation into the sensitivity of the TAWA-derived child poverty projections to isolated variations in particular macroeconomic variables and tax and welfare transfer policy settings.

Although many of the results are intuitive, some modelled changes could be seen as having a counterintuitive effect, in particular: decreasing the number of Job Seeker Support (JSS) recipients, increasing wage inflation, and a tax cut all increase moving-line BHC50 child poverty, even though they decrease fixed-line AHC50 child poverty. This is because they increase the median household income, which increases the BHC50 poverty threshold. Appendix A shows the differences in median equivalised

before housing cost (BHC) incomes among all scenarios. This highlights the importance of understanding the strengths and weaknesses of different poverty measures (Stephens & Eglinton, 2021) and the need for modellers to be transparent about the assumptions that drive results

There are several limitations to this analysis, as mentioned earlier. TAWA currently does not consider any behaviour changes that arise from changes in policy settings or any macroeconomic feedback effects, which increases the uncertainty of the modelling results. The static nature of the analysis is an important caveat (Eglinton, Chang & Nolan, 2021). Also, in the analysis of alternative forecasts of wage growth, a modelling assumption was used that linked rent and wage inflators, which made the "true" impact of child poverty due to wage growth hard to detect.

Furthermore, this modelling was undertaken using data collected prior to the impact of COVID on the economy and households. The Analytics and Insights team is currently working on switching the survey input to other sources, such as the Household Labour Forces Survey (HLFS), which will provide more up-to-date data on household/family structures, demographics and employment (Wright, 2021; Templeton, 2021).

Appendix A

Table A.1:

Equivalised BHC median household incomes in the status quo (Budget 21)

	Tax year 2022	Tax year 2023	Tax year 2024	Tax year 2025
Status Quo	$44,100	$45,300	$46,600	$48,300

Table A.2:

Equivalised BHC median household incomes under changes to JSS recipient populations

	Tax year 2022	Tax year 2023	Tax year 2024	Tax year 2025
Increase 15%	$43,800	$45,100	$46,400	$48,200
Increase 30%	$43,300	$44,600	$45,900	$47,700
Decrease 15%	$44,700	$45,900	$47,200	$48,800
Decrease 30%	$45,100	$46,300	$47,600	$49,100

Table A.3:

Equivalised BHC median household incomes under changes to SPS recipient populations

	Tax year 2022	Tax year 2023	Tax year 2024	Tax year 2025
Increase 15%	$44,200	$45,400	$46,700	$48,400
Increase 30%	$44,100	$45,300	$46,600	$48,300
Decrease 15%	$44,400	$45,600	$46,900	$48,600
Decrease 30%	$44,500	$45,700	$47,000	$48,700

Table A.4:

Equivalised BHC median household incomes under changes to wage growth rates

	Tax year 2022	Tax year 2023	Tax year 2024	Tax year 2025
Increase 15%	$44,200	$45,600	$47,000	$49,000
Increase 30%	$44,300	$45,800	$47,400	$49,500
Decrease 15%	$44,000	$45,100	$46,300	$47,800
Decrease 30%	$43,900	$44,900	$45,900	$47,300

Table A.5:

Equivalised BHC median household incomes under changes to rent growth rates

	Tax year 2022	Tax year 2023	Tax year 2024	Tax year 2025
Increase 15%	$44,100	$45,300	$46,600	$48,400
Increase 30%	$44,100	$45,300	$46,700	$48,400
Increase 45%	$44,100	$45,300	$46,700	$48,400
Decrease 15%	$44,100	$45,300	$46,600	$48,300
Decrease 30%	$44,100	$45,300	$46,600	$48,300
Decrease 45%	$44,100	$45,300	$46,600	$48,300

Table A.6:

Equivalised BHC median household incomes under changes to core benefit rates

	Tax year 2022	Tax year 2023	Tax year 2024	Tax year 2025
Increase $25	$44,200	$45,400	$46,700	$48,400
Decrease $25	$44,000	$45,200	$46,500	$48,200

Table A.7:

Equivalised BHC median household incomes under changes to FTC rates

	Tax year 2022	Tax year 2023	Tax year 2024	Tax year 2025

Increase $25	$44,200	$45,400	$46,700	$48,400
Decrease $25	$44,000	$45,200	$46,500	$48,300

Table A.8:

Equivalised BHC median household incomes under changes to IWTC rates

	Tax year 2022	**Tax year 2023**	**Tax year 2024**	**Tax year 2025**
Increase $25	$44,200	$45,400	$46,700	$48,400
Decrease $25	$44,000	$45,200	$46,500	$48,300

Table A.9:

Equivalised BHC median household incomes under changes to income tax settings

	Tax year 2022	**Tax year 2023**	**Tax year 2024**	**Tax year 2025**
Increase $25	$45,400	$46,500	$47,800	$49,600
Decrease $25	$42,900	$44,100	$45,400	$47,100

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