

# IPPR tax-benefit microsimulation results and policy analysis

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## Introduction and key findings

This report presents the results of the IPPR tax-benefit microsimulation model for income, inequality, and poverty in the 2022-23 financial year. We discuss the differences in results for two datasets created by modifying Family Resources Survey (FRS) 2019-20 data: one representing employment trends in 2019-20, before the pandemic, and one representing post-pandemic employment. Finally, we use these datasets to analyse the effects of several policies, including the effect of a £25 per week, per child Scottish Child Payment and changes to income and council tax rates.

### Key findings

- ▶ Incomes overall have risen since just before the Covid-19 pandemic, particularly for households at the lowest end of the income distribution. The increase is driven by higher earned income for most types of households.
- ▶ As in our labour market analysis, single working-age males (16-64) are the only group with lower earned income post-pandemic, caused by reduced employment rates.
- ▶ Poverty rates have fallen very slightly for most groups, particularly children (by 0.6pp), but the changes disappear when figures are rounded to the nearest percent. The largest decreases by household type are a 1pp decrease in the poverty of single working-age female households, consistent with their increased employment. Single working-age males and mixed pensioner and working-age adult households see a slight rise in poverty.
- ▶ Higher earned incomes bring some households out of relative poverty, but these households remain close to the poverty line. Even small changes in tax policy may have noticeable effects on relative poverty rates, particularly if tax rate changes elicit a behavioural response.

## Baseline IPPR results

The first dataset is a reweighted version of the FRS 2019-20 data that reflects population estimates for the first quarter of 2022, but leaves employment data unchanged. This dataset is referred to as "original" in tables throughout the report. The second dataset is reweighted to reflect changes both in population and in employment rates for individuals 16-64 between 2019-20 and the first quarter of 2022. This dataset is referred to as "updated" for simplicity.

Comparing results of the IPPR model for these two datasets allows us to estimate differences in income, inequality, and poverty arising from 2022Q1 employment versus what they would have been if pre-pandemic employment rates had persisted. A technical note on the reweighting methodology is included as an appendix to this report.

## Changes in taxes, benefits, and household income

First, we consider the overall changes across Scotland in fiscal costings, income, and poverty. Overall tax receipts rise and benefits fall, so that the difference between taxes and benefits is about 9.5 billion after the pandemic vs. a predicted 9 billion if pre-pandemic levels of employment had persisted to early 2022 (Table 1).

Table 1: Difference in predicted costings

Category	Original (£mil)	Updated (£mil)
Taxes - benefits	9,027.94	9,514.82
Total benefits	22,548.46	22,377.48
Total taxes	31,576.41	31,892.29

Source: Author calculations from FRS 2019-20 (DWP 2021) and IPPR model v.02\_44 (Kumar 2022)

These changes in tax receipts and benefits payments are a direct result of changes to income. On average, income rises, resulting in greater tax receipts and a lower total benefits bill. However, increases in income are not equal across the income distribution (Table 2). Those at the lowest end of the income distribution have the largest changes in income, with these increases generally getting smaller as income rises. For example, households in the lowest decile (the lowest-earning 10% of households) have equalised disposable income that is 4.7% higher based on post-pandemic employment than if employment trends from 2019-20 had persisted, while that of households in the top decile is only about 0.5% higher.

Table 2: Difference in predicted disposable income by decile

Decile	Original (£)	Updated (£)	% change
1	124.43	130.28	4.7
2	305.16	309.08	1.3
3	379.70	381.46	0.5
4	442.95	446.25	0.7
5	506.69	509.51	0.6
6	571.13	574.36	0.6
7	646.38	649.74	0.5
8	740.54	743.65	0.4
9	876.65	879.39	0.3
10	1,432.88	1,439.85	0.5

Source: Author calculations from FRS 2019-20 (DWP 2021) and IPPR model v.02\_44 (Kumar 2022)

Notes: Equivalised disposable income is measured after housing costs.

These differences in income vary between types of households. We define six types of households based on gender and the mix of adults of different ages in each household. These six types and their abbreviations are explained in Table 3.

Table 3: Household type definitions

Household type	Types of adults in household
Pensioner	Only adults over 65
Mixed (WA>50)	At least one adult over 65 and at least one adult 50-65; could also have an adult under 50
Mixed (WA<50)	At least one adult over 65 and at least one adult under 50; no adults 50-65
Single WA female	Only one working-age female (16-65)
Single WA male	Only one working-age male (16-65)
Multiple WA	Multiple working-age adults (16-65); no adults over 65

Figure 1 shows changes in earned and disposable income by household type. Since pensioner-only households do not have any members aged 16-64, their incomes are not weighted differently between the two datasets, and there is no difference in income between the two datasets for this group. Mixed pensioner and working-age adult households see small increases in earned income based on 2022Q1 employment rates, particularly in households with working-age adults under 50. Households with multiple working-age adults have about 1% higher earned and disposable income based on 2022 employment rates. Single working-age adult households have the largest differences in income, with single working-age females earning about 4% more and single working-age males 1.2% less based on employment rates in 2022. These findings are consistent with higher women's employment in 2022 compared to 2019-20 and lower men's employment, particularly among less-educated men.

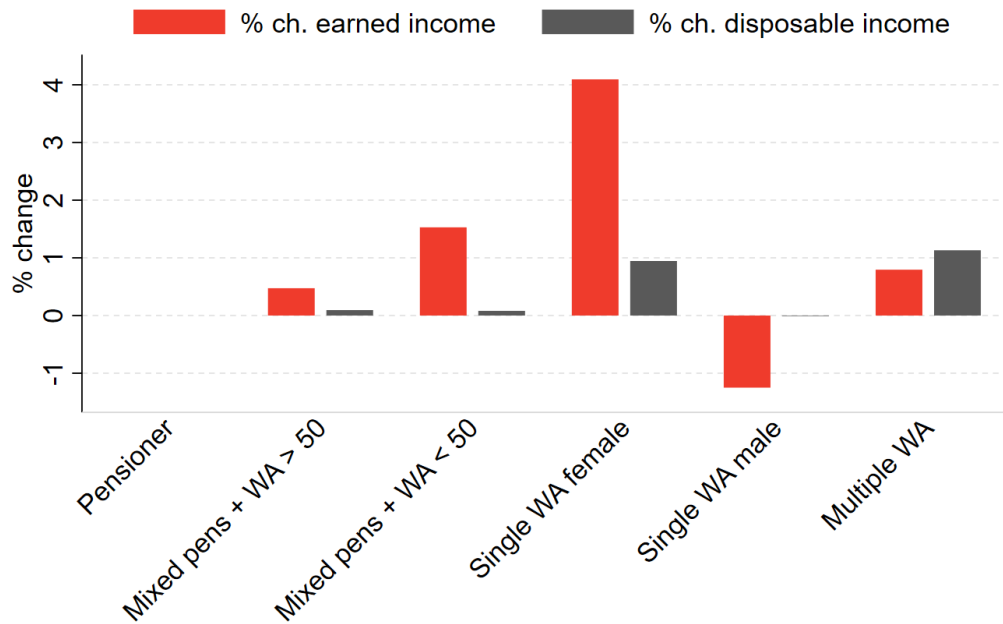


Figure 1: Changes in income by household type

Source: Author calculations from FRS 2019-20 (DWP 2021) and IPPR model v.02\_44 (Kumar 2022)

Notes: Disposable income is measured after housing costs.

Two sources of changes in total and disposable income are changes in taxes paid and benefits received. As with income, pensioners have no change in taxes and benefits (Figure 2). All other groups except single working-age males pay more in taxes and receive less in benefits, consistent with higher income for these households.

Although single working-age males have a relatively large average change in benefits received, this is partially because the average benefits received were relatively low to begin with. In the dataset based on 2019-20 employment rates, single working-age men received £91 in benefits on average, compared to about £96 in the dataset based on 2022 employment rates. This is only about a quarter of the average benefits received by mixed pensioner and younger working-age adult households, the group with the highest average benefits. The average benefits received by single working-age men is just over half of the average benefits paid to single working-age women in both datasets, possibly due to differences in employment patterns and the presence of children in a greater number of single working-age women's households.

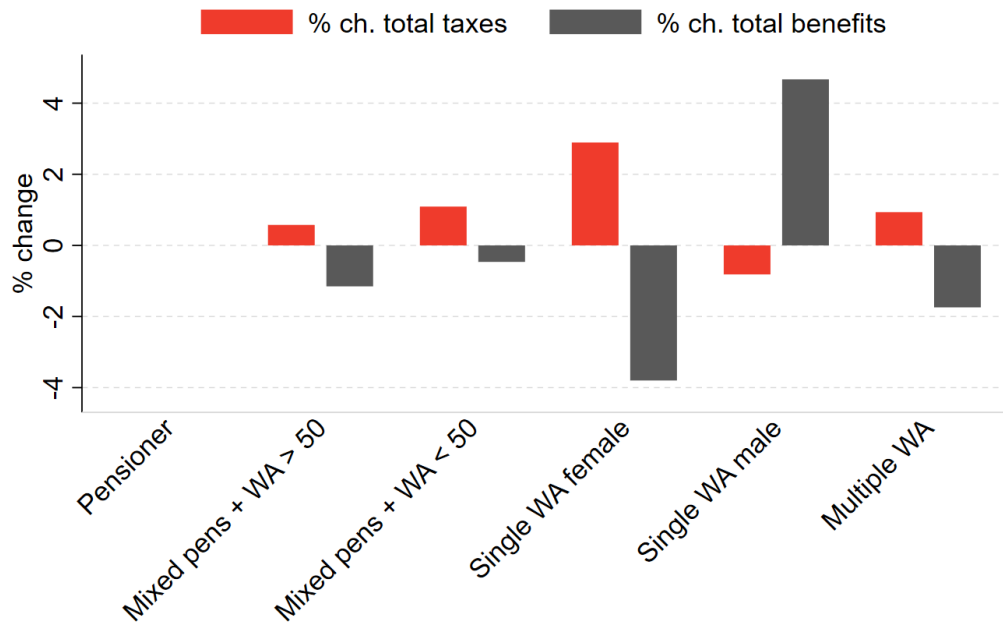


Figure 2: Changes in taxes and benefits by household type

Source: Author calculations from FRS 2019-20 (DWP 2021) and IPPR model v.02\_44 (Kumar 2022)

Notes: The IPPR model calculates benefits take-up by estimating a propensity to receive the benefit among qualifying benefit units.

## Changes in inequality and poverty

The IPPR model also gives estimated measures of inequality and poverty. Like income, we look both at overall changes in these measures and at changes by household type.

Overall measures of inequality have mixed differences between the two datasets (Table 4). The 75:25 and 75:50 income ratios rise by 0.01, but the 90:10 and 90:50 ratios both fall by 0.01. Overall inequality as measured by the Gini coefficient falls very slightly from 0.322 to 0.318.

Table 4: Difference in measures of inequality

Measure	Original	Updated
50:10 Ratio	2.02	2.02
50:25 Ratio	1.44	1.43
75:25 Ratio	1.97	1.95
75:50 Ratio	1.36	1.36
90:10 Ratio	3.51	3.53
90:50 Ratio	1.74	1.75
Gini coefficient	0.256	0.252

Source: Author calculations from FRS 2019-20 (DWP 2021) and IPPR model v.02\_44 (Kumar 2022)

Notes: All disposable income percentiles are calculated after housing costs.

There are also minimal differences in relative poverty rates between the two datasets. The poverty line is calculated as 60% of the median disposable income for the entirety of the UK.

The poverty line changes from £315.73 per week based on 2019-20 employment to £314.97 based on 2022 employment. When rounded to the nearest percentage point, the poverty rate does not change between the two datasets for any group, although there are minor decreases across the board consistent with small increases in average incomes (Table 5).

Table 5: Difference in predicted relative poverty rates

Group	Original (%)	Updated (%)
Adults	17.4	17.2
Children	25.4	24.8
Households	19.2	19.0
Pensioners	11.0	11.0
People	18.9	18.6
Working age adults	19.3	19.0

Source: Author calculations from FRS 2019-20 (DWP 2021) and IPPR model v.02\_44 (Kumar 2022)

Notes: Based on a poverty line equivalent to 60% of UK median income as calculated by IPPR model.

Relative poverty rate differences by type of household mirror differences in income (Figure 3). Relative poverty among single working-age women falls by over 1 percentage point (pp) based on 2022 employment as compared to 2019-20 due to their higher rates of employment. Households with multiple working-age adults see a smaller 0.5pp decrease in relative poverty. Contrary to results for income, mixed pensioner and working-age adult households see slightly higher relative poverty rates (by 0.1 to 0.2pp).

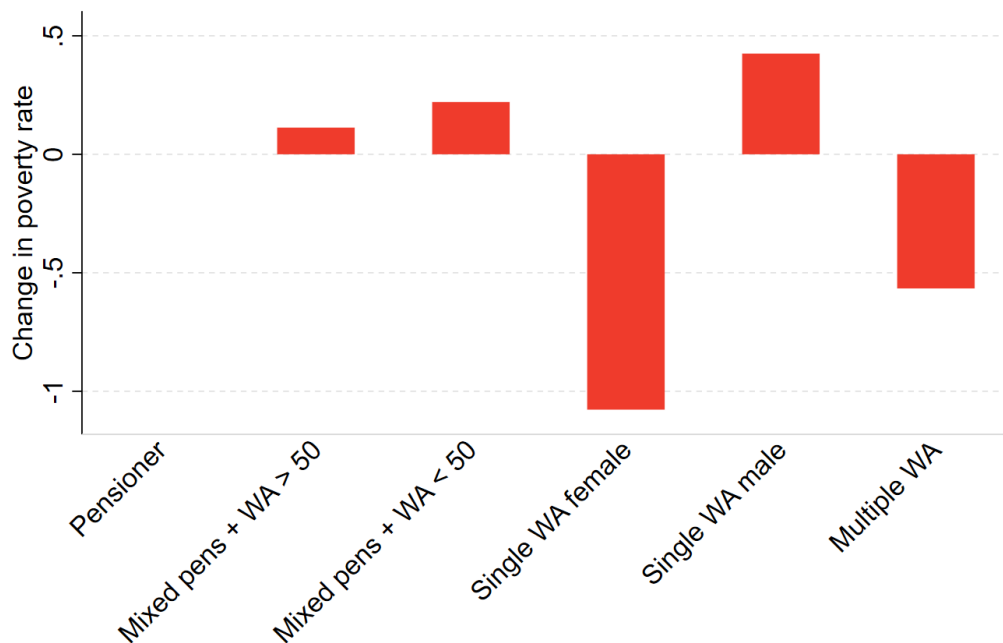


Figure 3: Changes in poverty rate by household type

Source: Author calculations from FRS 2019-20 (DWP 2021) and IPPR model v.02\_44 (Kumar 2022)

Notes: Based on a poverty line equivalent to 60% of UK median income as calculated by IPPR model.

The increase in relative poverty for mixed pensioner and working-age adult households despite increases in their average disposable income may be explained by mixed changes among households within these groups. If a few households with much higher income in these groups are weighted more heavily in the version of the FRS based on 2022Q1 employment rates, then average income rises. However, if these households remain out of poverty, but other households in these groups experience lower income and fall into poverty, then the overall relative poverty rate for the group rises as well.

# Policy analysis

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Throughout the policy analysis, we compare the effects of policies between the two versions of the dataset analysed in the last section: one representing an early 2022 labour market where employment rates are the same by group as they were in 2019-20, and one representing a labour market with employment rates from the first quarter of 2022. The primary comparison is a "difference-in-differences" measure in the sense that we look at how the differences in outcomes caused by a given policy differ between the two datasets.

In normal reporting results of microsimulation, it is standard practice to round percentage point changes to the nearest whole percentage point. For example, a fall of 0.2pp would therefore be normally reported as a 0pp change. In this paper, we have chosen to report the unrounded figures to show where the model states there is a change between the two datasets, on the understanding that the data is experimental and the results will not be used for policy development.

## Increase in Scottish Child Payment

First, we model the effects of the Scottish Child Payment (set at £25 per week, per child for all children under 16). The counterfactual is a scenario in which the Scottish Child Payment was never implemented in any form. For consistency with the rest of the analysis in this project, we have modelled these scenarios for 2022, rather than 2023 when full-out of the Scottish Child Payment is expected.

Because households generally have higher incomes in the "updated" dataset reweighted for employment rates in 2022, especially at the lower end of the income distribution, the effects of the Scottish Child Payment (SCP) on income and relative poverty are reduced compared to the "original" dataset reweighted only for population sizes. Differences in the effects of the SCP on inequality are minimal, but there are slightly greater reductions in a few measures of inequality in the updated data.

The difference in relative poverty effects for children is the largest; the reduction in child poverty caused by the SCP is 0.2pp lower in the updated data than in the original data.

Similarly, the proportion of households who gain in income from the SCP is generally higher in the original dataset. The exception is in the second quintile, where proportionally more households gain from the SCP in the updated dataset. This may be due to the labour market adjustments in this dataset, or to a change in the household composition of households that fall into the second quintile.



## Changes to income tax

Second, we model changes to income tax rates. We model both a 1pp increase in income tax rates across all bands and a 1pp decrease for all bands. The counterfactual for these changes is the current tax and benefits system.

The 1pp increase in income tax rates for all bands generally increases relative poverty and negligibly reduces inequality. The difference in relative poverty effects is again largest for child poverty, with the tax rate increase raising the child poverty rate by 0.17pp more in the updated dataset than in the original dataset. This is likely due to higher earned income in the updated dataset for some types of households, leading to higher taxes paid and fewer benefits.

However, there are only small differences in the effects of a 1pp decrease in income tax rates on relative poverty rates, with the largest difference in effects being a 0.07 smaller reduction in pensioner poverty in the updated data.

Changes in income are more mixed this time, with some winning and some losing from both the increase and decrease to income tax rates. A 1pp increase in income tax rates creates gains for a few households at the lower end of the income distribution, more so in the updated dataset. These gains arise when some households qualify for more benefits with the new tax rate. The average gain is about £35 per week higher for the lowest income quintile in the updated dataset than in the original.

As expected, more households lose from a rise in income tax rates. Proportions of households losing are greater in the updated data, particularly for the first quintile, although the average losses are negligibly different between datasets. The difference in the proportion of households losing due to the tax increase may be due to higher employment rates, and thus more taxable income.

Similar patterns hold for the 1pp decrease in income tax rates, with gains and losses reversed. The proportion of households that gain from the tax rate change increases with quintile. More households gain at each quintile in the updated data than do in the original data, especially for the first quintile, where the proportion of gainer households is 0.9 higher. Average gains in income are small and minimally different between datasets.

Only a few households lose from the decrease in income tax rates, with the only difference between datasets being a lower proportion (by 0.08%) of households in the first income quintile that lose from the policy in the updated data. This is likely due to a reduction in the benefits that these households qualify for. The average loss in the first income quintile is reduced by £64 per week in the updated data.

## Changes to council tax

Third, we model a 2% increase and a 2% decrease in the council tax rate. As with the income tax policy analysis, the counterfactual is the current tax and benefits system.

Due to the small changes in the council tax amounts, its regressive nature, and the existence of Council Tax Reduction which largely offsets changes in tax for the lowest income households, relative poverty and inequality do not change appreciably in either version of the dataset.

The 2% increase in council tax rates creates fewer "gainers" and more "losers" in the updated data than in the original data. The differences are larger at the lower end of the income distribution; that is, the increase in tax hurts those with lower incomes more in the updated data. There are no noticeable differences in the changes in gains and losses between datasets.

The effects of the 2% decrease in council tax rates on the proportion of those who gain and lose from the policy differ between datasets across the income distribution. More gainers are created at higher quintiles in the updated data, but fewer at the first and second quintiles. Similarly, slightly more households at the first and second quintiles lose from the decrease in council tax than at higher quintiles, particularly the third quintile. As with the 2% decrease, the amount of gains and losses do not change noticeably between datasets.

## Implications for policy

Our analysis highlights a few issues that policymakers should be aware of.

First, when earned incomes rise, the effects of the Scottish Child Payment on child poverty (and relative poverty in general) fall. This is because more households are already out of relative poverty, not because the policy is less effective.

Second, when proportionally more households have earned income, particularly at the lower end of the income distribution, changes in income tax are more likely to have progressive effects.

Third, however, a rise in earned income brings some households out of relative poverty, but these households likely remain close to the poverty line. Even small increases in income tax rates may have a larger effect on relative poverty than when employment rates and earned income are lower, particularly if higher taxes induce a behavioural response that reduces labour supply.

## References

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