Meeting Scotland's child poverty targets: Technical appendix

This technical appendix describes the methods used to obtain results in the main report.

IPPR microsimulation model

We conduct the analysis of combined policy levers using microsimulation modelling. Microsimulation models take underlying survey data and apply a system of taxes and benefits, resulting in an estimate of incomes, poverty rates, and distributional outcomes.

We use the IPPR tax-benefit microsimulation model (v2.7.8), which is a static model (i.e., does not estimate the effects of behavioural changes). We start with a baseline scenario representing the current UK tax-benefit system. Then, prior to running the IPPR model, we either:

- Modify parameters of the tax and benefit system (like the amount of Scottish Child Payment); or
- Modify variables in the input data (like pay rates).

We add policies cumulatively, and compare the results after each addition to the results for the previous policy. The difference is attributed to the additional policy.

All policies described below are applied only to people and households in Scotland.

The modelling is conducted using combined two-year datasets the Family Resources Survey (FRS) and Households Below Average Income (HBAI) datasets for 2021/22 and 2022/23. We model 2030/31, the year the final child poverty targets are due.

The baseline scenario is calculated from the parameter sheet v02_78_Base.xlsx. The statistics calculated are for Scotland only. Household income and poverty statistics are calibrated to account for differences between model results using the underlying FRS data (2021/22-2022/23) and official HBAI data for the same years.

We simulate the model data three times for each scenario compared to a baseline scenario with no changes, using the same random seed across all scenarios. Simulating the data multiple times reduces the impact of random variation across random seeds on the results.

Baseline scenario

The baseline scenario represents the current UK tax-benefit system. It accounts for all current and announced policies, and includes up-to-date forecasts of different types of inflation for uprating.

We use regional Local Housing Allowance rates rather than eligible rents reported by households as the upper bound for benefits that can be received to help with rent costs in the private rented sector. LHAs are set at the 30th percentile of private rents in a given area. The rate in the baseline is set at the mean LHA rate for all Broad Rental Market Areas (BRMAs) in Scotland, since Scotland does not publish the list of rents used to obtain the 30th percentile rate for each BRMA.

The baseline includes modelling of the newly-announced mitigation of the two-child limit by the Scottish Government. We show its impact compared to a baseline with no mitigation as part of our results.

We follow the Scottish Fiscal Commission's (SFC's) assumptions in our implementation of the mitigation policy. These include assumptions that the mitigation payments will:

- Be paid at a flat rate per child;
- Not affect entitlement to other benefits; and
- Not interact with the benefit cap or taper rate for Universal Credit.

We first run the IPPR baseline model. We then modify the output data in the following way, assuming that the transition to Universal Credit (UC) has been completed by 2030/31.

1. For each benefit unit receiving UC, calculate the total number of children eligible for UC if there were no two-child limit;
2. Subtract the number of children included in the UC claim to get the number affected by the two-child limit;[1]
3. Calculate a flat rate of £75.18[2] per week for each affected child and the total mitigation payment per benefit unit;
4. Aggregate to the household level and apply equivalisation factors from the HBAI data (before and after housing costs);
5. Add the equivalised mitigation payment to each household's calibrated,[3] equivalised disposable income (before and after housing costs);
6. Compare each household's new income to the calculated poverty line from the model[4] to get poverty indicators and new poverty rates;
7. Aggregate the grossed (using *gross4* from the FRS), unequivalised mitigation payments across all households to estimate the cost of the policy.

We apply this method to the output data for each policy scenario. The number of households receiving mitigation payments varies across scenarios depending on which households are receiving UC, causing the estimated cost to vary as well.

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[1] This accounts for benefit units that have received an exemption from the two-child limit policy.

[2] The SFC estimates assume a monthly payment per child of £320.28 in 2029/30. We then multiply by $\frac{12}{365} \times 7$ to get a weekly payment of 73.71, plus 2% inflation to obtain an estimated value of £75.18 per week.

[3] The IPPR model applies a calibration factor to the incomes used to calculate poverty rates. The calibration essentially calculates incomes in the data year from the FRS data and the baseline parameter sheet, then compares each household's modelled income to their reported income in the HBAI data. The factor difference between the two is then applied to estimated household income in the target year.

[4] We assume that mitigation payments to a relatively small number of households in Scotland only will not significantly shift median UK household income, which is typically the basis for different definitions of poverty.

Policy scenario details

Parental employment

Our first scenario is that combined employability and childcare policies maximise parental employment, resulting in higher household income among households with children.

We assume low- or no-cost, full-time childcare is available for young children and that wraparound care is provided for child of school age. This is costed as 1900 hours of free childcare per child aged 1-4 per year (50 hours per week during term-time) plus after-school care for children aged 5-10.

Employment rates are increased for parents. Rather than assuming full employment, however, we recognise that some parents still will not work even with full employability support and full-time care for their children.

The target rates for different types of parents are described below (**Table 1**).

Table 1: Groups for parental employment increases

Group	Employment rate increased to the rate for…
Mothers and single fathers of children under 1	[Excluded]
Mothers of children 1-4 and non-single fathers of children 0-4	Parents of school-age children (5-10)
Parents of school-age children (5-10)	Parents of secondary school-age children (11-16)

We exclude parents with a disability or who have a child with a disability.

Those moving into work are chosen randomly. We then choose whether parents move into the public or private sector based on propensity scores, where having characteristics[5] that are more highly correlated with working the public sector result in a higher propensity score and a higher likelihood of being selected for public sector work.

Those moving into work are assigned full-time hours (35 hours per week). Their hourly pay rate is assumed to be the median for their sector (public or private), calculated among parents in their group as described in the table above.

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[5] The characteristics used to calculate propensity scores are highest level of qualification achieved, gender, age, age squared, number of dependent children in the household, and number of disabled children in the household.

Hours and pay for parents who are already working

We also consider scenarios where employment policies or initiatives increase hours and pay for parents who are already working.

We assume that the childcare and wraparound care described in the previous section are available to all families.

We increase hours by the difference between median hours for each parent group and parents of older children.

For example, suppose the median hours of work for parents of children 5-10 is 30 hours, while it is 28 hours for parents of children 1-4. Working parents of children 1-4 would therefore all have their hours increased by 2 hours.

All parents earning less than the Real Living Wage (RLW) rate per hour have hourly pay increased to the RLW rate.

Rent support in the private rented sector

After labour market policies, we consider a scenario where households can receive more support for rents paid in the private rented sector.

We adjust the Local Housing Allowance (LHA) rate so that households receiving support for rent in the private rented sector (PRS) have their full rent amount covered with no cap on the rent amount.

Scottish Child Payment

We increase the amount of the Scottish Child Payment (SCP) in steps until the final child poverty targets are met. Poverty reductions associated with smaller increases to SCP are included in the results to provide a sense of the marginal effects of different amounts on child poverty.

Amounts listed are for 2030/31. The same amount, if instituted in an earlier year, would be less due to the uprating of benefits. The equivalent amounts are listed below (**Table 2**).

Table 2: Scottish Child Payment amounts

Relevant measure	SCP amount in 2030/31	Equivalent amount in 2024/25
Intermediate flat rate of SCP	£45	£40
Final flat rate of SCP	£150	£132
SCP premium for certain households	£50	£43
Final base rate of SCP	£115	£101

Results tables

Implications of policy ordering

Attribution of a household being kept out of poverty to any one policy in a scenario with several "stacked" policies is very difficult. We have chosen to implement labour market scenarios first and social security policies second, with the difference between successive scenarios attributed to the effects of the policy change in that scenario.

The modelled impact of a given scenario may change depending on the order in which the cumulative scenarios are added. This is because, for some households, any one of several policies would keep them out of poverty, so scenarios implemented first have a greater impact than they would if they were later in the order of scenarios (and scenarios implemented later may appear less impactful).

Cumulative policy impacts on relative child poverty (BHC and AHC)

All child poverty rates presented in the results section of the main report are measured after housing costs, where the poverty line is set at 60% of median UK disposable income.

Poverty rates under different measures in each of the final two scenarios are provided below (**Table 3**).

***Table 3**: Impact of policy combinations on different measures of poverty*

Group	Housing cost	% of median income used to calculate poverty line	Universal SCP rate scenario (base rate only)	Combined SCP rate scenario (base rate + premium)
All	BHC	40	5	5
		50	9	9
		60	14	14
	AHC	40	7	7
		50	10	11
		60	15	15
Children	BHC	40	1	1
		50	4	4
		60	8	9
	AHC	40	3	3
		50	6	6
		60	10	10

Costs of combined policy packages

We also calculate the costs to the Scottish or UK Governments associated with implementing each policy. We model costs including:

- Estimated costs of higher employment and pay in the public sector (both wages and employer NICs contributions);

- Estimated costs of employability programmes to support parents into work;

- Modelled costs of the Scottish Child Payment and other benefits (including the cost of mitigating the two-child limit);

- Modelled changes to tax revenues.

Scenarios involving changes in the labour market often have net negative costs because they increase tax revenues and reduce the cost of benefits. On the other hand, social security scenarios often come at a net positive cost.

We average the estimated costs across the two years of the underlying FRS data to get a single-year estimate.

Public sector pay and employer NICs

Changes to the labour market are done in the input data before running the model. When employment, hours, and pay are changed for people in the sample, we calculate a grossed change to the annual public sector pay bill in contemporary prices.

Employer NICs contributions are based on a person's total income. We add up income across jobs for each person and calculate the change in employer NICs paid by public sector employers in contemporary prices.

We then use the inflation forecasts used in the IPPR model to convert changes to public sector pay and employer NICs into estimated 2030/31 prices.

Employability programmes

We calculate a grossed number of people moving into work for the employment scenarios. We then multiply this by the estimated cost per job retained after 52 weeks for the Fair Start Scotland programme in 2017-18, uprated to the data year.

We then apply the inflation forecasts as above to convert the estimated cost of the employability programmes to 2030/31 prices.

Childcare costs

We estimate childcare costs for 2023/24, a year for which we have complete information about number of children and spending. We start with the Scottish Government early learning and childcare (ELC) census, taken in September 2023 (**Table 4**).

Table 4: *Number of children in funded ELC by age*

Age group	Number of children	% of total
5-year-olds	8554	9%
3-4 year olds	76436	83%
2-year-olds	6636	7%
Under 2 years old	556	1%
Total	92182	100%

Source: *FAI calculations from Scottish Government*

The census records the number of children receiving funded ELC.

Scottish Government local government finance statistics for 2023-24 record total gross expenditure of £1,051 million. This spending is based on the current offer of 1140 hours of childcare per year, or 30 hours per week during term-time.
We then calculate the estimated cost of childcare expansion and wraparound care for school-age children (

Table 5).

We break down the amount of gross expenditure that can be attributed to 3-4-year-olds based on their proportion of all children receiving funded ELC. We then assume that costs for 2- and 1-year-olds would be equal to half the attributed cost for 3-4-year-olds, with an additional 10% in costs for 1-year-olds.[6]

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[6] The additional 10% is due to higher supervision requirements for children under 2.

Table 5: *Calculations for estimating the cost of childcare and wraparound care expansions*

Element	Cost (£, 2023/24)
ELC for 3-4-year-olds (83% of gross expenditure)	871,691,000
Estimated cost for 2-year-olds (half of cost for 3-4)	435,845,000
Estimated cost for 1-year-olds (same as for 2-year-olds + 10%)	479,430,000
Total cost of funding 1140 hours/year for 1-5-year-olds	1,884,517,000
Total cost of funding 1900 hours/year for 1-5-year-olds (proration of row above)	3,140,862,000
Total cost of wraparound (after-school) care for 5-10-year-olds	642,718,000
Total cost of 1900 hours/year for 1-5 + wraparound care for 5-10	3,783,580,000
Estimated cost of policy change (Total cost less gross expenditure on ELC in 2023/24)	2,732,319,000

Source: FAI calculations from Scottish Government, National Records of Scotland, and Coram
Notes: Amounts are rounded to the nearest £1000.

We then consider the cost of adding wraparound (after-school) care for children aged 5-10. We exclude children aged 5 who have deferred their start to primary school (approximately 15% of 5-year-olds).

We further assume the take-up of the after-school care offer is the same as that for the childcare offer for 3-4-year-olds (74%, based on the ELC census taken in September 2023 and NRS mid-year population estimates for 2023).

We estimate that, excluding 5-year-olds with deferred school starts, 245,125 children will take up the after-school offer. The cost of after-school care per week, per child is assumed to be £69 based on Coram estimates for Great Britain.

These costs are then uprated from 2023/24 to 2030/31 based on the ONS inflation statistics and OBR inflation forecasts.

Scottish Child Payment and other benefits

Estimates of the cost of the Scottish Child Payment and other benefits (with the exception of the two-child limit mitigation) are modelled in the IPPR model in 2030/31 prices.

Two-child limit mitigation

The method of estimating the cost of mitigating the two-child limit is described in the baseline scenario section above. The flat-rate payment per child is expressed in 2030/31 prices based on SFC estimates of the payment for 2029/30 plus an assumed 2% increase for inflation.