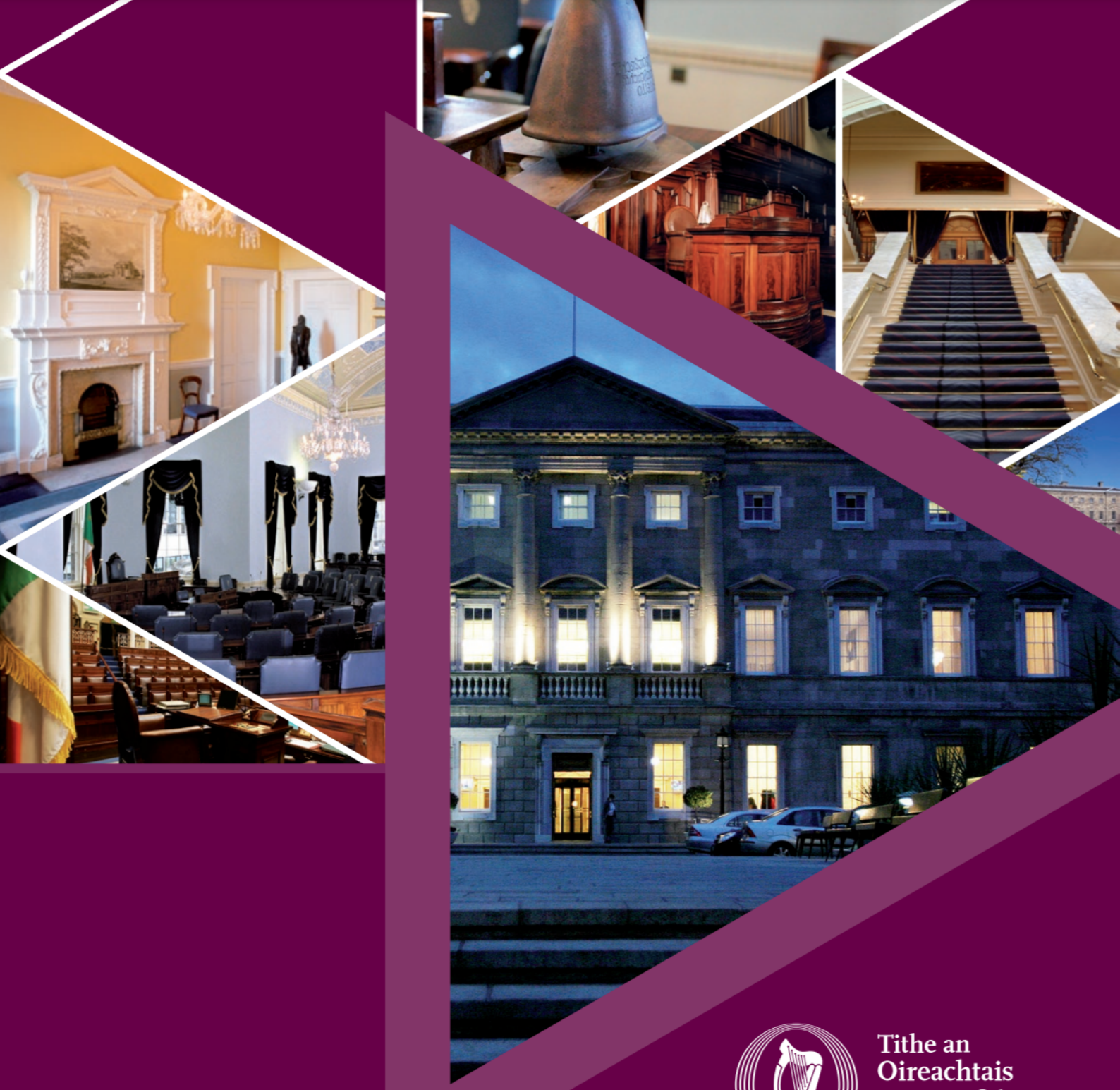

Tithe an Oireachtais
Houses of the Oireachtas

An Oifig Buiséid Pharlaiminteach
Parliamentary Budget Office

An Introduction to the SWITCH Microsimulation Model for Members

Publication 30 of 2022

Séanadh

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Key Points

SWITCH: Simulating Welfare, Income Tax, Childcare and Health Policies

This publication includes results based on SWITCH, the ESRI tax-benefit model. Information on the design, underlying data and model construction can be found at *www.esri.ie/switch*. Responsibility for the results and interpretation in this document rests with the PBO and not with the ESRI.

- This note introduces members to SWITCH, the ESRI's tax-benefit model, now being used by the PBO. Examples of SWITCH analyses and outputs in this note may provide members with information to help them request SWITCH analysis from the PBO. Examples in this paper include analysis of the permanent direct tax and welfare changes in Budget 2023, potential tax changes only and the single person child carer tax credit.
  Note: The overall Budget package is analysed against a fully indexed baseline for comparison, accounting for unexpected 2022 and forecast 2023 inflation. In the tax analyses, various scenarios involving indexation of the tax system are assessed against the Budget tax package, as well as a no policy change baseline. In these examples, indexation only includes inflation as forecast for 2023.
- This highlights the diversity of approaches that can be taken in SWITCH. The interpretation of results depends on the specific questions asked.

Permanent measures in Budget 2023

- As we are currently dealing with high rates of inflation, if there were no changes in the Budget, this would be an effective cut to people's disposable income. As such, the first step is to create a baseline which is indexed. We do this by increasing all rates, bands and credits by the chosen percentage. We do not include inflation for 2022 which was previously forecast in Budget 2022.
- Compared to an indexed baseline that accounts for unexpected 2022 inflation and forecast 2023 inflation, permanent Budget 2023 direct tax and welfare measures are regressive overall. This means that lower income deciles lose more, proportionately, in disposable income than middle and upper income deciles.
- By family type, lone parents and pensioners lose more proportionately than those of working age, since the former are more reliant on welfare income, which increased by less than the standard rate tax band in Budget 2023. Therefore, welfare recipients lose more than those in employment, proportionately, in Budget 2023 (assessing permanent measures only).
- The permanent Budget 2023 measures may result in a slight increase in the overall at-risk-of-poverty rate (the proportion of people with an income below 60% of median income). The rate increases most for the elderly population. This is due to pension rates increasing proportionately less than other payments, as well as decreasing (in real terms) allowances related to living alone, fuel and over 80s. These all contribute to increased poverty risk rates for the elderly.

- The permanent welfare measures taken in Budget 2023 are relatively close to 5% indexation of the welfare system overall, although the percentage changes differ by scheme since a flat rate increase of €12 was adopted across most schemes. If 5% were applied to all welfare schemes, the distributional impacts would be very similar overall, but this approach is more equitable and provides certainty for recipients.
- Budget 2023 measures were largely targeted. However, some of the most costly measures are universal – the energy credits and the extra month of child benefit. Targeted measures benefit more people on low incomes. If the policy objective is to achieve a more progressive outcome, for example, an increase in qualified child payments could achieve better results than an increase in child benefit, for the same total amount of spending.

Modelling Tax in SWITCH

- The SWITCH model is an effective tool for analysing alternative income tax policy changes across multiple criteria, including overall fiscal cost, as well as the distributional impact on disposable incomes at the household level.
- We compare tax policy changes in isolation (i.e. we exclude social welfare policy changes from our analysis). We consider two alternative baselines – one involving no policy changes, and another based on tax policy changes included in Budget 2023. We then examine multiple potential tax packages as alternatives to these baseline scenarios.
- We estimate that, while the Budget tax package increases disposable incomes relative to a no policy change baseline, households in upper income deciles gain relatively more than the poorest households. This is expected, given that a larger proportion of those at the lower end of the income distribution are outside of the income tax system.
- We estimate that full indexation of the tax system to inflation, is approximately €1.6 billion more costly than the no policy change baseline and €290 million more costly than the Budget 2023 baseline. Relative to the Budget tax package, partial indexation and indexation to half of the rate of inflation (3.55%) are less costly options, with relative savings ranging from €21 million to €640 million.
- Indexation increases incomes relative to the no policy change scenario, however, only full and (very marginally) partial indexation provide an overall increase in income relative to the Budget tax package (this does not hold when the tax system is indexed to half of the inflation rate). Indexation generally provides for a more equal outcome when compared to the Budget tax package (in terms of the impact on the Gini Coefficient).

Introduction

This note introduces members to SWITCH, the ESRI's tax-benefit model (**S**imulating **W**elfare, **I**ncome **T**ax, **C**hildcare and **H**ealth policies). The SWITCH model user interface allows users to input changes to direct tax and welfare parameters to analyse the impact of such changes to Government revenue and expenditure and the distributional impact of the changes, for instance by household income decile.

In the absence of complete Revenue and Social Protection microdata, SWITCH allows the PBO to analyse, for Members, current Government direct tax and welfare policy compared to alternative policy options. This note outlines the type of analyses that can be conducted using SWITCH, the strengths and limitations of the model, and draws on recent Budget policy to illustrate SWITCH uses.

How SWITCH Works and Underlying Data

SILC (Survey on Income and Living Conditions) is the core dataset underlying SWITCH. The current SWITCH iteration uses 2019 SILC data,[1] containing data gathered on 5,000 households. These data are supplemented with administrative income microdata from Revenue and the Department of Social Protection. The survey data are weighted to be representative of the population, allowing for overall population level results (costs, impacts). Uprating indices[2] are also applied to each year of data to be representative of the most recent year. For instance, wage growth estimates are applied to provide estimates of earnings in 2022 and 2023.

SWITCH is not totally static in the way that Revenue and Social Protection ready reckoner data are. This means that a change in one option in SWITCH will have knock-on impacts on other options (a tax change that results in higher net income may result in reduced benefits as a means threshold may be breached). However, SWITCH is not dynamic in the sense that behavioural changes are not factored in, e.g. tax changes that result in changes to net income may impact decisions on working (this and other limitations are discussed below). As with any microsimulation model, changes to options in SWITCH are applied to all relevant units in the dataset and the results are aggregated to give overall impacts at the population level (the weighted survey dataset in this case). Users can apply multiple changes together and analyse the fully interacted impacts, allowing for full Budget direct tax and welfare packages to be assessed, but not dynamically.

1 More information on the 2019 version of the SILC survey, including the legislative basis for the survey, as well as survey design and administration, can be found in: *Standard Report on Methods and Quality for the Survey on Income and Living Conditions (EU-SILC) 2019*, CSO.

2 Uprating indices are yearly values in SWITCH, taken for example from CSO datasets, which allow for estimates of future year datasets. SWITCH currently uses 2019 SILC data and therefore values for wage growth and other key variables are required to estimate the 2022 and 2023 datasets.

SWITCH Limitations

While SWITCH is a very powerful tool for analysis of direct tax and welfare policy, there are a number of key limitations that members need to be aware of when requesting SWITCH analysis. When modelling policy changes, behavioural responses are not factored in (e.g. changing income tax policy may incur a labour supply response which will not be reflected in SWITCH outputs). Further, the design and analysis of new 'blue-sky' policies is not generally feasible by the PBO as we cannot make changes to how SWITCH works. Current PBO work using SWITCH is generally limited to adjustments to existing policies. There are also limitations to the adjustments that can be made to current means test rules and thresholds. Regarding the estimation of policy costings using SWITCH – although SWITCH can provide an indication of the cost of policy changes, additional analysis will be required in many instances (particularly on the welfare side, where cost estimates will be sensitive to assumptions regarding the take-up of a scheme). As SWITCH uses survey data weighted to be representative of the population, costings are subject to missing data and uncertainty.

An Introduction to the SWITCH Microsimulation Model for Members

Modelling the Overall Budget Package Permanent Measures in SWITCH and Targeted v Universal Measures

Please note that the following examples are for illustrative purposes only to highlight potential uses of SWITCH and are not to be seen as an 'alternative budget'.

Example 1

Firstly, Budget 2023 permanent direct tax and welfare policies are analysed below, from a distributional impact perspective, in comparison to a fully indexed scenario. Using a fully indexed baseline is a proxy for an inflation-proofed Budget since under this scenario, all welfare rates, income thresholds, tax bands, credits and exemptions are increased by a selected rate for inflation. 12.1% is selected as the indexation rate in this instance based on Central Bank forecasts of inflation in 2022 and 2023,[3] and subtracting inflation that was accounted for in Budget 2022. This is broadly similar to the Budget distributional impact analysis approach usually taken by the ESRI, albeit different rates of inflation and time periods may be used. However, this approach differs substantially to that taken by the Department of Finance in their post-Budget analysis.[4] The Department of Finance usually look at the distributional impact analysis in purely nominal terms, not using an indexed / inflation-proofed baseline, which in times of exceptionally high inflation, results in very different outputs (to be interpreted differently). The approach taken here, with a fully indexed baseline, is designed to show the changes in disposable income for different groups compared to a standstill inflation-proofed scenario. Given recent exceptionally high rates of inflation, results therefore indicate that most groups are worse off in comparison to the fully indexed baseline, although by varying degrees.[5]

The main Budget 2023 policy changes included are: *Key Direct Tax Changes*

- Widening of standard rate income tax bands by €3,200
- Increase in employee, personal and earned income tax credits of €75 (although not lone parent credit); home carer tax credit +€100
- €500 rent tax credit
- Increase in USC threshold to €22,920 (to facilitate NWM increase)
- Employer PRSI threshold increase to €441

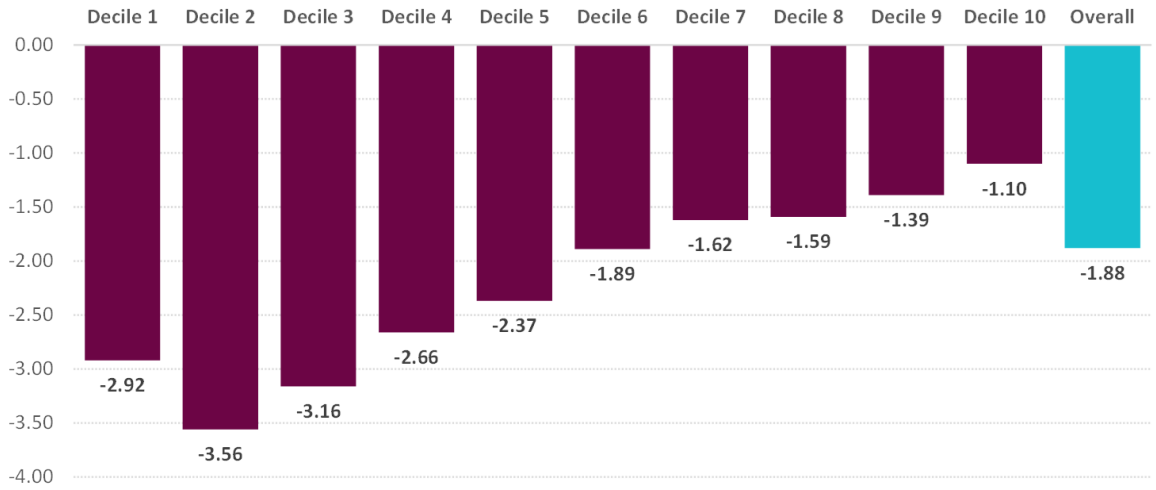
Key Welfare Changes

- €12 increase in weekly welfare rates, including pensions, proportionate increases for qualified adults and reduced rates
- Qualified child increases up €2
- Working Family Payment income thresholds up €40
- Widening of fuel allowance eligibility

3 *Central Bank Quarterly Bulletin 4 of 2022.*
4 *Budget 2023, Quality of Life Assessment, Department of Finance.*
5 Full indexation of direct tax and welfare measures, given current exceptionally high rates of inflation, would cost circa €3bn more than the actual permanent changes to direct tax and welfare introduced in Budget 2023.

Figure 1 below shows the percentage change in equivalised[6] household income, by household income decile,[7] of Budget 2023 direct tax and welfare permanent changes,[8] compared to a 12.1% indexed scenario. Compared to a situation where households see their welfare payments rise by the level of inflation and tax bands/credits rise by the level of inflation (the indexed baseline scenario), overall, households are losing 1.88% in disposable household income. Budget 2023 permanent measures are going some way towards insulating households from current high rates of inflation. However, losses vary substantially across the income spectrum. Income deciles 1-4 are losing the most, compared to the inflation-proofed baseline, at over 2.5% each. Deciles 7-10 are losing the least, proportionately, at less than 1.7% each (as low as 1.1% for the 10% of highest income households).

Figure 1: Overall Distributional Impact of Budget 2023 v 12.1% Indexed Baseline - % Change in Disposable Income by Household Income Decile



Source: Results based on SWITCH, the ESRI tax-benefit model

The factors driving this regressive pattern include the following: (1) middle and upper income deciles are more reliant on employment income and the widening of the standard rate tax bands benefits these groups more than the lower income deciles, who are more reliant on welfare income. The single person standard rate tax band was increased by 8.7% (by €3,200 to €40,000). In comparison, the core working age social welfare rate was only increased by 5.7% (by €12 to €220). The Contributory State Pension only increased by 4.7% (by €12 to €265.30). Pensioners comprise a large proportion of deciles 2 and 3; (2) Under the fully indexed baseline scenario, welfare recipients gain more as the full percentage of indexation is gained in welfare income but only a proportion of tax indexation is realised for those in employment as tax system indexation involves increasing bands and rates, not take-home pay directly. As a consequence, compared to an indexed baseline, the outcomes look less favourable for welfare recipients.

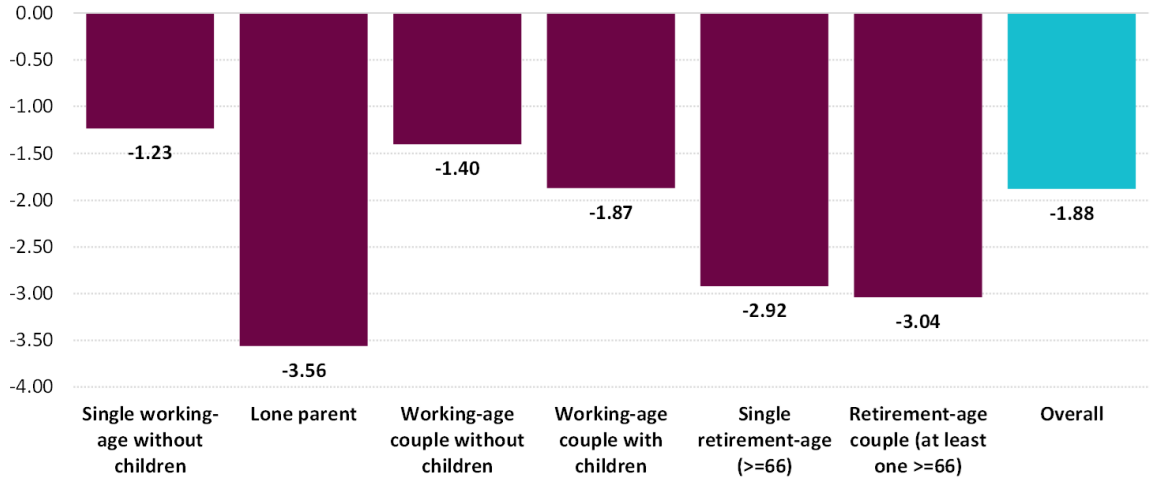
6 Equivalisation involves weighting members of a household to calculate equivalised household income. The national scale attributes a weight of 1 to the first adult, 0.66 to each subsequent adult (aged 14+ living in the household) and 0.33 to each child aged less than 14. The weights for each household are then summed to calculate the equivalised household size. Disposable household income is divided by the equivalised household size to calculate equivalised disposable income for each person, which essentially is an approximate measure of how much of the income can be attributed to each member of the household. This equivalised income is then applied to each member of the household.

7 All households are divided into ten equal group sizes, with decile 1 as the 10% with the lowest income and decile 10 as the 10% with highest income. Quintiles are also used in this analysis – 5 equal groups, with quintile 1 as the 20% of households with the lowest income and quintile 5 as the 20% of households with the highest disposable income.

8 Aside from the 2 energy credits due to be paid in January and March 2023, the Budget 2023 package analysed here does not include the temporary one-off lump sum cost of living measures in Budget 2023. This is an analysis of the permanent changes. Temporary lump sum measures will be exhausted by early 2023 and the permanent measures are the ones that will impact equality across the income distribution in the medium-long term.

The distributional impact of permanent Budget 2023 measures also varies substantially by family type, as illustrated in Figure 2 below. Lone parents lose relatively more than other family types, compared to a fully indexed baseline – losing 3.56% compared to the 1.88% across all family types. Lone parents tend to rely on welfare payments, including in-work benefits when in employment. Also, the lone parent tax credit did not increase in Budget 2023, unlike the other main tax credits. (Important to note - childcare costs, a key issue for lone parents, are not included in SWITCH disposable income calculations as an expense, and are therefore not included in the distributional impact analysis presented here.) Pensioners also lose more than working age family types, since pension rates were increased proportionately less than most other parameters that were changed in the Budget. The widening of the standard rate tax bands benefits family types of working age, with single people without children only losing 1.23%, compared to the indexed baseline scenario.

Figure 2: Overall Distributional Impact of Budget 2023 v 12.1% Indexed Baseline - % Change in Disposable Income by Family Type

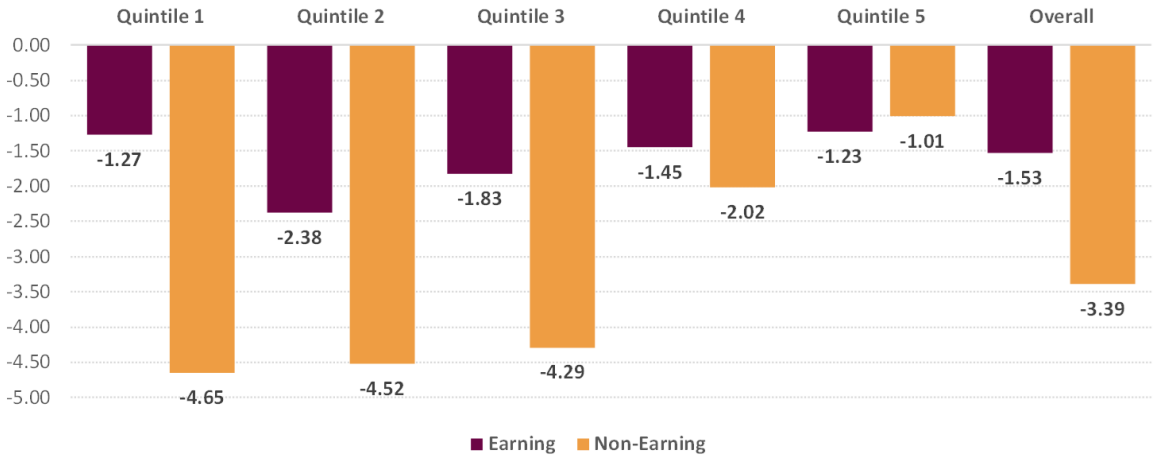


Source: Results based on SWITCH, the ESRI tax-benefit model

Figure 3 below shows the distributional impact of Budget 2023 measures, compared to the fully indexed baseline scenario, by earning and non-earning status, by income quintile (A) and by family type (B).

Figure 3: : Overall Distributional Impact of Budget 2023 v 12.1- % Change in Disposable Income by Earning/Non-Earning Status

(a) By Income Quintile



(b) By Family Type

Source: Results based on SWITCH, the ESRI tax-benefit model

It is evident that non-earners reliant on social transfer income are losing proportionately more in Budget 2023 than earners reliant on employment income, when compared to a fully indexed baseline scenario. Non-earners in income quintiles 1-3, non-earning lone parents and non-earning working-age couples with children are all experiencing losses of more than 4% in disposable income, compared to the indexed baseline scenario. Overall, non-earners are losing 3.39%, compared to a loss of 1.53% for earners.

The at-risk-of-poverty rate measures the proportion of a group with an income below 60% of median income. Budget 2023 policies, when compared to the fully indexed baseline scenario may result in an increase in the at-risk-of-poverty rate for the whole population from 12.14% to 12.74%. The rate increases most for the elderly population (pensioners), from 9.81% to 11.81%. This is due to pension rates increasing proportionately less than other payments, as well as decreasing allowances (in real terms) for living alone, fuel and over 80s. These all contribute to increased poverty rates for the elderly. Figure 4 below refers.

Figure 4: Overall Distributional Impact of Budget 2023 v 12.1% Indexed Baseline - At-Risk-of-Poverty (AROP) Rates by Group

Source: Results based on SWITCH, the ESRI tax-benefit model

Example 2

For a very similar overall cost to the actual permanent Budget 2023 policies that have been adopted, an option could have been to index all welfare payments, with the exception of child benefit, at 5%.[9] Fuel allowance eligibility widening and increases to the Working Family Payment income thresholds could also be included in this alternate scenario at the same cost. In this alternate scenario analysed below, all tax policy changes in Budget 2023 are maintained as is in the 5% welfare indexation scenario (the tax system is not indexed in this scenario).

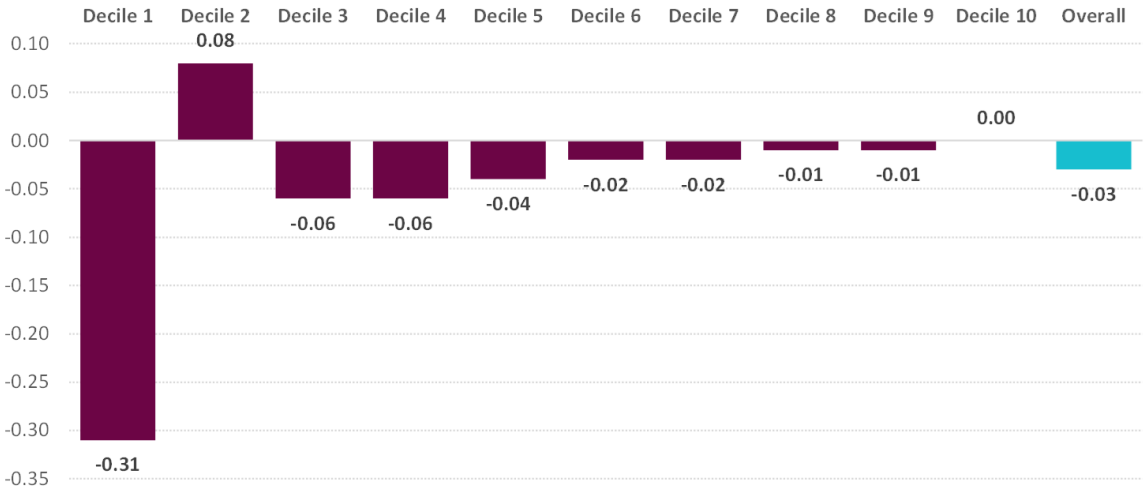
The main changes to Budget 2023 welfare policies in this 5% indexation scenario include

- Working age payments increase by less than the €12 Budget increase, e.g. the €208 rate increases to €218.40, rather than €220,
- Pension payments increase by more, e.g. the Contributory State Pension increases to €266, rather than €265.30,
- The qualified child increases for over 12s increase to €50.40, rather than €50,
- The fuel allowance increases to €34.70, rather than staying static (falling in real terms) at €33,
- The living alone allowance increases to €23.10, rather than staying static (falling in real terms) at €22,
- The over 80s allowance increase to €10.50, rather than staying static (falling in real terms) at €10.

Since the above changes are minimal, the overall cost of the 5% welfare indexation approach is very close to the actual Budget 2023 permanent welfare changes cost. However, indexation provides greater certainty and fairness in a way that ad-hoc flat-rate nominal increases to welfare payments do not. All payments increase by proportionately the same amounts under indexation and if linked to inflation or wage growth, recipients will know their future payment amounts on a continual basis. Figures 5 and 6 below show how close 5% indexation of the welfare system is to actual Budget 2023 welfare changes (note overall small scale on axis, i.e. no substantial changes).

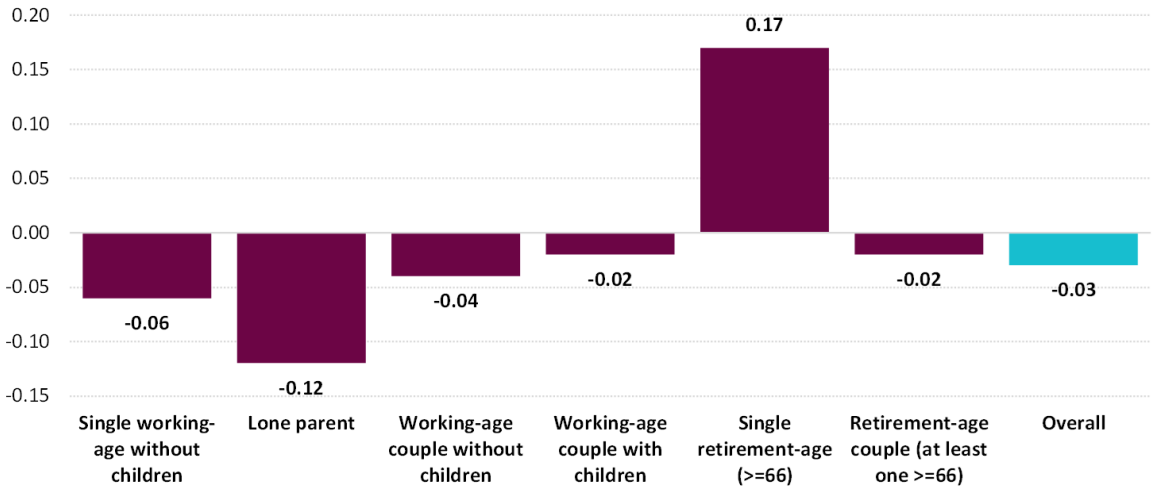
9 It should be noted that 5% is not a figure connected to wage growth or inflation, so isn't true "indexation." In practice, this rate should be connected to an external measure such as prices or wages (see the PBO's analysis of *Social Welfare Rate Changes 2011 - 2022* for an explanation of indexation) In this case, 5% is chosen as it's the same approximate cost as the overall Budget welfare measures.

Figure 5: Overall Distributional Impact of 5% Welfare Indexation v Budget 2023 - % Change in Disposable Income by Household Income Decile



Source: Results based on SWITCH, the ESRI tax-benefit model

Figure 6: Overall Distributional Impact of 5% Welfare Indexation v Budget 2023 - % Change in Disposable Income by Family Type



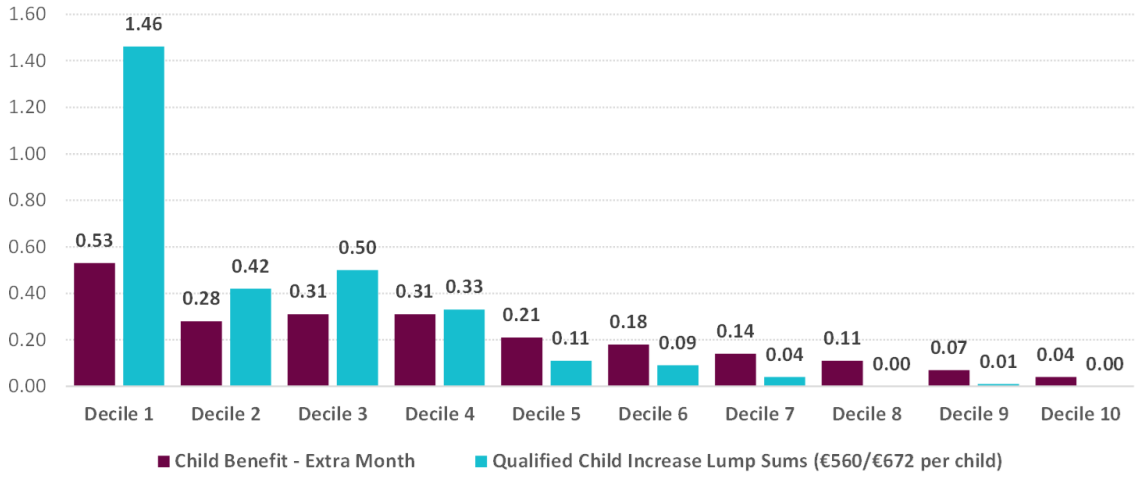
Source: Results based on SWITCH, the ESRI tax-benefit model

Example 3

Budget 2023 included a number of one-off lump sum payments such as the targeted payments to Working Family Payment and fuel allowance recipients and universal payments to child benefit recipients and all households via the energy credits. Targeted payments are effective at reaching the households in most need, while universal payments provide some insulation against inflation to all households. Given limited resources, it may be a more effective use of taxpayers funds to focus on targeted payments, in order to alleviate at-risk-of-poverty rates in the lower income deciles.

The example shown in Figure 7 illustrates this dynamic. If the funds used to provide an extra month of child benefit were allocated to pay lump sums to those in receipt of 'qualified' child increases (as part of their welfare payments), the distribution pattern is much more progressive, with lower income deciles gaining more. The 'qualified' child increase approach also benefits lone parents in particular (a vulnerable group) and achieves a greater reduction in the at-risk-of-poverty rate for the child population. ESRI research has previously shown 'qualified' child increases to be a more effective method of reducing poverty than child benefit, albeit the impacts are still quite limited and the Working Family Payment may be the single most effective welfare route to target poverty.[10]

Figure 7: Distributional Impact of Qualified Child Lump Sum v Child Benefit Lump Sum - % Change in Disposable Income by Income Decile



Source: Results based on SWITCH, the ESRI tax-benefit model
Both scenarios are measures against a no change 2023 scenario

[10] *Headline Poverty Target Reduction in Ireland and the Role of Work and Social Welfare*, ESRI June 2022.

Modelling Tax Packages in SWITCH

This section showcases how the SWITCH model can be used at budget time, on a pre- and post-budget basis, to assess potential income tax (including USC and PRSI) policy changes, in terms of their overall fiscal cost as well as the distributional impacts by decile and quintile.

In all our scenarios, we use forecasts of wage growth based on the latest estimates from the Central Bank for 2022 (3.8%) and 2023 (5.8%).[11] We consider two alternative baseline scenarios – one involving no policy changes (i.e. assuming the 2022 tax system holds for 2023) and another based on tax policy changes introduced in Budget 2023. We then examine multiple potential tax packages as alternatives to these baseline scenarios, generally involving some degree of inflation indexation.

As this section focuses on tax policy changes, we examine tax packages in isolation. In other words, apart from changes to the income tax and USC system, all other budgetary measures are held constant relative to 2022 (i.e. modelling is done on a pre-budget basis). We do not model any changes to the social welfare system in any of these scenarios.

Baseline Scenarios

The specific measures included in our two baseline scenarios are shown in the box below.

The first simply assumes that there are no policy changes for 2023, with tax parameters unchanged from 2022. This describes a scenario where the growth in nominal wages in 2023 increases the tax burden on taxpayers, given that tax bands and credits are held constant year-on-year (this is often referred to as "bracket creep").

The second baseline scenario contains the income tax policy changes included in Budget 2023 – specifically, changes to tax bands and various tax credits.

Baseline A: No policy changes

No changes to the tax system relative to 2022.

Baseline B: Budget 2023 Tax Policy Changes
Changes to tax policy are in line with the changes to income tax and USC introduced in Budget 2023. This includes:

- Increase of €3,200 in the income tax standard rate cut-off point for all earners:
  - €36,800 to €40,000 – single, widowed or surviving civil partner;
  - €40,800 to €44,000 – single, widowed or surviving civil partners, qualifying for the Single Person Child Carer Credit;
  - €45,800 to €49,000 – married couples or civil partners.

[11] *Quarterly Bulletin, QB4 – October 2022*, Central Bank of Ireland.

- Increase of €75 in the Personal, Employee, and Earned Income tax credits.
- Increase of €100 in the Home Carer tax credit.
- Increase of €1,625 in the ceiling for the 2% rate of USC.

How does the Budget 2023 income tax package compare to a no policy change scenario?

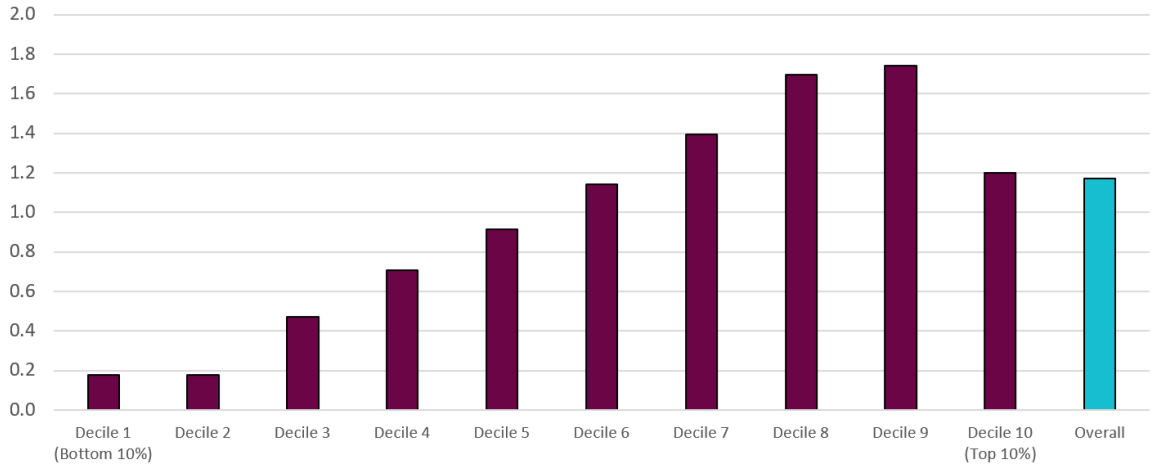
To begin, we use the SWITCH model to compare our two baseline scenarios. In other words, we compare income tax changes included in the Budget (Baseline B) against a scenario where the 2022 tax system is held constant into 2023 (Baseline A). In effect, Baseline A simulates what would happen if no change had been made in the Budget. The growth in wages alone would have resulted in a greater tax burden and a disimprovement across all deciles, relative to the Budget package.

In terms of cost, the Budget 2023 tax package (as simulated in Baseline B) is estimated to reduce tax revenue by approximately €1.28 billion next year, relative to the no policy change scenario (as simulated in Baseline A).[12]

To assess the relative progressivity of these baseline scenarios, a distributional impact assessment is required; that is, an analysis of the relative impact of the two scenarios on incomes at different points of the income distribution.

Figure 8 shows the estimated impact of the Budget 2023 tax package on weekly disposable household income (by decile), relative to the no policy change baseline. Overall, the Budget package increases disposable income by 1.17% per week, however, households in the upper deciles gain relatively more than the poorest households. This is as expected, given that we are simulating income tax policy changes only, and a larger proportion of those at the lower end of the household income distribution will be outside of the income tax system (and rely relatively more on income from social welfare schemes rather than employment).

Figure 8: % Change in Disposable Income by Household Income Decile: Baseline B vs. Baseline A



Source: Results based on SWITCH, the ESRI tax-benefit model. Notes: This chart shows the impact on weekly disposable household income, by decile, of Baseline B (the Budget 2023 scenario) relative to Baseline A (the no policy change scenario).

[12] The Department of Finance's cost estimate was approximately €1.30 billion (see: *Budget 2023 – Tax Policy Changes*, Department of Finance, 27 September 2022).

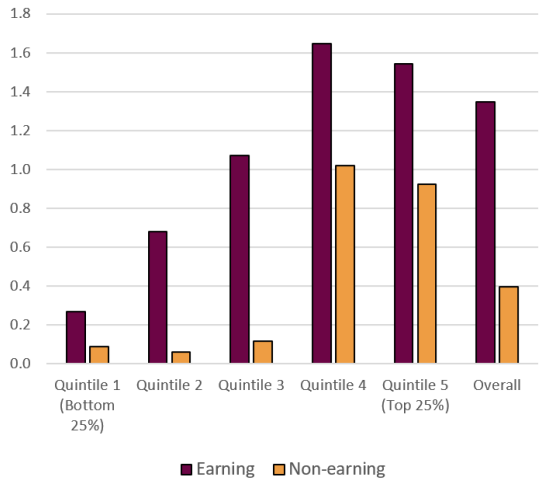
We can see this effect more clearly by separately examining the relative impact on earner and non-earner cohorts. As shown in Figure 9a, at every quintile earners gain more from the Budget 2023 tax package than non-earners. Overall, earners gain approximately 1.35% per week, compared to gains of just 0.4% for non-earners.

The SWITCH model also facilitates the analysis of the gender impact of tax policy changes. As shown in Figure 9b, we observe relatively little difference in the impact of the Budget tax package between men and women, however, men gain somewhat more in all but Quintile 4. Overall, the Budget package increases weekly disposable income for men by 1.20%, compared to 1.14% for women.

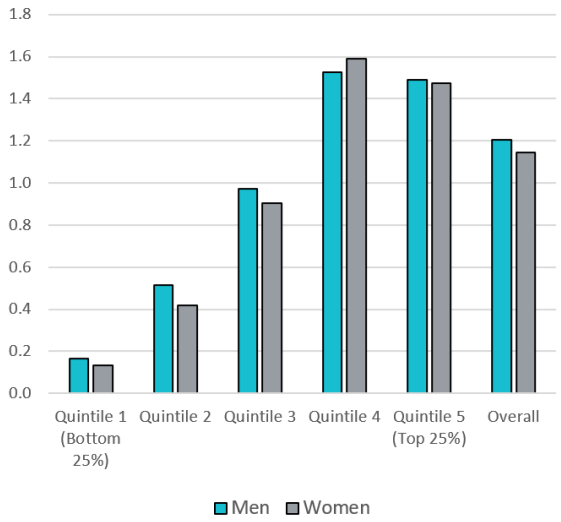
Finally, we compare our two baseline scenarios in terms of the relative impact on inequality, as captured by estimates of the Gini coefficient. When assessed in terms of disposable income, the Budget 2023 tax package marginally increases the value of the coefficient, by 0.0019 (from 0.2759 under a no policy change scenario to 0.2779 under the Budget 2023 scenario). This implies that the budgetary tax package, in isolation, leads to a marginally more unequal outcome relative to a no policy change scenario.

Figure 9: % Change in Disposable Income, by:

(a) Earner vs. Non-earner



(b) Gender



Source: Results based on SWITCH, the ESRI tax-benefit model. Notes: These charts show the impact on weekly disposable income of Baseline B (the Budget 2023 scenario) relative to Baseline A (the no policy change scenario), by quintile, across earner/non-earner cohorts and by gender.

Assessing Alternative Scenarios

Against these two baseline scenarios, we assess a range of alternative tax packages in terms of their relative cost, the distributional impact by decile, gender and earner/non-earner status, as well as the implications for inequality (as captured by the Gini Coefficient). All of these are useful criteria in assessing the relative merits of alternative tax policy proposals. These alternative tax packages generally involve some form of inflation indexation. A description of each is provided in the box below.

Alternative Scenario C: Indexation of the income tax system to inflation

All income tax bands, credits and age exemption limits, as well as USC and PRSI thresholds, are increased in line with the Department of Finance's forecast of inflation for 2023, of approximately 7.1%. For example, this increases the standard rate band of income tax from €36,800 to approximately €39,413, and the lower USC threshold from €12,012 to approximately €12,865.

Alternative Scenario D: Partial indexation of the income tax system to inflation

The main income tax bands and credits are increased in line with the Department's own forecast of inflation for 2023, of approximately 7.1%. For example, this includes the standard rate bands of income tax, as well as the Employee, Earned Income and Personal tax credits, but does not include USC and PRSI thresholds or age exemption limits.

Alternative Scenario E: Indexation of the income tax system to 50% of inflation

This alternative scenario mirrors Alternative Scenario C but applies an indexation equivalent to half of the Department's forecast of inflation for 2023 (approximately 3.55%).

Alternative Scenario F: Partial indexation of the income tax system to 50% of inflation

This alternative scenario mirrors Alternative Scenario D but applies an indexation equivalent to half of the Department's forecast of inflation for 2023 (approximately 3.55%).

How does inflation indexation compare to our baseline scenarios (i.e. versus no policy change or the Budget 2023 tax package)?

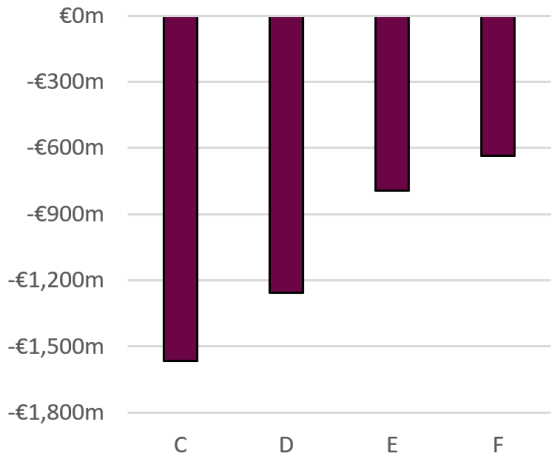
We first examine the cost of each indexation scenario relative to our two baseline scenarios. These results are shown in Figure 10a and Figure 10b (for the no policy change and Budget 2023 baselines respectively).

In terms of cost, full indexation is the most expensive scenario, approximately €1.6 billion more costly than the no policy change scenario and €290 million more costly than the Budget 2023 scenario.

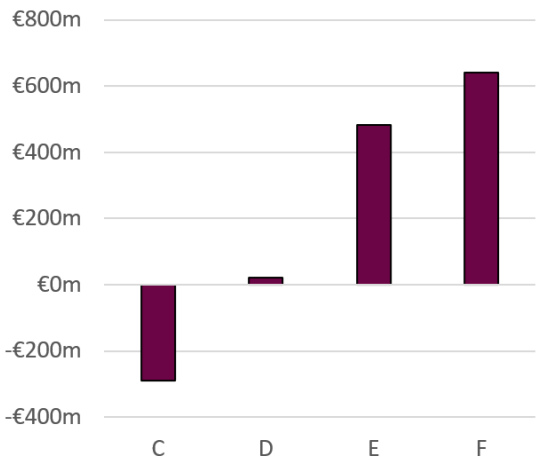
As expected, all indexation scenarios are more costly than the no policy change baseline. However, relative to the Budget 2023 tax package, the partial indexation scenario and the two scenarios indexing to 50% of inflation, are less costly (with relative savings ranging from €21 million to €640 million).

Figure 10: Fiscal Cost of Indexation Scenarios, versus:

(a) Baseline A – no policy change



(b) Baseline B – Budget 2023

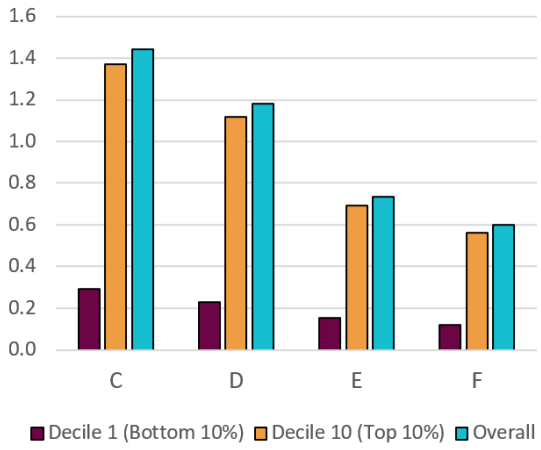


Source: Results based on SWITCH, the ESRI tax-benefit model. Notes: Baseline A refers to the no policy change scenario while Baseline B refers to the Budget 2023 scenario. Alternative Scenarios C, D, E and F are detailed in the box above, and involve various degrees of inflation indexation (from full indexation to inflation, to partial indexation to 50% of inflation).

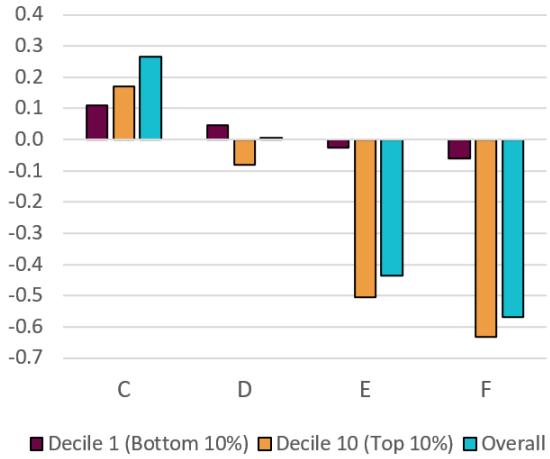
We proceed with an analysis of the distributional impact of these indexation scenarios. Figure 11a and Figure 11b show the percentage change in disposable household income for each of the indexation scenarios, relative to Baseline A and Baseline B, respectively. For brevity, and to highlight the extent to which tax policy changes can impact differently on different ends of the income distribution, we focus on the results for the lowest and highest income deciles (i.e. Decile 1 and Decile 10 respectively), as well as the result across all deciles ("overall").

Figure 11: % Change in Disposable Income by Household Income Decile, Indexation

(a) Baseline A – no policy change



(b) Baseline B – Budget 2023



Source: Results based on SWITCH, the ESRI tax-benefit model. Notes: Baseline A refers to the no policy change scenario while Baseline B refers to the Budget 2023 scenario. Alternative Scenarios C, D, E and F are detailed in the box above, and involve various degrees of inflation indexation (from full indexation to inflation, to partial indexation to 50% of inflation).

As shown in Figure 11a, all indexation scenarios increase disposable incomes relative to the no policy change scenario, with the largest gain associated with full indexation to inflation (Alternative Scenario C). As expected, we observe more modest gains for partial indexation (Alternative Scenario D) and for indexation to 50% of inflation (Alternative Scenarios E and F). In each scenario, the highest decile gains significantly more than the lowest decile. It stands to reason that, as a larger proportion of those at the lower end of the income distribution are outside of the income tax system, the gains from a policy change that serves to reduce the income tax burden will not benefit the lowest income deciles to the same degree.

As Figure 11b illustrates, full and (very marginally) partial indexation to inflation provide an overall increase in disposable income relative to the Budget tax package. While the lowest decile also gains modestly under partial indexation, the highest decile is worse off in all but the full indexation scenario. Furthermore, linking the tax system either wholly or partially to 50% of inflation leads to an overall worse outcome relative to the Budget tax package.

Focusing on the impact by gender, we observe relatively minor differences between men and women in each of the indexation scenarios. As shown in Figure 12a, all indexation scenarios provide gains relative to the no policy change baseline. However, as shown in Figure 12b, relative to the Budget 2023 tax package, only full and (very marginally) partial indexation lead to an overall gain in incomes for men and women (indexation to 50% of inflation leads to a worse outcome for both men and women relative to the Budget tax package).

Figure 12: % Change in Disposable Income by Household Income Decile, Indexation

Source: Results based on SWITCH, the ESRI tax-benefit model. Notes: Baseline A refers to the no policy change scenario while Baseline B refers to the Budget 2023 scenario. Alternative Scenarios C, D, E and F are detailed in the box above, and involve various degrees of inflation indexation (from full indexation to inflation, to partial indexation to 50% of inflation).

Figure 12c and Figure 12d show the "spread" in the income gains (or losses) between men and women; that is, the extent to which men gain (or lose) more than women in each scenario. We present this information overall, and for those in the first and fifth quintiles (i.e. the bottom and top 25% of incomes respectively).

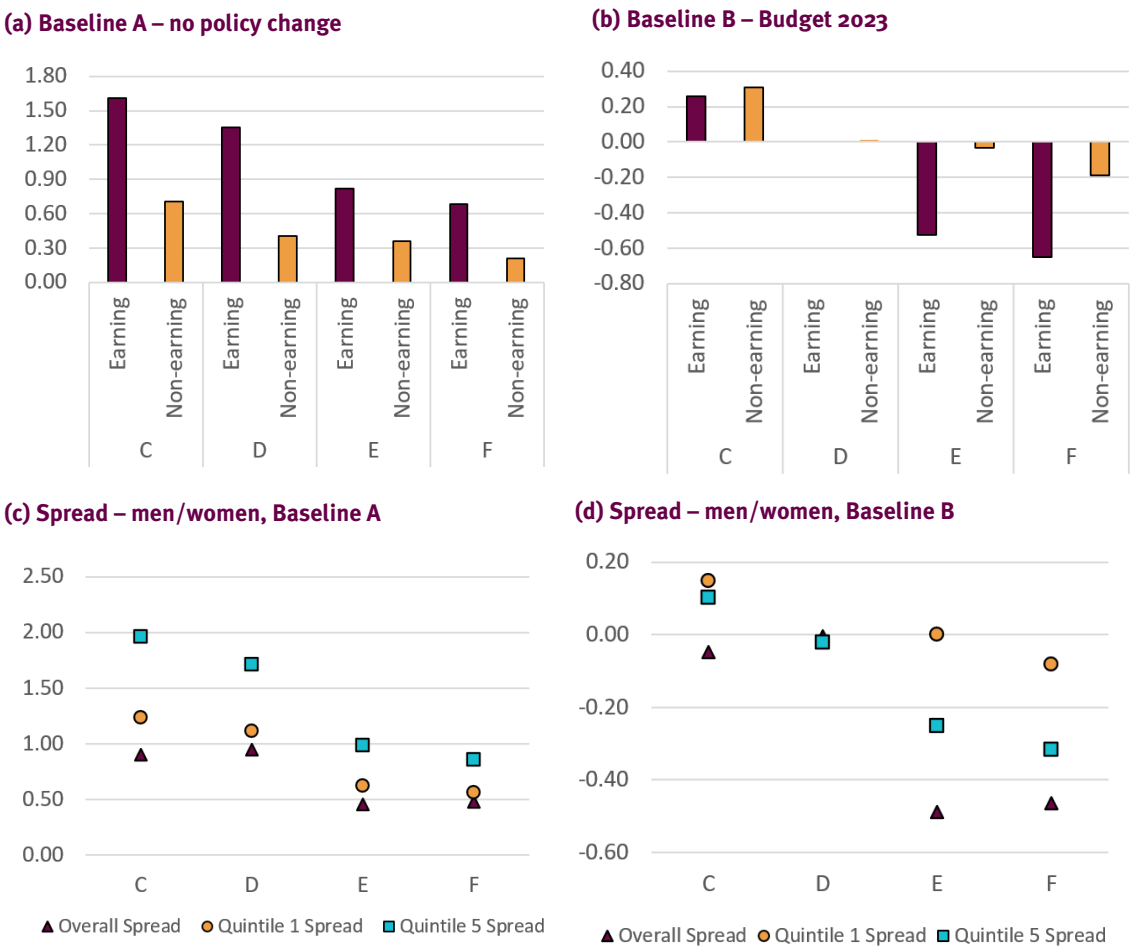
As shown, against the no policy change baseline, the spread is largest under full indexation and is the most pronounced for those in Quintile 5. In other words, when the tax system is indexed to inflation and assessed against a no policy change alternative, the highest income men gain more than the highest income women (a corollary of the gender pay gap).

Relative to the Budget tax package, we observe minimal differences between men and women under full and partial indexation, however, men lose relatively more than women when the tax system is indexed to 50% of inflation (this is most evident for Quintile 5, the highest income cohort).

Figure 13a and Figure 13b compare the results for earner and non-earner cohorts. As shown, there are pronounced differences between these two groups across most of the indexation scenarios. While both groups gain across all scenarios relative to a no policy change baseline, the full indexation scenario results in the largest increase in income for both cohorts, with earners gaining significantly more than non-earners. This is highlighted in Figure 13c, which shows the "spread" between earners and non-earners.

Against the Budget 2023 baseline, full and (very marginally) partial indexation results in a higher disposable income for both earner and non-earner cohorts. However, indexing to 50% of inflation leaves both cohorts worse off, with earners impacted relatively more than non-earners. Figure 13d highlights this further.

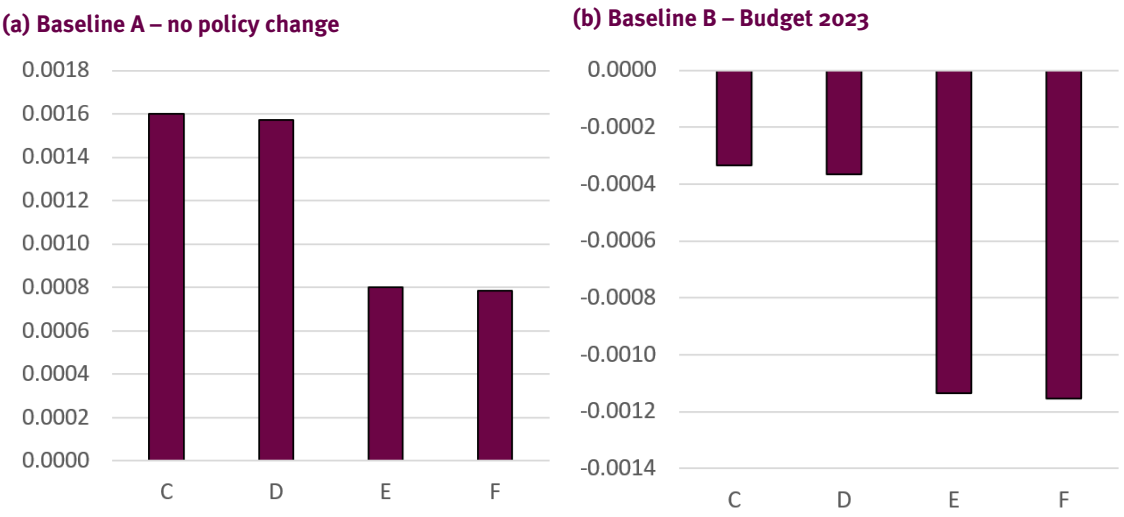
Figure 13: % Change in Disposable Income by Household Income Decile, Indexation



Source: Results based on SWITCH, the ESRI tax-benefit model. Notes: Baseline A refers to the no policy change scenario while Baseline B refers to the Budget 2023 scenario. Alternative Scenarios C, D, E and F are detailed in the box above, and involve various degrees of inflation indexation (from full indexation to inflation, to partial indexation to 50% of inflation).

Finally, we examine the impact of the indexation scenarios on the Gini Coefficient. Figure 14a and Figure 14b show changes relative to Baseline Scenarios A and B respectively. Indexation results in a less equal outcome when compared to a no policy change alternative. However, the reverse is true when indexation is assessed against the Budget 2023 tax package. In other words, indexation generally provides for a more equal outcome when compared to the Budget 2023 tax package.

Figure 14: Change in the Gini Coefficient, Indexation



Source: Results based on SWITCH, the ESRI tax-benefit model. Notes: Baseline A refers to the no policy change scenario while Baseline B refers to the Budget 2023 scenario. Alternative Scenarios C, D, E and F are detailed in the box above, and involve various degrees of inflation indexation (from full indexation to inflation, to partial indexation to 50% of inflation). A positive (negative) value indicates that the Gini Coefficient is smaller (larger) in the baseline scenario than in the alternative or reform scenario, implying that the baseline provides a relatively more (less) equal outcome.

The Single Person Child Carer Credit

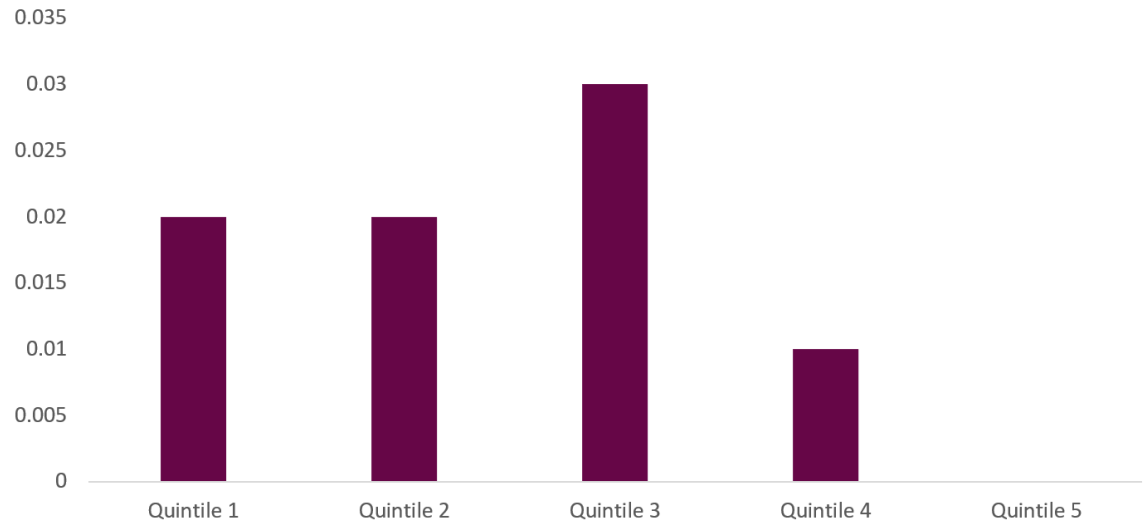
The Single Person Child Carer Credit (SPCCC) is a tax credit for people who are caring for children on their own. It replaced the One-Parent Family Tax Credit in 2014. The 2022 ESRI report[13] on lone parents (a vulnerable group) found that those on rental supports are much more likely to be below the poverty line while in work. It also noted almost a quarter of the working poor (24%) are lone parents. In Budget 2023 there was a series of tax credit increases but none for lone parents.

This example shows the costs and benefits of increasing the SPCCC by 12.1% in Budget 2023. The purpose of this is to use a tax credit to protect lone parents from the costs of inflation. As discussed in Example 1, a 12.1% inflation rate is based on the Central Banks forecasts of inflation for 2022 and 2023. In monetary terms, this would increase the SPCCC to €1,849.7 (+€199.7), at an estimated net cost of €13.08m. On an annual basis this change in tax policy would increase disposable income for lone parents by an estimated €77.28 - €83.72.

Figure 15 shows the percentage change in disposable income on a household basis for lone parents if the tax credit had been increased by 12.1%. This tax policy could be viewed as progressive as lower income quintiles gain more than those in the higher income quintiles. The bottom two quintiles benefit by a 0.02% increase in disposable income, while there is no appreciable gain for Quintile 5. The expansion of the tax credit would have the additional benefit of reducing the poverty gap by 0.01%.

[13] ESRI (2022) *The impact of one-parent family payment reforms on the labour market outcomes of lone parents*

Figure 15: Percentage Change in Disposable Income on a Household Basis



Source: Results based on SWITCH, the ESRI tax-benefit model

Disclaimer
The results shown above are a simulation of what would be expected from an increase in the tax credit for the SPCCC. It is important to note that this is a simulation and the data underlying the model are not complete. The model provides the user with an understanding of the effect of a change in policy but cannot guarantee/predict an outcome with absolute certainty.

Contact for Analysis Requests

The above examples should provide members with information to inform requests for SWITCH analyses from the PBO. The PBO are happy to discuss potential work using SWITCH with members and we can be contacted at *pbo@oireachtas.ie*.

Appendix

Key Outputs Provided by SWITCH:

- Estimated revenue and expenditure differences between policies (and net revenue)
- Impact on disposable household income by tax units & households (at decile/quintile level)
- Impact on disposable income by gender (at quintile level)
- Impact on disposable income by family type (e.g. single, lone parent, couple with children)
- Impact on disposable income by earning/non-earning status (by quintile & family type)
- Welfare recipient and cost estimates by scheme for each scenario
- Inequality metrics – Gini coefficient and at-risk-of-poverty rates
- Estimated recipient numbers and expenditure for non-cash benefits

Example areas that the PBO can model in SWITCH:

- Existing income tax bands & rates
- Existing income tax credits, including rent tax credit
- Existing USC bands & rates
- Existing PRSI thresholds & rates
- Existing weekly welfare rates, including reduced rates and qualified adult increases
- Means test thresholds
- Qualified child increases
- Childrens allowance
- Fuel allowance rate and income thresholds
- Living alone allowance
- Over 80s allowance
- Working Family Payment income thresholds and take-up rate
- One-off lumps sums targeted to fuel allowance recipients, living alone allowance recipients, working family payment recipients, carer's support grant recipients, disability allowance recipients, invalidity pension recipients and also universal energy credits.

Example areas that cannot currently be modelled in SWITCH, or where there is limited scope for modelling:

- Indirect taxes, such as VAT, carbon tax and excise
- New tax bands, credits, exemptions and new welfare schemes, means test bands and targeted lump sums
- Fuel allowance is limited to modelling for pensioner recipients only
- Inclusions/exclusions from means tests – limited scope
- Since disposable income is an analysis of net income, after tax and direct social transfers, expenses such as childcare and housing costs (e.g. HAP amounts) are not included in distributional impact analysis. Therefore, childcare and HAP analyses are limited.

Table 1: Equivalised Disposable Household Income Levels by Decile – from Example 1

Household Decile	Income Level (€pw)
Decile 1	<292.87
Decile 2	<340.14
Decile 3	<390.04
Decile 4	<455.08
Decile 5	<516.16
Decile 6	<583.68
Decile 7	<675.08
Decile 8	<789.51
Decile 9	<917.83
Decile 10	>917.83

Table 2a: Equivalised Disposable Household Income Levels by Decile – Baseline A (tax modelling)

Household Decile	Income Level (€pw)
Decile 1	<269.08
Decile 2	<310.70
Decile 3	<369.05
Decile 4	<433.07
Decile 5	<495.02
Decile 6	<567.94
Decile 7	<647.85
Decile 8	<765.20
Decile 9	<891.58
Decile 10	>891.58

Table 2b: Equivalised Disposable Household Income Levels by Decile – Baseline B (tax modelling)

Household Decile	Income Level (€pw)
Decile 1	<269.08
Decile 2	<311.40
Decile 3	<371.08
Decile 4	<435.76
Decile 5	<499.68
Decile 6	<575.42
Decile 7	<658.30
Decile 8	<778.93
Decile 9	<905.97
Decile 10	>905.97

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Go to our webpage: *www.Oireachtas.ie/PBO*
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