

UKMOD Behaviour (BVR) Add-on

technical note

Matteo Richiardi[†], Justin van de Ven[†], and Daria Popova[†]

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1 Background

The total effects of a change to fiscal policy can typically be disaggregated into two components:

1. Effects that would be observed if all individual characteristics upon which tax and benefit payments depend remained invariant – referred to as “impact”, “static”, or “first-order” effects.
2. Effects associated with behavioural responses to the change in fiscal policy – referred to as “behavioural” or “second-order” effects.

First-order effects are often a prime focus of interest in public policy debate. This focus reflects the relative transparency of definition of first-order effects, and prevailing uncertainty concerning forecasts of behavioural responses underlying second-order effects. Nevertheless, the potential importance of accounting for behavioural responses when analysing the likely effects of fiscal policy reform scenarios has not gone unnoticed.

An extensive economic literature has sought to improve our understanding of behavioural responses to policy change. The simplest approach considered by this literature involves econometric estimation of functions that describe behaviour in terms of policy parameters. This “reduced form” approach provides an intelligible connection between the subjects of interest (policy parameters) and the issues of concern (behaviour). Yet there are substantial risks associated with assuming that such stylised relationships will continue to hold into the future, as Lucas’ critique and the hyper-inflation episode of the 1970s made clear. An appreciation of the limitations of reduced form methods has motivated interest in identifying “structural descriptions” of behaviour that are (conceptually) invariant to changes in the policy environment.

Nevertheless, most work that seeks to account for second-order effects in UK government studies of changes to tax and benefits policy adopts a reduced form approach to project

[†] Centre for Microsimulation and Policy Analysis, University of Essex.

behavioural responses. A popular method is to base analyses on assumed elasticities, which relate changes in policy parameters to (percentage) changes in (hours of) employment. This focus reflects both the relative transparency of the approach, and the ease of conducting associated sensitivity analyses.

In the case of Department for Work and Pensions (DWP) and HM Treasury modelling, for example, elasticities for labour supply responses draw upon related empirical studies conducted by the Institute for Fiscal Studies (2013, 2008). A similar approach has been applied to taxable income by the Scottish Government (2020) and Scottish Fiscal Commission (2021, 2018).

The method implement in UKMOD follows the approach documented by the Scottish Fiscal Commission, which has the advantage of being transparent an publicly documented.

1.1 Scottish Fiscal Commission assumptions

The Scottish Fiscal Commission (SFC) models behavioural responses over four domains¹:

- Intensive margin responses to changes in marginal effective tax rates
- Extensive margin responses to changes in average effective tax rates
- Additional intra-UK migration responses
- Short-term forestalling responses

It is important to avoid mis-interpretation of the terminology used here. The “extensive margin” in economic studies often refers to incidence, whereas the “intensive margin” refers to quantum given incidence. Hence, in studies of employment, the extensive margin refers to whether people are in or out of work, whereas the intensive margin refers to the number of hours worked among those who are working.

In contrast, the SFC behavioural assumptions interpret the “intensive margin” as the subset of individuals who experience a change in marginal effective tax rates as the result of a reform, and the “extensive margin” as the subset of individuals who experience a change in average effective tax rates. For example, a 5% increase in the basic rate of income tax will affect the intensive margin only of basic rate taxpayers, but will affect the extensive margin for all people with taxable incomes in excess of the minimum threshold to pay the basic rate. This document uses the SFC’s terminology throughout.

Individuals who experience a change in marginal effective tax rate will (usually) also experience a change in average effective tax rate; in this case SFC behavioural responses are limited to consideration of the intensive margin.

¹ Scottish Fiscal Commission (2021), 5.13.

The BVR add-on focusses exclusively on the intensive and extensive margin behavioural responses outlined above. Each of these responses is described at further length below.

1.1.1 Intensive margin responses to changes in marginal effective tax rates

In this case, SFC analyses “account for behavioural responses to changes in a taxpayer’s marginal rate of tax primarily through the use of Taxable Income Elasticities (TIEs). TIEs estimate the percentage change in total taxable incomes in response to a one per cent change in the net-of-tax rate” (p. 16). Assumed TIES underlying the 2020/21 budget forecasts are reported in Table 1.

Consider the case of an individual earning £200,000, with an assumed TIE of 0.5, whose (top) marginal tax rate increases from 40% to 45%. This policy change represents an 8.33% ($0.55 / 0.6 - 1$) reduction in the “net-of-tax rate”. In this case, a reduction in total taxable income of 4.17% ($0.5 \times 8.4\%$) would be projected, equal to £8,333 ($200,000 \times 4.17\%$). The increase in tax revenue generated by the rise in marginal tax rate would consequently be reduced by £3,750 ($8,333 \times 0.45$) due to projected behavioural responses.

Table 1: Scottish Fiscal Commission’s assumed taxable income elasticities for 2020/21 budget forecasts

Taxable income start (£)	Taxable income end (£)	Taxable income elasticity
Low	Basic rate limit	0.015
Basic rate limit	80,000	0.1
80,001	150,000	0.2
150,001	300,000	0.35
300,001	500,000	0.55
500,001	High	0.75

Source: Scottish Fiscal Commission (2021), Figure 5.3.

1.1.2 Extensive margin responses to changes in average effective tax rates

The SFC adopts a more stylised approach for simulating behavioural responses at the extensive than the intensive margin, which (ostensibly) reflects the relatively thin evidence base for informing the associated approach.

Here, the SFC projects extensive margin effects by multiplying the change in total net transfer payments of an individual affected by a considered policy reform by an assumed factor. Factors underlying the 2020/21 Scottish budget forecast are reported in Table 2.

Consider the case of an individual paying the top rate of tax, whose net tax liability would increase by £500 in 2020/21 following an increase in the basic rate of tax. In this case, if the average effective tax rate factor was 0.2, then the increase in tax liability projected after behavioural responses would be £400 ($500 \times (1 - 0.2)$).

Table 2: Scottish Fiscal Commission’s assumed average effective tax rate factors for 2020/21 budget forecasts

Taxable income start (£)	Taxable income end (£)	Extensive AETR factors
Low	Basic rate limit	0
Basic rate limit	80,000	0.06
80,001	150,000	0.06
150,001	300,000	0.25
300,001	500,000	0.25
500,001	High	0.25

Source: Scottish Fiscal Commission (2021), Figure 5.4.

2 Methods

Following the approach outlined above for projecting behavioural responses at the intensive and extensive margins requires the following information:

- Intensive margin:
 - Taxable Income Elasticities (TIEs)
 - Taxable Income under baseline scenario
 - Marginal Effective Tax Rates (METRs) under baseline and reform scenarios
- Extensive margin:
 - Average Effective Tax Rate factors (AETR factors)
 - Net tax liability under baseline and reform scenarios

UKMOD addresses these requirements by:

- including TIEs and AETR factors in the model spine from the 2016 system year;
- checking for METRs and net tax liabilities for a baseline combination of policy and input data when input data are imported.

Given this information:

- the “Behavioural Responses” (BVR) add-on is designed to evaluate second-order effects; and
- the “Behavioural responses” statistics template is designed to analyse the impact of behavioural responses on UKMOD projections.

Each of the above points is addressed in turn.

2.1 Assumed behavioural parameters

The SFC’s modelling approach was first documented in 2018, with an updated description provided in 2021. Both descriptions are identical, comprising the same TIEs and AETR factors across the same income bands. Furthermore, income band thresholds are reportedly

fixed in nominal terms, except for the upper income threshold of the lowest band, which evolves with the basic rate (of tax) limit. These details are included in policy *ConstDef_uk* of UKMOD; see parameters *TIERate*, *TIETresh*, *AETRFactor*, and *AETRThresh*.

2.2 Extended input data

Use of the BVR add-on involves extending the model input data. The steps to achieve this are described in Section 4.

2.3 The Behavioural Responses (BVR) add-on

The MTR add-on that is described in the UKMOD documentation was taken as the starting point for the BVR add-on. The MTR add-on evaluates marginal effective tax rates (METRs) implied by a policy system for everyone in the input data with non-zero labour income. The BVR add-on extends upon the MTR add-on in four ways:

- 1) METRs are evaluated for the entire population described by the input data;
- 2) routines to evaluate behavioural responses to the intensive margin are included;
- 3) routines to evaluate behavioural responses to the extensive margin are included; and
- 4) adjustments to income and employment to reflect the intensive and extensive behavioural responses are included.

The revised add-on loops over the UKMOD spine seven times. The first loop conducts a standard UKMOD simulation, as would be run without the add-on. This loop permits net tax burdens to be evaluated for the considered policy system for all observations in the input data. The second to sixth loops re-evaluate tax and benefit payments that would apply if selected sources of income increased slightly from their observed values, commencing with labour income (*yem* and *yse*), before proceeding to private pension income (*ypp*), taxable property income (*yprtx*), taxable investment income (*yiyltx*), and other income (*yprnt*, *yiynt*, *yptmp*, *yot01*, *yptot*).

Comparisons between projected transfer payments in the first and subsequent loops are used to evaluate observation-specific marginal effective tax rates for each respective measure of income under the considered policy system, in common with the MTR add-on. The final loop uses the net tax burdens evaluated from the first loop, and the effective marginal tax rates to calculate intensive and extensive behavioural responses as described in Section 1.1. These behavioural responses are assumed for the final loop of the BVR add-on.

Each of the amendments to the MTR add-on referred to above is described in turn below.

2.3.1 Evaluation of METRs for the entire population

The MTR add-on was devised to explore policy implications for employment incentives, which limited consideration of the MTR add-on to marginal variation of labour incomes.

Consistency with the modelling approach described in Section 1.1, however, requires all sources of taxable income to be taken into consideration.

The METR of individual i , mtr_i , with original (pre-tax and benefit) income x_i , and disposable (post-tax and benefit) income y_i is given by:

$$mtr_i = 1 - \frac{\Delta y_i}{\Delta x_i}$$

where Δ denotes a small perturbation of original income: $\Delta x_i = x'_i - x_i$. The MTR add-on considers projections for a small deviation of employment income to evaluate METRs for the employed population. This approach has been extended for the BVR add-on to consider a more complete description of original income for the population with positive original income.

Specifically, as discussed above, five separate sources of original income are considered by the BVR add-on: employment income, private pension income, taxable property income, taxable investment income, and a residual “other” income. METRs for each of these sources of income are evaluated for any individual reported in the input dataset aged 18 and over and with income from the respective source exceeding a minimum threshold. These METRs are evaluated by increasing the reported measures of income by 5 percentage points.

2.3.2 Evaluating behavioural responses at the intensive margin

Behavioural responses at the intensive margin are projected in the form of changes to taxable income, following the approach adopted by the SFC as described in Section 1.1.1. This involves first calculating METRs of the considered policy system for all observations in the input data set, as discussed above (Section 2.3.1). The add-on then evaluates, for each income source, the ratio of the calculated METRs to METRs reported in the input data for the default system/input data combination (see Section 2.2). These ratios are then combined with Taxable Income Elasticities provided as parameters to the model (see Section 2.1) to evaluate the change in income associated with the considered policy system.

Note that the ratio of METRs mentioned above can only sensibly be obtained where the METRs reported in the input data are less than 100%. Where METRs reported in the input data exceed 95%, then behavioural responses at the intensive margin are ignored. Although a substantial share of the population may be subject to a METR above 95% in practice, the respective population is predominantly comprised of individuals on very low incomes, for whom behavioural responses are anticipated to be small.

2.3.3 Evaluating behavioural responses at the extensive margin

Behavioural responses at the extensive margin are also projected in the form of changes to income, in common with responses at the intensive margin. In this case, the total net

transfer payments of the considered system are deducted from the associated statistic reported in the input data for the reference system/input data (see Section 2.2). These values are then multiplied by the respective Average Effective Tax Rate (AETR) factor described in the expanded model parameters (see Section 2.1) to obtain the projected impact of behaviour on net transfer payments under the considered system. Income changes due to extensive margin behavioural responses are then obtained by dividing the change in net transfer payments by the respective METR under the considered system.

As for the intensive margin behavioural responses, the ratio noted above can only be sensibly obtained where the METR is greater than zero. Hence extensive margin behavioural responses are only considered for observations where the METR exceeds 5%.

2.3.4 Identifying behavioural adjustments

Having identified the intensive and extensive behavioural responses as described above, the model proceeds by assuming the intensive margin where this is non-zero and the extensive margin otherwise. This is consistent with the SFC's approach, as described in Section 1.1, and reflects the greater precision generally associated with empirical measures of intensive margin effects.

2.4 Statistics Presenter template

Statistics Presenter includes a template entitled "UKMOD Statistics – Behavioural responses". As behavioural responses are understood as arising due to a change in the policy environment, the associated template is an adaptation of the "Baseline/Reform" template. The "Behavioural responses" template is structured around three projected scenarios.

The "base" scenario reflects policy prior to a considered reform. The "static reform" scenario reports statistics that omit behavioural responses. Comparisons between the "base" and "static reform" scenarios replicate a standard analysis of a reform scenario, commonly explored using the "Baseline/Reform" template. "Static effects" (Section 1) of the considered reform that omit behavioural responses are obtained by subtracting statistics evaluated under the "base" from the "static reform" scenario.

The third scenario is referred to as the "behavioural reform", and incorporates the behavioural responses evaluated by the BVR add-on. "Behavioural effects" of the considered reform are evaluated by subtracting "static reform" from "behavioural reform" statistics. These statistics provide a measure of the impact of behavioural responses to the reform. Finally, the "total effects" of the reform are obtained by subtracting statistics evaluated under the "base" from those evaluated from the "behavioural reform", so that total effects are the sum of static and behavioural effects.

3 Structure of the BVR Add-on

The BVR add-on is comprised of 10 policies, each of which is briefly described in turn.

3.1 *oa_control_bvr*

The *oa_control_bvr* policy, in common with other add-ons, defines which systems the add-on is designed for use with and controls associated integrations with the respective policy spines. Each of the subsequent policies of the BVR add-on is associated with a separate function identifying where in an existing policy spine the policy should be injected. The last function of the *oa_control_bvr* policy is designed to facilitate consideration of full benefits take-up for analysis.

3.2 *prep_bvr*

The *prep_bvr* policy manages the loops upon which the BVR add-on depends. The seven principal loops around which analysis is organised are defined by a “Loop” function with *loop_id prim* (for primary). As noted in Section 2.3, the first primary loop conducts a standard UKMOD simulation of the targeted system. In primary loops 2 to 6, UnitLoops are used to adjust specific measures of income, which are used to evaluate associated marginal effective tax rates. The seventh (and final) primary loop uses detail gathered in preceding loops to evaluate behavioural responses to the targeted policy system.

The loops of the BVR add-on are inserted into the policy spine after all inputs have been initialised (following policy *neg_uk*) and continue until just prior to where outputs are saved (*output_std_uk*).

3.3 *init_bvr*

The *init_bvr* policy defines loop-specific adjustments. These adjustments are defined at the top of the add-on loops, adjusting income (for unit loops in primary loops 2 to 6), and behaviour (loop 7).

3.4 *store_bvr*

Policy *store_bvr* is added just above the standard output policy in the policy spine (*output_std_uk*). The policy is designed to store targeted results for subsequent processing and model output.

3.5 *calc_bvr*

The *calc_bvr* policy evaluates the net tax burden of each simulated individual at the end of the first primary loop. These calculations are evaluated prior to *store_bvr*, for use as intermediate inputs in later calculations.

3.6 *earns_bvr*

The *earns_bvr* policy is inserted just after *calc_bvr*. This policy evaluates marginal effective tax rates on earnings after primary loop 2, and associated behavioural responses considered in loop 7.

3.7 *ypp_bvr*

The *ypp_bvr* policy is inserted just after *earns_bvr*, and performs a similar role to that policy but for private pensions rather than earnings.

3.8 *yprtx_bvr*

The *yprtx_bvr* policy follows the same pattern as outlined above for taxable property income.

3.9 *yiytx_bvr*

The *yprtx_bvr* policy follows the same pattern as outlined above for taxable investment income.

3.10 *other_bvr*

The *yprtx_bvr* policy follows the same pattern as outlined above for “other” income.

3.11 *dummy_bvr*

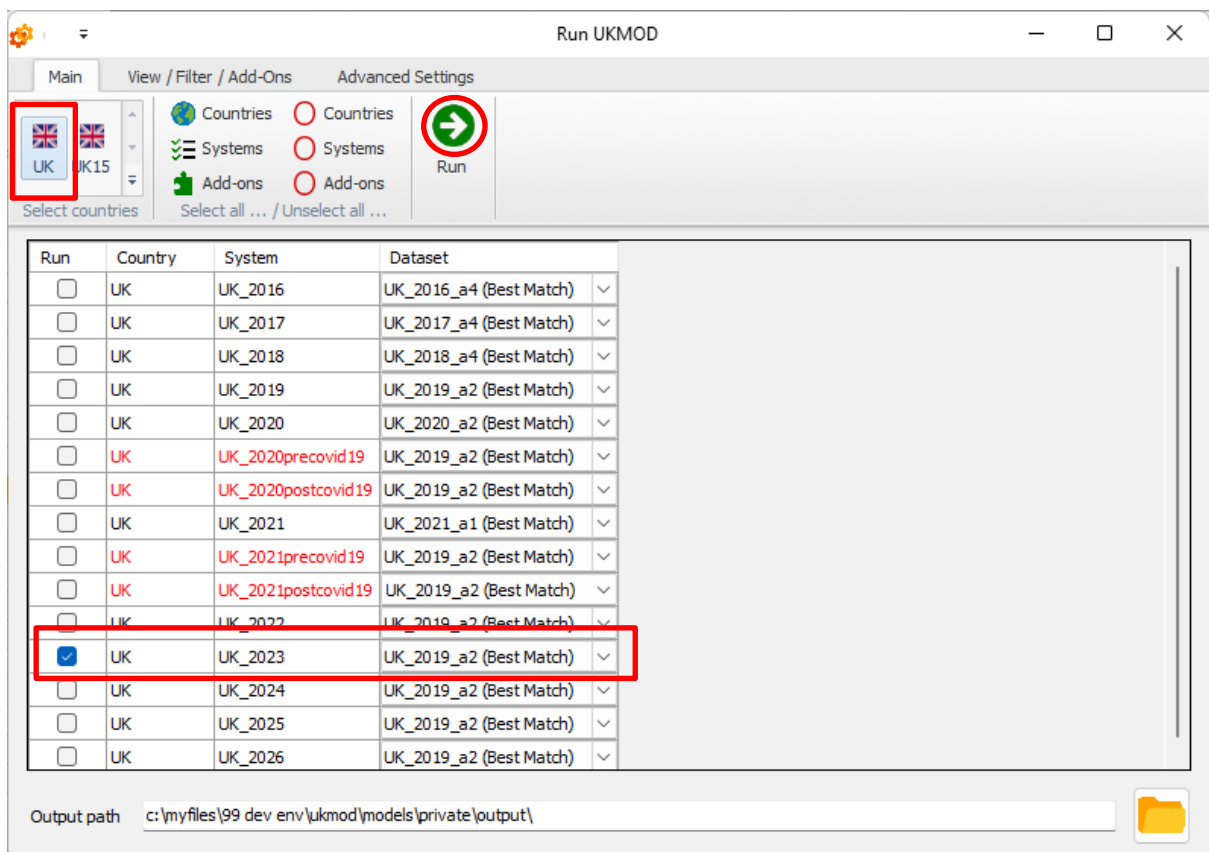
The *dummy_bvr* policy is included to ensure that variables of interest are reported by the EUROMOD software.

4 Practical Use of the BVR Add-on

This section describes how to use the BVR add-on for the first time, with the aid of a practical example.

Suppose we are interested in analysing a 5-percentage point increase in the basic rate of tax for people residing England and Northern Ireland, starting from the 2023 system. We begin by generating results for the default combination of system and input data.

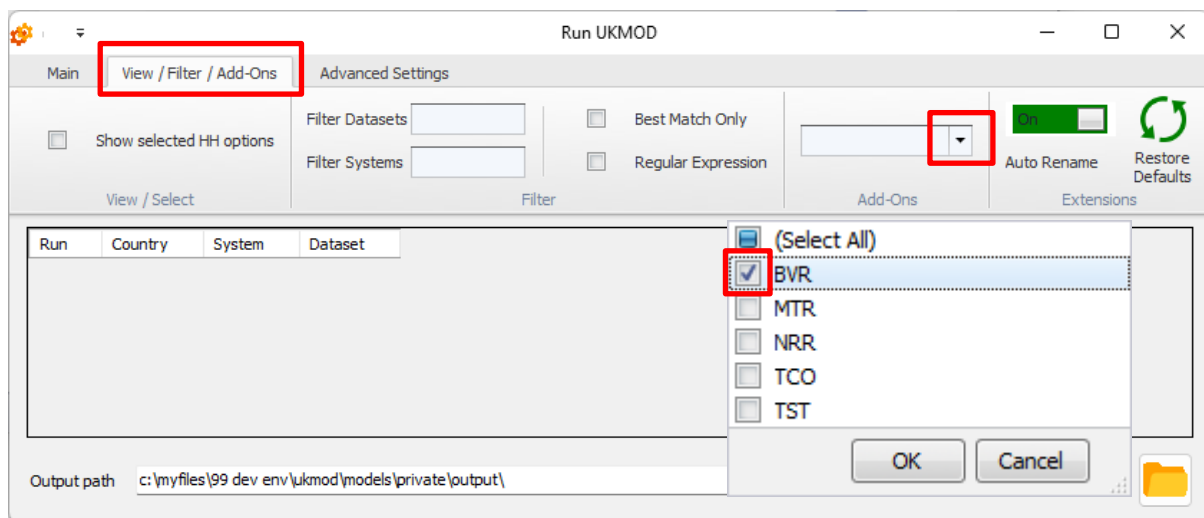
Open UKMOD, and press the “Run UKMOD” button:



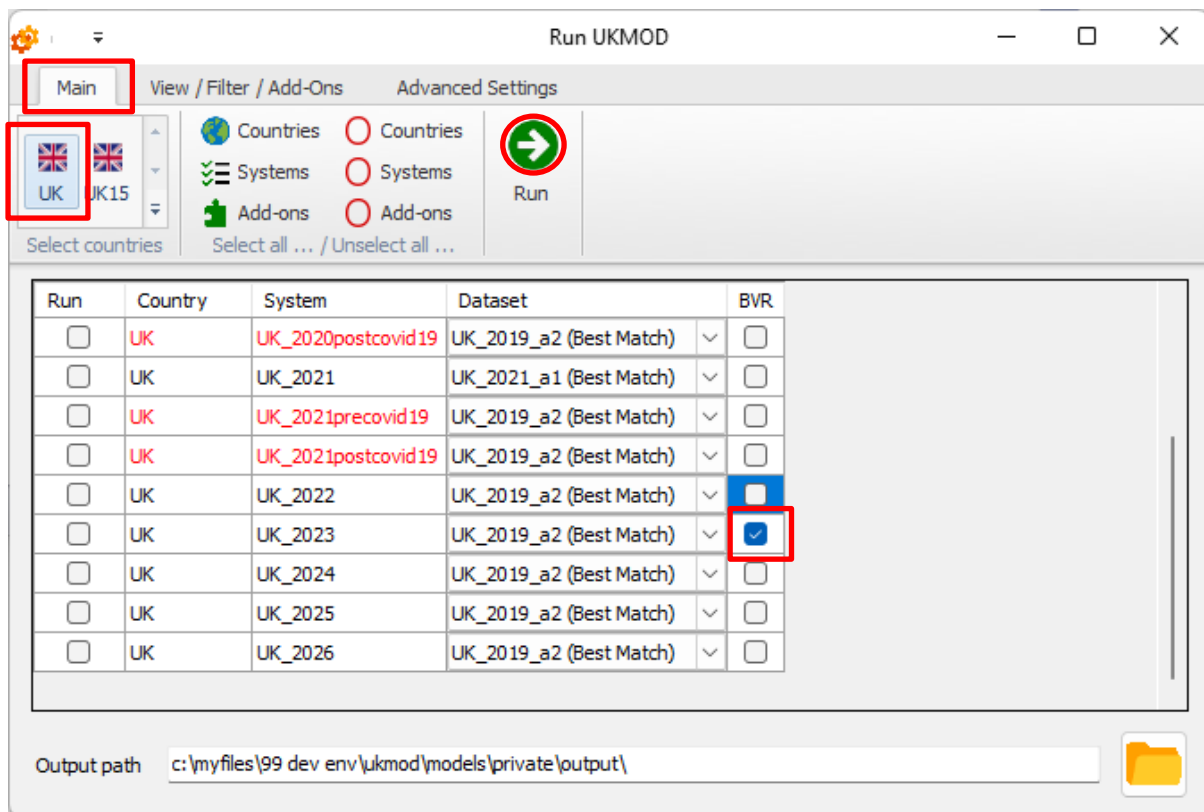
After generating results for our reference case, we evaluate working statistics for the reference case that are used to project behavioural responses. This is done by running the

BVR add-on for the default 2023 system. **Note** that we need to generate these results for the whole of the UK, even if we are interested exclusively in analysing results for a specific nation. This is because the working variables will be appended to the model's input data, which include observations for the whole of the UK.

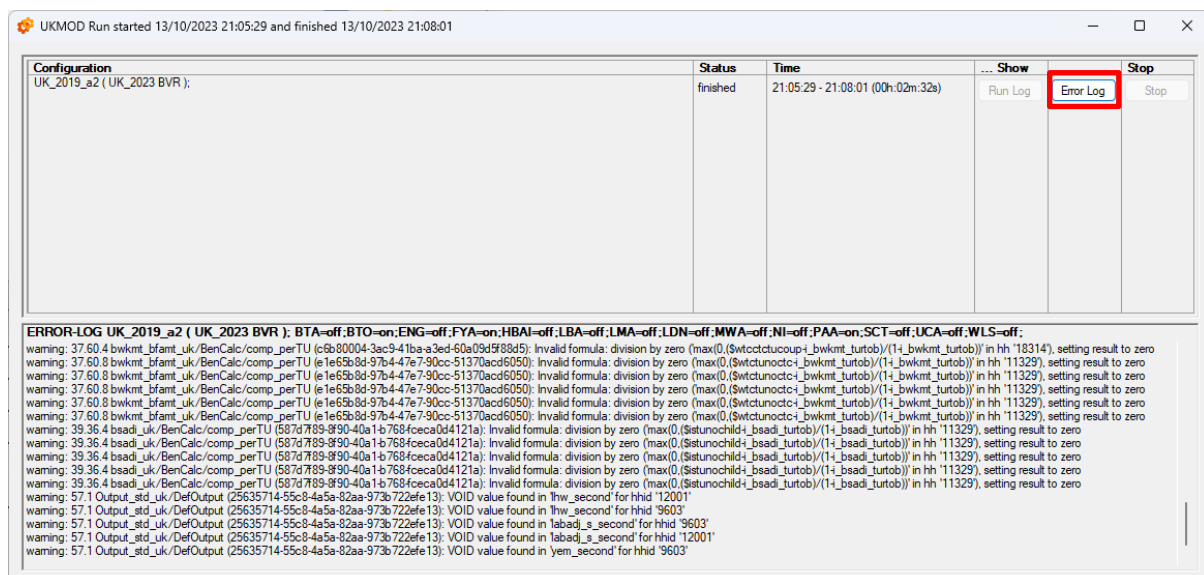
Open the run window, select the “View / Filter / Add-Ons” tab, and choose the BVR option from the add-ons drop-down menu. If you are using a model prepared for one of the nations rather than the UK, then you should select the relevant national extension (e.g. “SCT”), and turn the option to “Keep Households from Scotland” off.



Return to the “Main” tab, select the “UK” model, navigate down and select the option to run the BVR add-on for the UK_2023 system (accepting the default dataset), and press the “Run” button.



The model should then run through and complete – note that this may take some time, as the model needs to run through 7 iterations of a standard simulation. Note also, that you are likely to receive some warning messages at the end of the simulation – these can be ignored.



We now need to copy reference statistics from the output file generated by the above simulation to the input file considered for analysis.

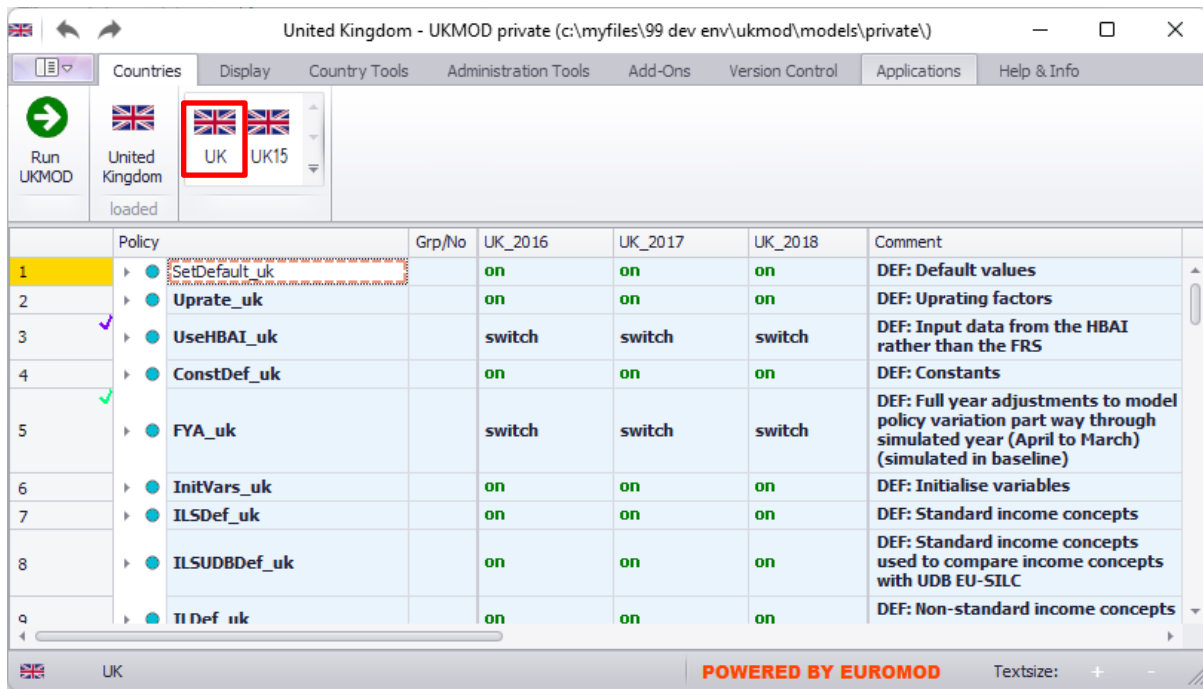
Open the output file “uk_2023_bvr.txt” and the input file “UK_2019_a2.txt” in Excel. In the output file (uk_2023_bvr.txt), search for “mntr_earn_s”. Copy this column of data and append the data to the right-most column of the input data (UK_2019_a2.txt). Edit the name at the top of the column to “mntr_earn_s”. Repeat this process for “mntr_ypp_s”, “mntr_yprtx_s”, “mntr_yiytx_s”, “mntr_other_s” and “ntax_s”. Ensure that both variables report results for all observations in the input data. If the new variables report a different number of observations as described by the input data, then verify that you have analysed the same system and input data with the BVR add-on, and that you have directed the model to generate results for the whole of the UK.

	EV	EW	EX	EY	EZ	FA	FB	FC	FD	FE	FF	FG	FH
1	bdict0220	bdict0119	bdict0219	bdict0120	lemiwi	tmu04	mntr_earn	mntr_ypp	mntr_yprtx	mntr_yiytx	mntr_other	ntax	
2	0	0	0	0	999	72.77666	71	0	0	0	0	381.35	
3	0	0	0	0	999	140.5592	0	100	0	0	0	-152.02	
4	0	0	0	0	999	228.75	58	0	0	0	0	1760.93	
5	0	0	0	0	999	0	73.03	0	0	0	0	855.45	
6	0	0	0	0	999	133.8925	58	0	0	0	0	1822.16	
7	0	0	0	0	999	0	0	0	0	0	0	0	
8	0	0	0	0	999	0	0	0	0	0	0	-1289.47	
9	0	0	0	0	999	0	0	0	0	0	0	-443.48	
10	0	0	0	0	999	197.5053	0	58	0	0	0	-146.71	
11	0	0	0	0	999	0	0	0	0	0	0	-523.29	

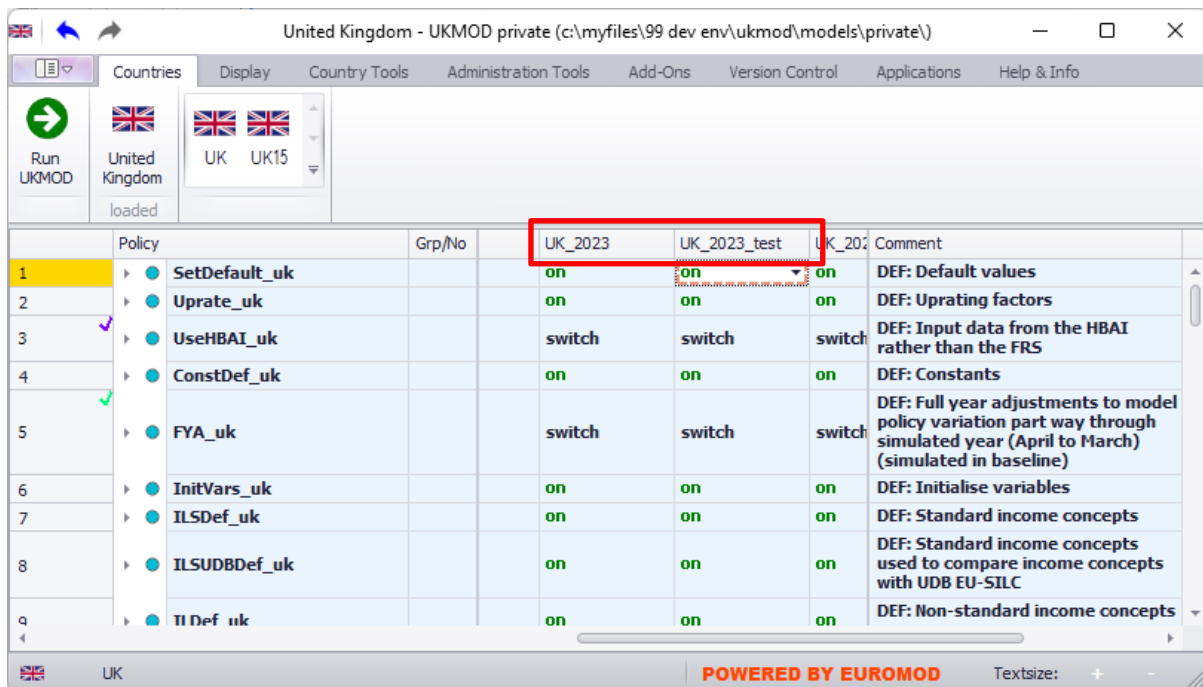
Save the input data file, and close both Excel workbooks.

We have now set-up the input file UK_2019_a2.txt to analyse behavioural reforms to changes in the 2023 system. Note that this process would need to be repeated if you were to consider reforms for any other system and/or input data set.

We now return to UKMOD to define our policy reform of interest. Open the UK model of UKMOD.



Create a copy of the 2023 system (by right-clicking “UK_2023” at the top of the display window and selecting copy/paste system). Call this copy “UK_2023_test”.



Navigate to the income tax parameters of the UK_2023_test system and increase the value of parameter \$ITRate1 from 0.2 to 0.25 (as shown).

United Kingdom - UKMOD private (c:\myfiles\99 dev env\ukmod\models\private\)

Run UKMOD United Kingdom loaded

Policy	Grp/No	UK_2022	UK_2023	UK_2023_test	UK_2024	Comment
4.4.11	\$ITThresh1	37700#y	37700#y	37700#y	37700#y	Higher Rate Threshold (HRT)
4.4.12	\$ITThresh2	150000#y	125140#y	125140#y	125140#y	Additional Rate Threshold (ART)
4.4.13	\$ITThresh3	0	0	0	0	Default value for the whole of UK
4.4.14	\$ITThresh4	0	0	0	0	Default value for the whole of UK
4.4.15	\$ITRate1	0.2	0.2	0.25	0.2	First tax rate
4.4.16	\$ITRate2	0.4	0.4	0.4	0.4	Second tax rate
4.4.17	\$ITRate3	0.45	0.45	0.45	0.45	Third tax rate
4.4.18	\$ITRate4	0	0	0	0	Higher rate (Scotland)
4.4.19	\$ITRate5	0	0	0	0	Additional rate (Scotland)
4.4.20	\$ITRate1Wf	0	0	0	0	First WRIT (Wales)
4.4.21	\$ITRate2Wf	0	0	0	0	Second WRIT (Wales)
4.4.22	\$ITRate3Wf	0	0	0	0	Third WRIT (Wales)
4.4.23	\$ITThresh1Sav	37700#v	37700#v	37700#v	37700#v	Higher Rate Threshold (HRT) - savings

UK ConstDef_uk - DefConst POWERED BY EUROMOD Textsize: + -

Save the model (CNTRL + s), and re-run the BVR add-on for the new system “UK_2023_test”.

Run UKMOD

Main View / Filter / Add-Ons Advanced Settings

Select countries: UK UK15

Select all ... / Unselect all ...

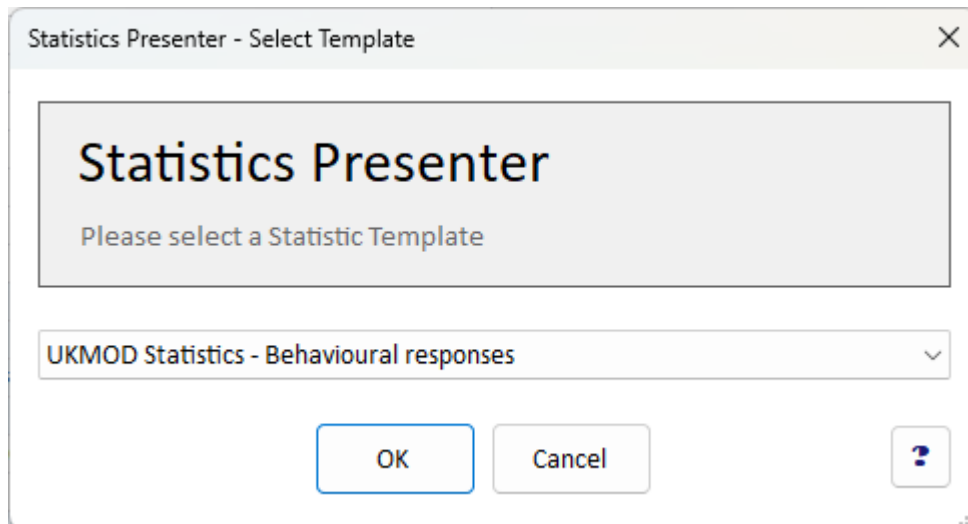
Run

Run	Country	System	Dataset	BVR
<input type="checkbox"/>	UK	UK_2018	UK_2018_a4 (Best Match)	<input type="checkbox"/>
<input type="checkbox"/>	UK	UK_2019	UK_2019_a2 (Best Match)	<input type="checkbox"/>
<input type="checkbox"/>	UK	UK_2020	UK_2020_a2 (Best Match)	<input type="checkbox"/>
<input type="checkbox"/>	UK	UK_2020pre covid19	UK_2019_a2 (Best Match)	<input type="checkbox"/>
<input type="checkbox"/>	UK	UK_2020post covid19	UK_2019_a2 (Best Match)	<input type="checkbox"/>
<input type="checkbox"/>	UK	UK_2021	UK_2021_a1 (Best Match)	<input type="checkbox"/>
<input type="checkbox"/>	UK	UK_2021pre covid19	UK_2019_a2 (Best Match)	<input type="checkbox"/>
<input type="checkbox"/>	UK	UK_2021post covid19	UK_2019_a2 (Best Match)	<input type="checkbox"/>
<input type="checkbox"/>	UK	UK_2022	UK_2019_a2 (Best Match)	<input type="checkbox"/>
<input type="checkbox"/>	UK	UK_2023	UK_2019_a2 (Best Match)	<input type="checkbox"/>
<input type="checkbox"/>	UK	UK_2023_test	UK_2019_a2 (Best Match)	<input checked="" type="checkbox"/>
<input type="checkbox"/>	UK	UK_2024	UK_2019_a2 (Best Match)	<input type="checkbox"/>
<input type="checkbox"/>	UK	UK_2025	UK_2019_a2 (Best Match)	<input type="checkbox"/>
<input type="checkbox"/>	UK	UK_2026	UK_2019_a2 (Best Match)	<input type="checkbox"/>

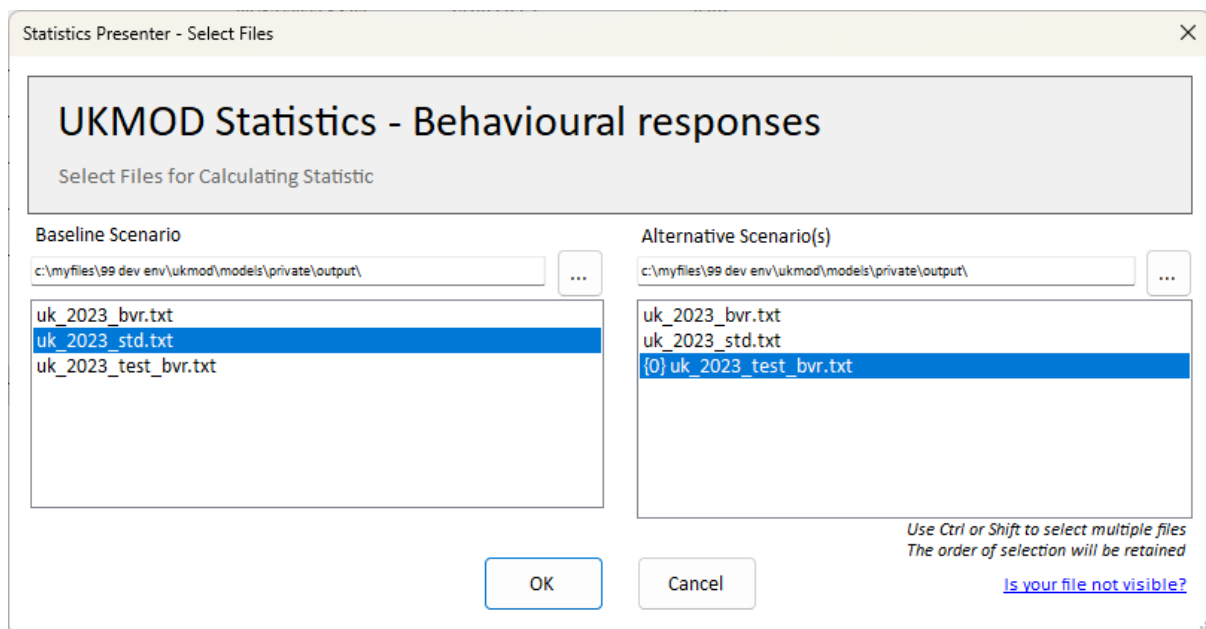
Output path: c:\myfiles\99 dev env\ukmod\models\private\output\

The add-on should run through, this time evaluating behavioural responses to the reform. When the model is complete, we can analyse results using Statistics Presenter.

Open the “Statistics Presenter” selection window, and select “UKMOD Statistics – Behavioural responses” from the drop-down menu.



Under the Baseline Scenario, select the “uk_2023_std.txt” output, under the Alternative Scenario select the “uk_2023_test_bvr.txt” output, and press “OK”.



When the statistics presenter window is populated you can inspect associated results.

UKMOD Statistics - Behavioural responses

Results for United Kingdom 2023 vs UK_2023_test



Fiscal Overview

Inequality

Mean HH income (equ)

Mean BU income (equ)

Income Shares

Cut Offs

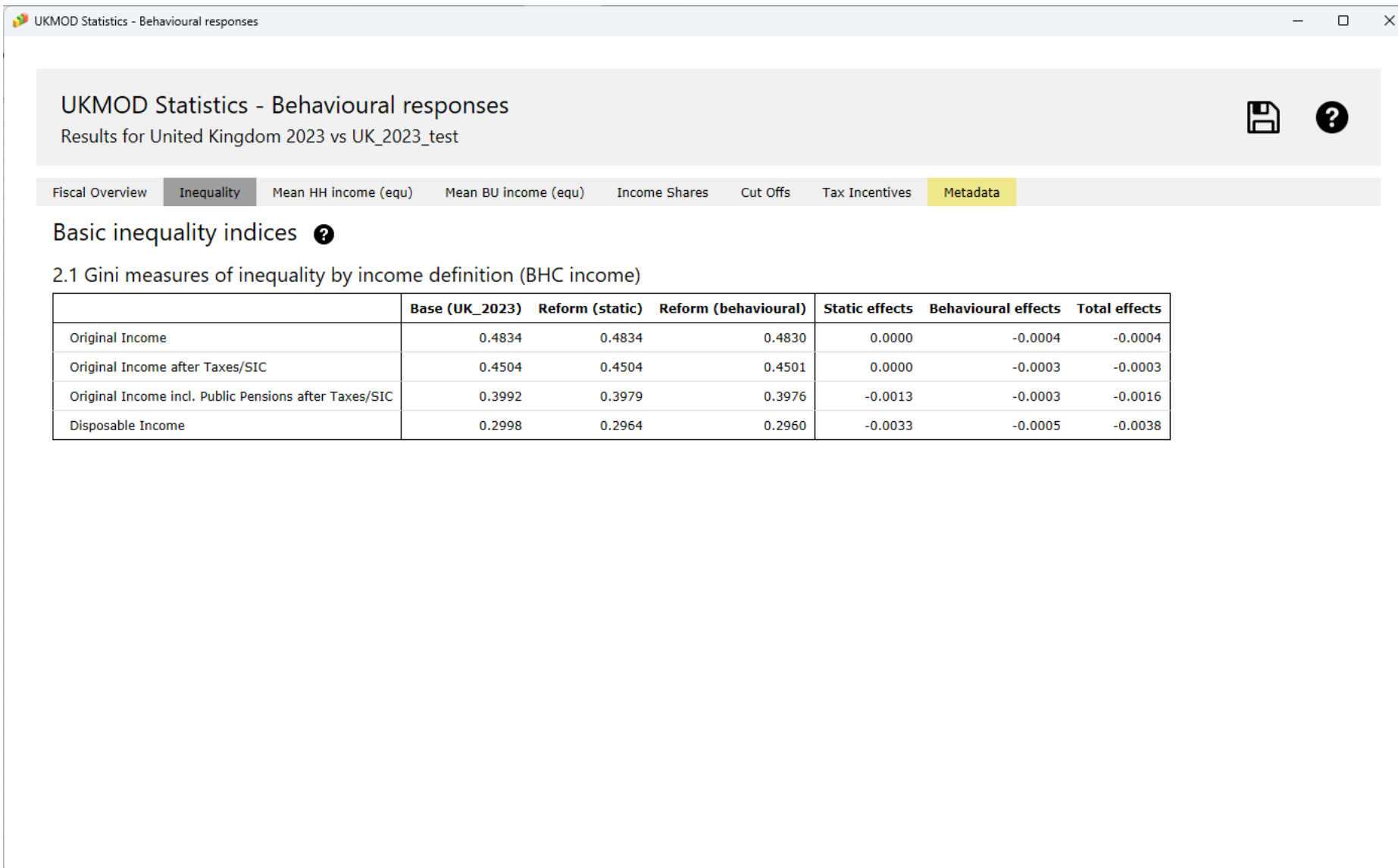
Tax Incentives

Metadata

Market incomes and fiscal overview ?

Yearly, million, currency as defined in model output

	Base (UK_2023)	Reform (static)	Reform (behavioural)	Static effects	Behavioural effects	Total effects
Total market incomes	1,330,393.36	1,330,393.36	1,327,336.26	0.00	-3,057.10	-3,057.10
... employment and self-employment income	1,158,494.50	1,158,494.50	1,156,225.19	0.00	-2,269.32	-2,269.32
... other sources of market income	171,898.85	171,898.85	171,111.07	0.00	-787.78	-787.78
Government revenue through taxes and national insurance contributions	464,245.02	492,110.14	490,526.02	27,865.12	-1,584.12	26,281.00
... direct taxes	288,077.07	315,942.19	314,737.81	27,865.12	-1,204.38	26,660.74
..... personal income tax (simulated)	241,633.64	269,498.77	268,294.36	27,865.13	-1,204.40	26,660.72
..... devolved taxes in Scotland	17,196.11	17,196.11	17,196.11	0.00	0.00	0.00
..... devolved taxes in Wales	2,949.49	2,949.49	2,949.49	0.00	0.00	0.00
..... non-devolved taxes	221,488.05	249,353.17	248,148.78	27,865.13	-1,204.40	26,660.73
..... non-saving non-dividend taxes	208,230.19	236,093.15	235,056.47	27,862.96	-1,036.68	26,826.28
..... saving income taxes	13,057.10	13,059.26	12,893.73	2.16	-165.53	-163.37
..... dividend income taxes	200.77	200.77	198.58	0.00	-2.19	-2.19
..... council tax (non-simulated)	46,443.51	46,443.51	46,443.51	0.00	0.00	0.00
... all national insurance contributions (simulated)	176,167.95	176,167.95	175,788.22	0.00	-379.73	-379.73
..... national insurance contributions (personal)	67,731.65	67,731.65	67,627.80	0.00	-103.85	-103.85
..... employee national insurance contributions	62,036.72	62,036.72	61,942.17	0.00	-94.55	-94.55
..... self-employed national insurance contributions	5,694.93	5,694.93	5,685.63	0.00	-9.31	-9.31
..... other national insurance contributions	0.00	0.00	0.00	0.00	0.00	0.00



UKMOD Statistics - Behavioural responses						
Results for United Kingdom 2023 vs UK_2023_test						
Fiscal Overview	Inequality	Mean HH income (equ)	Mean BU income (equ)	Income Shares	Cut Offs	Tax Incentives
Metadata						
Mean equivalised household income disaggregation						
3.1 Original income averages by population decile (£ per week)						
	Base (UK_2023)	Reform (static)	Reform (behavioural)	Static effects	Behavioural effects	Total effects
Decile 1	123.41	123.41	123.29	0.00	-0.12	-0.12
Decile 2	218.84	218.84	218.57	0.00	-0.27	-0.27
Decile 3	314.92	314.92	314.56	0.00	-0.36	-0.36
Decile 4	446.39	446.39	445.00	0.00	-1.38	-1.38
Decile 5	585.12	585.12	584.45	0.00	-0.66	-0.66
Decile 6	741.45	741.45	740.54	0.00	-0.91	-0.91
Decile 7	908.90	908.90	907.80	0.00	-1.10	-1.10
Decile 8	1,127.56	1,127.56	1,125.83	0.00	-1.73	-1.73
Decile 9	1,446.53	1,446.53	1,443.12	0.00	-3.41	-3.41
Decile 10	2,798.11	2,798.11	2,787.96	0.00	-10.15	-10.15
All	871.00	871.00	868.99	0.00	-2.01	-2.01
3.2 Disposable income averages by population decile (£ per week)						
	Base (UK_2023)	Reform (static)	Reform (behavioural)	Static effects	Behavioural effects	Total effects
Decile 1	273.35	272.43	272.38	-0.92	-0.05	-0.97
Decile 2	407.28	404.56	404.53	-2.72	-0.03	-2.75
Decile 3	482.68	478.22	478.05	-4.46	-0.16	-4.62
Decile 4	556.77	548.69	548.41	-8.09	-0.28	-8.37
Decile 5	636.39	624.24	623.86	-12.15	-0.38	-12.53
Decile 6	726.64	709.30	708.76	-17.34	-0.54	-17.87
Decile 7	831.80	809.85	809.19	-21.95	-0.66	-22.61
Decile 8	964.37	937.11	936.08	-27.27	-1.03	-28.29
Decile 9	1,159.70	1,124.20	1,122.22	-35.50	-1.98	-37.48

UKMOD Statistics - Behavioural responses

UKMOD Statistics - Behavioural responses
Results for United Kingdom 2023 vs UK_2023_test

Fiscal Overview
Inequality
Mean HH income (equ)
Mean BU income (equ)
Income Shares
Cut Offs
Tax Incentives
Metadata


Income Shares
received/paid by each population Group
4.1 Original income shares by population decile

	Base (UK_2023)	Reform (static)	Reform (behavioural)	Static effects	Behavioural effects	Total effects
Decile 1	1.41 %	1.41 %	1.42 %	0.00 %	0.00 %	0.00 %
Decile 2	2.35 %	2.35 %	2.35 %	0.00 %	0.00 %	0.00 %
Decile 3	3.50 %	3.50 %	3.50 %	0.00 %	0.00 %	0.00 %
Decile 4	4.98 %	4.98 %	4.98 %	0.00 %	0.00 %	0.00 %
Decile 5	6.55 %	6.55 %	6.56 %	0.00 %	0.01 %	0.01 %
Decile 6	8.50 %	8.50 %	8.51 %	0.00 %	0.01 %	0.01 %
Decile 7	10.42 %	10.42 %	10.43 %	0.00 %	0.01 %	0.01 %
Decile 8	12.86 %	12.86 %	12.87 %	0.00 %	0.01 %	0.01 %
Decile 9	16.76 %	16.76 %	16.76 %	0.00 %	0.00 %	0.00 %
Decile 10	32.66 %	32.66 %	32.62 %	0.00 %	-0.04 %	-0.04 %
All	100.00 %	100.00 %	100.00 %	0.00 %	0.00 %	0.00 %

4.2 Disposable income shares by population decile



	Base (UK_2023)	Reform (static)	Reform (behavioural)	Static effects	Behavioural effects	Total effects
Decile 1	3.55 %	3.62 %	3.62 %	0.07 %	0.00 %	0.07 %
Decile 2	4.96 %	5.04 %	5.05 %	0.08 %	0.01 %	0.09 %
Decile 3	6.09 %	6.17 %	6.18 %	0.08 %	0.01 %	0.09 %
Decile 4	6.97 %	7.03 %	7.03 %	0.06 %	0.01 %	0.06 %
Decile 5	7.94 %	7.97 %	7.97 %	0.03 %	0.01 %	0.03 %
Decile 6	9.26 %	9.25 %	9.26 %	-0.01 %	0.01 %	-0.01 %
Decile 7	10.45 %	10.40 %	10.41 %	-0.04 %	0.01 %	-0.04 %
Decile 8	11.98 %	11.90 %	11.90 %	-0.08 %	0.00 %	-0.07 %

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UKMOD Statistics - Behavioural responses

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UKMOD Statistics - Behavioural responses
Results for United Kingdom 2023 vs UK_2023_test

Fiscal Overview
Inequality
Mean HH income (equ)
Mean BU income (equ)
Income Shares

Cut Offs
Tax Incentives
Metadata

Effects of Taxation on Behavioural Incentives

6.1 Marginal tax rates on earnings income by income decile

Decile averages in percentage points

	Base	Reform	change
Decile 1	3.3	4.2	0.9
Decile 2	9.4	9.8	0.4
Decile 3	10.6	11.6	1.0
Decile 4	13.6	15.0	1.4
Decile 5	14.2	16.3	2.0
Decile 6	16.5	18.3	1.8
Decile 7	18.7	20.8	2.2
Decile 8	20.5	22.6	2.1
Decile 9	23.3	25.2	1.9
Decile 10	27.8	28.8	1.0
All	15.8	17.3	1.5

6.2 Marginal tax rates on private pension income by income decile

Decile averages in percentage points

	Base	Reform	change
Decile 1	0.7	0.8	0.1
Decile 2	2.0	2.3	0.3
Decile 3	3.4	3.6	0.2

References

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