Office for Budget Responsibility

08 February 2024

The labour supply effects of the Autumn 2023 National Insurance Contributions cut

Introduction

1 In the 2023 Autumn Statement, the Chancellor cut the main rate of National Insurance contributions (NICs) paid by employees by 2 percentage points and the self-employed by 1 percentage points, reducing the tax liabilities of around 27 million employees and over 2 million self-employed individuals. This note explains how our November 2023 *Economic and fiscal outlook* (*EFO*) estimated the effect this would have on labour supply over the next five years.

2 We estimated that these NICs cuts would increase total hours worked by 0.3 per cent by 2028-29, or 94,000 in full-time equivalent (FTE) terms. We obtained these estimates using HM Treasury's labour supply model, into which we supplied our own assumptions on the extent to which people change their behaviour in response to changes in their net wages, drawing on the empirical literature on the topic.[1]

3 We would welcome any feedback on our modelling, assumptions, or general approach to feedback@obr.uk. In particular, we would be grateful for any feedback on the labour supply elasticities we have assumed.

How labour supply responds to tax changes

4 Changes in tax rates on employment income affect workers' incentives to supply labour. For instance, a cut in the rate of NICs increases the take-home pay of those earning above the NICs thresholds, which results in an increase in their effective wage. People typically respond to a change in effective wages in two key ways: it can affect whether or not to work at all, and – for those that do work – it can alter the number of hours they work.[2] The resulting impact on labour supply therefore comes through two primary channels:

5 First, is the **extensive margin**, where people decide whether or not to work. Reducing the tax on earnings will increase the relative benefit of working compared with relying on non-labour income, raising the gain-to-work (GTW). This should encourage new entrants into the labour market and increase overall labour market participation.

6 Second, is the **intensive margin**, where those already employed make decisions about how many more or fewer hours to work. Here the net impact on work incentives depends on the interplay between two competing effects:

[1] In other words, 'elasticities', which measure the sensitivity of labour supply to changes in wages or income.
[2] There are additional ways a worker can respond to changes in the wage rate, including altering the intensity of their work holding fixed the number of hours, though we do not explicitly consider these responses in this article.

- We expect a negative **income effect**, because the NICs cut lowers *average* tax rates and raises overall post-tax income. This allows people to enjoy more leisure while working fewer hours at no lower net incomes. If leisure is a normal good (so that greater resources mean that people take more of it) they are likely to respond by reducing their work hours somewhat.

- But we expect a positive **substitution effect**, because, for most people, the NICs cut lowers the *incremental* tax paid on an additional hour of work. Individuals respond to this change in the net value of an additional hour's work by increasing their work hours, as the marginal value of work increases compared to leisure.[3]

Labour supply elasticities

7 Because income and substitution effects usually work in opposite directions, the direction of the labour supply response at the intensive margin is unclear from theory alone. To capture the relative strengths of these effects we make assumptions about **elasticities**, which quantify the size of changes in labour supply in response to changes in financial work incentives.

- At the extensive margin, **participation elasticities** capture the change in labour force participation resulting from a 1 per cent change in the gain-to-work metric. In other words, they measure the change in labour participation due to changes to an individual's additional income from work, relative to out-of-work benefits.

- While at the intensive margin, we use **progression elasticities** to measure the percentage change in hours worked, applying **separate elasticities for income and substitution effects**. Income elasticities measure change in hours worked in response to changes in net weekly incomes, while substitution elasticities measure change in hours worked due to changes in net hourly earnings.

Our assumed elasticities

8 The elasticities we used are based primarily on those set out in an IFS study, which reviewed empirical studies on elasticities of labour supply, focusing on the UK.[4] They are also informed by estimates and insights from a range of other studies, including those outlined in Meghir and Phillips (2010) and Attansio et al., (2015).[5] Professor Hamish Low also provided useful guidance on the latest empirical work. Tables A1 and A2 in the annex to this note

[3] Note that income and substitution effects only take place when there is a change to the average tax rate and to the marginal tax rate, respectively. This does not happen for every individual in the population. For example, people who earn below the lowest thresholds for paying taxes are subject to neither effect.
[4] Adam, S., and D. Phillips., *An ex-ante analysis of the effects of the UK Government's welfare reforms on labour supply in Wales*, 2013.
[5] Meghir, C., and D. Phillips, *Labour Supply and Taxes in Dimensions of Tax Design: Volume 1 of The Mirrlees Review*, 2010, and Attanasio, O., P. Levell, H. Low, and V. Sanchez-Marcos, *Aggregating Elasticities: Intensive and Extensive Margins of Female Labour Supply*, 2015.

show the participation and progression elasticity estimates, respectively, across different population subgroups.

- Table A1 shows extensive elasticities with respect to in-work income, which are transformed into **participation elasticities** using a methodology detailed in Appendix E, page 128 of Adam and Phillips (2013), so that they can be applied to the gain-to-work, rather than to in-work income. This procedure is necessary because elasticities with respect to gain-to-work are not reported in the literature.

- Table A2 shows **progression elasticities.** Here, positive substitution elasticities for all groups exceed the magnitude of negative income elasticities for all groups, so hours will increase in response to tax rate reductions.

9 Elasticities estimates represent a key source of uncertainty to our labour supply model. While the IFS study drew its elasticity estimates from the most robust empirical studies available at the time, we acknowledge that they may not be as representative of the current UK labour market as they were. In particular, it is worth noting that both participation and progression elasticities tend to be the largest for those with children of pre-school and early ages, which suggests childcare costs were also an important factor in the decision of parents/guardians to work.

10 But given changes in the structure of the labour market since these estimates were produced, these impacts may also have changed over time. We are working to update our elasticities by seeking external engagement and reviewing more recent empirical literature. As elasticity estimates are not available for every population subgroup, the model also excludes part of the workforce.[6]

Our modelling of labour supply responses

11 We used the Treasury's Labour Supply model to assess the effect of the 2023 Autumn Statement NICs cuts. This is a partial equilibrium model that estimates the impact of personal tax and welfare reform on labour supply. Our assumptions about elasticities, which were inputted into the model, determined the degree of responsiveness of different population sub-groups to the policy. The direct implications of tax policy for the distribution of individual incomes were determined by the Treasury's Intra-Government Tax and Benefit Model (IGOTM) – a microsimulation model underpinned by ONS' Living Costs and Food survey data.

12 The model comprises two components: the **labour market participation model** and the **labour market progression model**, which estimate impacts at the extensive and at the intensive margin, respectively.

[6] Students, the self-employed and those over 60 are excluded from both the participation and progression models, while disabled people and those eligible for and near or on the hours' thresholds are also excluded from the participation model (see tables A3 and A4). We accounted for the self-employed, by scaling impacts on employees using the relative fiscal costs of both policies (see paragraph 18).

13 **The labour market participation model** estimates the change in the number of people in work, measured by the participation rate. To obtain the impact of a policy on the extensive margin, the model:

- **Uses IGOTM-derived changes to each current employee's in-work and out-of-work incomes to estimate the percentage change in the 'gain to work' metric**, which measures the additional income each individual gains from being employed.

- **Estimates participation effect by population sub-group** by applying, at individual level, the participation elasticity, which varies by demographic and income groups, to the change in 'gain to work', then doing a weighted sum across individuals.

- **Computes total change in participation by aggregating labour market participation changes** across sub-groups with population estimates.

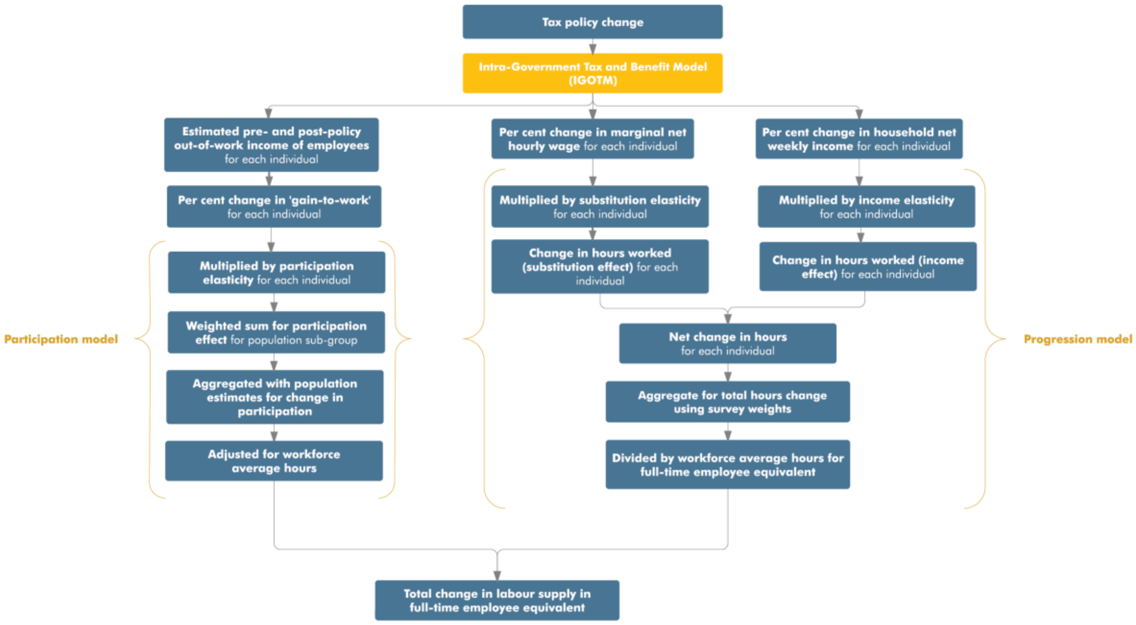
14 **The labour market progression model** estimates the change in the number of hours worked by those already in work, measured at the individual level. To obtain the impact of a policy on the intensive margin, the model:

- **Uses IGOTM-derived changes to individual incomes to estimate the change in marginal net hourly wages and in household net weekly income** for each individual in the sample.

- **Computes the change in hours worked by each individual in the sample,** applying group-based income and substitution elasticities to the changes in marginal net hourly wages and net weekly income, respectively, and summing the effects.

- **Aggregates changes in hours worked for every individual** in the sample, using survey weights to obtain economy-wide changes in total hours worked.

A schematic of the model



15 The model implicitly assumes that the increase in labour supply will be met by an increase in labour demand. Its estimates therefore reflect longer run effects, once the economy has adjusted. This can be a good approximation for when the economy is close to full employment, though in the short run, constraints on labour demand and negative spill-over effects on those already employed may dampen some of the positive labour supply impact. However, such short run effects are difficult to quantify – for a qualitative discussion, see Adam and Phillips (2013).

Box 1: Stylised example of the impact on an individual of a tax policy change

To provide a stylised illustration of the mechanics of the model's progression component, consider the impact on one individual of a hypothetical 2 percentage point cut to the tax rate applied on all income – for example, on a working-age man without children. Assume he is already working, and subject to a marginal tax rate of 30 per cent and to an average tax rate of 20 per cent.[a] As he has a 70 per cent after-tax marginal wage rate, a 2 percentage point tax cut would imply a 2.9 per cent (2/70) increase to the marginal wage rate. Similarly, it implies a 2.50 per cent (2/80) increase to the average wage rate.

To estimate the substitution effect, we apply the substitution elasticity for men who are not lone parents (see Table A2) of 0.15 to the change in the marginal wage rate of 2.9 per cent, which leads to an increase in hours of 0.44 per cent for this individual. To estimate the income effect, we apply the income elasticity for men who are not lone parents of -0.05 to the change in the average wage rate of 2.50 per cent, which leads to a decrease in hours of 0.13 per cent for this individual. Taken together, the substitution and income effects therefore imply an overall increase in average weekly hours for this individual of roughly 0.31 per cent (0.44 - 0.13 per cent). As this individual is already working, the tax cut would reinforce his decision to work by raising in-work relative to out of work income.

[a] These are deliberately stylised figures, based on an example in CBO, How the Supply of Labor Responds to Changes in Fiscal Policy, 2014, to illustrate the model's key mechanics.

Results

16 The cuts in the rate of NICs paid by employees and the self-employed affected around 27 million employees and over 2 million self-employed individuals. More specifically, the Autumn Statement:

- **Cut the main rate of Class 1 NICs by 2 percentage points**, from 12 to 10 per cent from 6 January 2024.
- **Cut the main rate of Class 4 NICs by 1 percentage point**, from 9 to 8 per cent from 6 April 2024.
- **Removed the requirement to pay Class 2 NICs for self-employed individuals** with annual profits above £12,570 from 6 April 2024.

17 The resulting changes in incentives share many features with the stylised example discussed in Box A.1, above, with average wages increasing for individuals paying NICs. As in the example above, the progressivity of the tax system means that for the majority of employees marginal wages rise by more than average wages (those that earn between the current £12,570 threshold at which people start paying NICs and the current £50,270 threshold above which people pay an unchanged rate of 2 per cent). And some individuals not in the labour force before the policy change, will now face a lower tax bill if they work, raising the GTW.

18 Table 1 shows the results of running this policy change through the full modelling framework described above. As the model excludes the self-employed (due to lack of high-quality elasticity estimates on their responsiveness, see paragraph 10), we adjusted the model's outputs by scaling up the model-derived impacts by a factor of 1.08: the ratio of the fiscal costs of all the measures to those affecting employees only.

19 The labour supply impact of the NICs cuts can be decomposed into the two channels described above:

- The **participation effect** increases the number of people in employment by 28,000 2028-29, as a result of the increase in weekly 'gain-to-work' of £8.58[7] on average. However, because people join the labour force at below average hours, the increase in labour supply from the participation effect is only 14,000 in full-time equivalent terms.

- The **progression effect** increases number of hours worked by existing employees by 79,000 on a full-time equivalent basis in 2028-29, owing to the increases in marginal net hourly wage and in household net weekly income of £0.23[7] and £13[7], respectively, on average. This reflects a stronger substitution effect than the income effect and assumes that those that are incentivised to increase their hours worked will tend to earn more than those entering employment.

20 The much higher number of people in, rather than out of, work contributes to a substantially larger labour supply impact through progression relative to participation. Small changes in the hours of existing workers sum up to much greater full-time employment equivalent changes than the increase in labour market participation.

Table 1: Impact of NICs cuts on employment in 2028-29

	Participation impact		Progression impact	Total effect	
	Employment	Full time employment equivalent	Full time employment equivalent	Full time employment equivalent	Per cent
Change	28,000	14,000	79,000	94,000	0.30

Note: We assume that those entering the labour market work 18.8 hours per week, which was the average number of hours worked by part-time workers in 2021 according to ASHE data. Results may not sum due to rounding.

Conclusion

21 We keep the elasticities we use in estimating these labour supply impacts under review and would welcome feedback on our approach. As indicated in our November 2023 EFO, we also intend to use the same modelling approach to analyse the impacts on labour supply of

[7] Note, these estimates account for interactions within the wider tax and benefit system and are calculated as average intermediate inputs for modelling changes in labour supply in response to changes in tax and benefits.

frozen personal tax thresholds in the context of the recent high inflation. We would be grateful for any thoughts on our modelling, key assumptions, and general approach to capturing labour supply impacts of tax and benefit policy changes.

Annex: Detailed model assumptions

Table A1: Extensive elasticities with respect to in-work income used in the labour supply model

	Position in the UK earnings distribution				
	Lowest earning 20%	Next 20%	Middle earning 20%	Next 20%	Top earning 20%
Men (except lone fathers)	0.227	0.182	0.136	0.091	0.023
Single women without children	0.216	0.173	0.130	0.086	0.022
Women without children, non-working partner	0.216	0.173	0.130	0.086	0.022
Women without children, working partner	0.432	0.345	0.259	0.173	0.043
Lone parents, youngest child aged					
0–2	1.195	0.956	0.717	0.478	0.120
3–5	1.554	1.243	0.932	0.621	0.155
6–10	1.195	0.956	0.717	0.478	0.120
11+	0.797	0.637	0.478	0.319	0.080
Women with non-working partner, youngest child aged					
0–2	0.324	0.259	0.194	0.129	0.032
3–5	0.421	0.336	0.253	0.168	0.042
6–10	0.324	0.259	0.194	0.130	0.033
11+	0.216	0.173	0.130	0.086	0.021
Women with working partner, youngest child aged					
0–2	0.755	0.604	0.453	0.302	0.076
3–5	0.982	0.786	0.589	0.393	0.098
6–10	0.755	0.604	0.453	0.302	0.076
11+	0.504	0.403	0.302	0.201	0.051

Note: These elasticities are transformed into participation elasticities with respect to changes in gain-to-work in the model, using a methodology detailed in Appendix E, page 128 of Adam and Phillips (2013).
Source: Adapted from Adam and Phillips (2013)

Table A2: Progression elasticities used in the labour supply model

	Elasticities		
	Substitution	Income	Difference
Married or cohabiting women, youngest child aged			
No children	0.14	0	0.14
0-2	0.301	-0.185	0.116
3-4	0.439	-0.173	0.266
5-10	0.173	-0.102	0.071
11+	0.160	-0.063	0.097
Lone parents, youngest child aged			
0-4	0.094	-0.037	0.057
5-10	0.128	-0.075	0.053
11-18	0.136	-0.054	0.082
All men (excluding lone fathers)	0.15	-0.05	0.1
Single women (excluding lone mothers)	0.15	-0.05	0.1

Note: The difference is illustrative of the net effect of the elasticities, but not used in practice in the model, as the substitution and income elasticities are applied separately to the change in marginal wage rate and the change average income, respectively.
Source: Adapted from Blundell, Duncan and Meghir (1998), Blundell and Shephard (2011), and Meghir and Phillips (2010).

Table A3: Demographic groups covered by progression model

Included	Excluded
Working age men	Self-employed
Working age single women without children	Full time students
Working age lone parents	All aged 60+
Working age married and cohabiting women with and without children	

Table A4: Demographic groups covered by participation model

Included	Excluded
Working age men	Self-employed
Working age women without children	Full time students
Working age lone parents	All aged 60+
Working age married and cohabiting women with children	Disabled people