# Online Appendix

## Appendix A: Illustrating the Tax and Transfers Proposals with Hypothetical Households

Focusing on a family comprising two working-age adults and two children, we illustrate how their disposable income varies across the baseline and reform scenarios when:

1. both are unemployed and entitled to social insurance-based income support;
2. one is working full-time 40 hours per week and earning the (adult) minimum wage of £1,094 per month (which is 64% of median earnings),[[1]](#footnote-1) the other unemployed;
3. both are working 40 hours per week, each earning £1,094 per month;
4. both are working 40 hours per week, the female earning £1,094 and the male earning £1,462 per month (85% of median earnings);
5. both are working 40 hours per week, the female earning £1,094 and the male earning £1,720 per month (i.e. median earnings);
6. both are working 40 hours per week, the female earning £1,094 and the male earning £2,150 per month (125% of median earnings).
7. both are working 40 hours per week, the female earning £1,094 and the male earning £3,096 per month (180% of median earnings).

Table AA.1 shows how disposable income compares in the baseline versus alternative reform scenarios across these circumstances for such a household, and what underlies this in terms of the different sources going to make up the family’s disposable income.

The baseline itself brings out the major role that means-tested transfers play in the UK system, as emphasised in the introduction. When there are no earnings because both adults are unemployed, even when both partners are entitled to insurance-based benefits (as we have assumed for this illustrative case) means-tested payments account for almost as much of their income. Furthermore, such payments continue to constitute a major part of household income even when one or both partners are working, across much of the earnings range we have illustrated here.

Table AA.1 Alternative Tax/Benefit Reforms Illustrated for Hypothetical Household of 2 Adults and 2 Children with Various Levels of Earnings

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  *Scenario* | Earnings | Child Benefit | Social insurance benefits | Means-tested benefits | PI | Income tax | Social Ins. contr. | Total net income |
|  | Household income (£, annual) |
| 1/ No earners |  |  |  |  |  |  |  |
| Baseline | 0 | 1,773 | 7,541 | 6,045 | 0 | 0 | 0 | 15,360 |
| Tax+CB+SI | 0 | 7,377 | 11,781 | 1,449 | 0 | 1,317 | 0 | 19,290 |
| Tax+CB+PI | 0 | 7,377 | 7,541 | 1,449 | 262 | 0 | 0 | 16,630 |
|  |  |  |  |  |  |  |  |  |
| 2/ 1 earner £1,094 pm |  |  |  |  |  |  |  |
| Baseline | 13,125 | 1,773 | 3,771 | 6,765 | 0 | 486 | 1,314 | 23,634 |
| Tax+CB+SI | 13,125 | 7,377 | 5,890 | 1,300 | 0 | 1,803 | 1,314 | 24,576 |
| Tax+CB+PI | 13,125 | 7,377 | 3,771 | 516 | 4,033 | 2,983 | 2,271 | 23,568 |
|  |  |  |  |  |  |  |  |  |
| 3/ 2 earners £1,094 each pm |  |  |  |  |  |  |
| Baseline | 26,250 | 1,773 | 0 | 3,215 | 0 | 972 | 2,629 | 27,638 |
| Tax+CB+SI | 26,250 | 7,377 | 0 | 0 | 0 | 2,816 | 2,629 | 28,182 |
| Tax+CB+PI | 26,250 | 7,377 | 0 | 0 | 7,803 | 5,966 | 4,541 | 30,923 |
|  |  |  |  |  |  |  |  |  |
| 4/ 2 earners £1,094, £1,462 pm |  |  |  |  |  |  |
| Baseline | 30,666 | 1,773 | 0 | 1,501 | 0 | 1,808 | 3,393 | 28,739 |
| Tax+CB+SI | 30,666 | 7,377 | 0 | 0 | 0 | 3,652 | 3,393 | 30,998 |
| Tax+CB+PI | 30,666 | 7,377 | 0 | 0 | 7,803 | 6,970 | 5,305 | 33,571 |
|  |  |  |  |  |  |  |  |  |
| 5/ 2 earners £1,094, £1,720 |  |  |  |  |  |  |
| Baseline | 33,762 | 1,773 | 0 | 299 | 0 | 2,394 | 3,928 | 29,511 |
| Tax+CB+SI | 33,762 | 7,377 | 0 | 0 | 0 | 4,239 | 3,928 | 32,972 |
| Tax+CB+PI | 33,762 | 7,377 | 0 | 0 | 7,803 | 7,673 | 5,841 | 35,428 |
|  |  |  |  |  |  |  |  |  |
| 6/ 2 earners, £1,094, £2,150 |  |  |  |  |  |  |
| Baseline | 38,922 | 1,773 | 0 | 0 | 0 | 3,372 | 4,821 | 32,502 |
| Tax+CB+SI | 38,922 | 7,377 | 0 | 0 | 0 | 5,380 | 4,821 | 36,097 |
| Tax+CB+PI | 38,922 | 7,377 | 0 | 0 | 7,803 | 9,043 | 6,733 | 38,325 |
|  |  |  |  |  |  |  |  |  |
| 7/ 2 earners, £1,094, £3,096 |  |  |  |  |  |
| Baseline | 50,274 | 1,773 | 0 | 0 | 0 | 5,522 | 6,785 | 39,740 |
| Tax+CB+SI | 50,274 | 7,377 | 0 | 0 | 0 | 9,343 | 6,785 | 41,523 |
| Tax+CB+PI | 50,274 | 7,377 | 0 | 0 | 7,803 | 14,555 | 8,697 | 42,202 |

Source: Authors’ calculations with EUROMOD and hypothetical data for a household with zero housing costs and Council Tax.

Now comparing the Tax+CB+SI package with the baseline, the first point to note is that the amount of Child Benefit this family receives is much greater across all levels of earnings. When there are no earnings because both adults are unemployed, their insurance-based transfers are also considerably higher than in the baseline. Together with the much higher Child Benefit, this means their disposable income is significantly higher than in the baseline, despite the fact that much of that increase has been offset by a reduction in means-tested transfers and increase in income tax (since Child Benefit is now subject to tax).

When one adult is in work on low earnings, their disposable income is closer to but still above the baseline, with higher social insurance benefits (for the unemployed partner) and Child Benefit substantially offset by reduced means-tested payments, but leaving the family much less reliant on means-tested payments than in the baseline. When both adults are in work at low earnings their disposable income is about the same as the baseline because their higher Child Benefit is offset by higher tax and loss of all means-tested payments. The same is true at somewhat higher levels of earnings, as income tax and social insurance contributions also rise. At the higher earnings levels shown in our illustration, there are no means-tested transfers in the baseline to be withdrawn and there is a substantial net gain in terms of disposable income. This ceases to be the case at higher earnings than we have illustrated, beyond the point where the higher Child Benefit is offset by the increase in income tax and social insurance contributions. As earnings rise further above that level there will be an increasing net loss as the proportion of earnings going in tax and social insurance contributions rises.

Turning to the reform package incorporating the PI (Tax+CB+PI), the amount of Child Benefit is again much greater across all levels of earnings than in the baseline. When neither adult is working, their insurance-based transfers are the same as in the baseline, with the PI as a marginal top-up, and net income is similar to the baseline because most of the increase in Child Benefit has been offset by a reduction in means-tested transfers. When one adult is in work on low earnings, though, the other receives the full PI and their disposable income is slightly below the baseline, with the PI and higher Child Benefit substantially offset by reduced means-tested payments and the tax and contributions now payable on even that modest level of earnings. However if the unemployed adult did not qualify for unemployment insurance benefit then the family would be much better off with the Tax+CB+PI package than in the baseline.

When both adults are in work at low earnings their disposable income is higher than in the baseline, although their PI and higher Child Benefit are partly offset by higher tax and zero means-tested payments. The same is true at somewhat higher levels of earnings, as income tax and social insurance contributions also rise. At the higher earnings levels shown in our illustration, there are low levels or no further means-tested transfers to be replaced and the full PI continues to be paid, so there is a substantial net gain in terms of disposable income which is similar to or larger than seen with the Tax+CB+SI package. As with that package, at higher earnings than we have illustrated, the scale of the increase in income tax and social insurance contributions results in a reduction in disposable income.

## Appendix B: Measuring Work Incentives

The incentive for those in work to increase their earnings is measured by calculating the marginal effective tax rate (METR) for each person in work, i.e. the proportion of a small increase in earnings that would be lost in either higher tax payments or lower benefit entitlements. This is calculated by applying a marginal increase to individual earnings and recalculating the household’s net income, applying the rules of the tax and transfer systems in the baseline versus reform scenarios (and taking household-level features into account where relevant). Browne (2015) notes that performing this calculation by increasing earnings marginally while leaving hours of work unchanged may produce different results to increasing hours of work slightly and leaving the hourly wage unchanged, because entitlements to some benefits and tax credits depend on hours of work as well as on income, but reports that in practice the results are similar.

The incentive to remain in work has been measured by calculating the participation tax rate (PTR) for each person in work. The formula is: $PTR\_{i}=1-\left(\frac{HDI\_{wi}-HDI\_{nwi}}{E\_{wi}}\right)$ where ($HDI\_{wi}-HDI\_{nwi}$) is the difference in total household net income (*HDI*) if an individual *i* is working (subscript *w*) as opposed to not working (*nw*); $E\_{wi}$ are the earnings of individual *i*. The higher the value of PTR, the smaller the gain from working and the weaker the incentive to continue doing so. Using EUROMOD, we take each earner in a household in turn and set his or her earnings to zero, calculate the transfers to which they would then be entitled, and calculate the new household net income. We do not calculate the PTR for persons who do not report any earnings in the survey.

## Appendix C: Gainers and Losers from Alternative Tax/Benefit Reforms by Household Type and Income Decile

As background to the results presented in the paper on the impact of the reform scenarios on different decile groups, Table AC.1 shows how different types of household are spread across the income distribution. Older households are defined as those where the household reference person is aged 65 or over, and working age households as those where that person is aged under 65. The household reference person or HRP in the FRS is taken to be the person in whose name the accommodation is owned or rented; if there are two or more such persons, the one with the highest income is taken to be the HRP; if they have the same income, the HRP is taken as the eldest.

The table shows that working-age households are spread rather evenly across the deciles, whereas older ones are less likely to be found at the very top or bottom. Households with no earners are unsurprisingly more likely to be in the bottom half of the distribution while one-earner households are also slightly more likely to be in the bottom half whereas those with two or more earners are more likely to be in the top half, with few in the bottom two deciles.

Table AC.1: Distribution of Households Types by Income Decile, Equivalised Net Income

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Decile  | With elderly | With children | Working age | No earners | 1 earner | 2+ earners |
| 1 | 5.8 | 9.7 | 10.9 | 22.1 | 10.3 | 1.1 |
| 2 | 12.4 | 12.0 | 9.5 | 19.4 | 11.6 | 2.2 |
| 3 | 11.2 | 12.5 | 9.7 | 14.1 | 14.2 | 4.5 |
| 4 | 12.1 | 12.2 | 9.4 | 11.3 | 12.5 | 8.0 |
| 5 | 12.6 | 11.5 | 9.3 | 9.5 | 11.0 | 10.2 |
| 6 | 11.5 | 10.6 | 9.8 | 7.4 | 9.8 | 12.5 |
| 7 | 10.0 | 9.5 | 10.0 | 5.7 | 8.1 | 13.9 |
| 8 | 9.3 | 8.0 | 10.2 | 4.3 | 7.9 | 14.3 |
| 9 | 8.5 | 7.5 | 10.4 | 3.7 | 7.4 | 15.5 |
| 10 | 6.6 | 6.5 | 10.8 | 2.6 | 7.3 | 17.7 |

Source: Authors’ calculations with EUROMOD and FRS. Notes: The category ‘with elderly’ refers to households with at least one individual aged 65+. The category ‘with children’ includes households with at least one individual aged below 18. The category ‘working age’ refers to households with the head (person with the highest level of gross market income), aged between 16 and 61 if female and between 16 and 64 if male. The categories ‘no earner’ and ‘2+ earners’ include households with no or 2+ earners, where earner is defined as having positive income from employment and/or self-employment. Thus households may be included in more than one category.

Table AC.2 shows how the percentage of households by type seeing a substantial gain varies, overall and across the distribution. Table AC.3 shows the corresponding figures for those losing 5% or more of their household income.

Table AC.2: Percentage Gaining 5% or More from Alternative Tax/Benefit Reforms by Household Type and Income Decile

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | All | With elderly | With children | Working age | No earner | 2+ earners |
| *% gaining 5% or more with Tax+CB+SI Package* |
| Decile | % | % | % | % | % | % |
| 1 | 54.3 | 90.3 | 87.7 | 49.7 | 52.6 | 45.1 |
| 2 | 55.4 | 79.8 | 61.4 | 47.8 | 62.0 | 49.6 |
| 3 | 45.2 | 78.7 | 44.9 | 35.7 | 60.5 | 39.4 |
| 4 | 50.3 | 69.6 | 56.1 | 44.0 | 55.5 | 56.0 |
| 5 | 52.7 | 69.6 | 64.4 | 47.1 | 56.7 | 66.8 |
| 6 | 45.1 | 65.2 | 59.1 | 38.9 | 58.1 | 52.0 |
| 7 | 27.7 | 51.6 | 39.0 | 22.0 | 49.1 | 29.0 |
| 8 | 8.3 | 28.9 | 8.3 | 3.8 | 32.9 | 5.9 |
| 9 | 1.7 | 7.3 | 1.6 | 0.6 | 8.4 | 0.3 |
| 10 | 0.1 | 0.9 | 0.0 | 0.0 | 1.1 | 0.0 |
| All | 34.1 | 57.2 | 46.5 | 28.4 | 52.7 | 26.1 |
| *% gaining 5% or more with Tax+CB+PI Package* |
| Decile | % | % | % | % | % | % |
| 1 | 79.2 | 36.2 | 95.5 | 85.2 | 69.1 | 100.0 |
| 2 | 62.6 | 14.9 | 83.4 | 77.6 | 42.4 | 97.6 |
| 3 | 61.4 | 10.5 | 80.5 | 76.3 | 30.6 | 94.7 |
| 4 | 59.7 | 11.7 | 80.1 | 74.7 | 20.9 | 96.1 |
| 5 | 57.3 | 10.5 | 80.2 | 72.1 | 15.8 | 90.0 |
| 6 | 53.1 | 9.5 | 80.9 | 65.3 | 14.5 | 72.6 |
| 7 | 38.0 | 6.9 | 65.4 | 45.3 | 9.2 | 47.0 |
| 8 | 13.3 | 1.9 | 24.6 | 15.8 | 8.8 | 15.5 |
| 9 | 1.8 | 1.2 | 3.5 | 1.9 | 4.5 | 1.7 |
| 10 | 0.9 | 1.7 | 0.8 | 0.8 | 8.1 | 0.2 |
| All | 42.7 | 10.0 | 65.4 | 50.6 | 34.0 | 42.5 |

Source: Authors’ calculations with EUROMOD and FRS. Notes: see Table AC.1

Table AC.3: Percentage Losing 5% or More from Alternative Tax/Benefit Reforms by Household Type and Income Decile

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | All | With elderly | With children | Working age | No earner | 2+ earners |
| *% losing 5% or more with Tax+CB+SI Package* |
| Decile | % | % | % | % | % | % |
| 1 | 0.1 | 0.8 | 0.0 | 0.0 | 0.1 | 0.0 |
| 2 | 1.0 | 3.3 | 0.3 | 0.3 | 1.4 | 0.8 |
| 3 | 1.0 | 0.2 | 1.3 | 1.3 | 0.2 | 1.1 |
| 4 | 0.6 | 0.1 | 0.8 | 0.7 | 0.1 | 0.3 |
| 5 | 1.0 | 0.2 | 0.9 | 1.3 | 0.2 | 0.8 |
| 6 | 2.3 | 0.2 | 1.0 | 2.8 | 0.2 | 0.3 |
| 7 | 3.2 | 0.4 | 0.2 | 3.8 | 0.5 | 1.6 |
| 8 | 8.3 | 0.7 | 0.8 | 9.9 | 1.8 | 5.1 |
| 9 | 20.2 | 3.0 | 2.7 | 23.3 | 5.5 | 16.8 |
| 10 | 64.9 | 21.9 | 42.9 | 71.4 | 18.8 | 71.4 |
| All | 10.3 | 2.4 | 3.6 | 12.1 | 1.2 | 16.4 |
| *% losing 5% or more with Tax+CB+PI Package* |
| Decile | % | % | % | % | % | % |
| 1 | 3.3 | 0.3 | 1.4 | 3.7 | 4.8 | 0.0 |
| 2 | 5.5 | 8.2 | 2.3 | 4.4 | 8.3 | 0.0 |
| 3 | 6.7 | 21.8 | 1.5 | 2.1 | 14.0 | 0.0 |
| 4 | 7.5 | 26.0 | 1.0 | 1.5 | 20.0 | 0.6 |
| 5 | 9.0 | 32.7 | 0.6 | 1.0 | 27.0 | 0.4 |
| 6 | 9.2 | 37.6 | 0.3 | 0.7 | 35.4 | 1.0 |
| 7 | 10.7 | 46.2 | 0.4 | 1.9 | 47.4 | 0.8 |
| 8 | 20.6 | 64.0 | 2.1 | 11.0 | 67.2 | 7.0 |
| 9 | 48.0 | 79.4 | 18.4 | 41.7 | 82.3 | 41.8 |
| 10 | 91.5 | 93.3 | 83.1 | 90.8 | 85.8 | 93.6 |
| All | 21.2 | 38.5 | 7.8 | 16.8 | 22.9 | 24.4 |

Source: Authors’ calculations with EUROMOD and FRS. Notes: See Table AC.1

## Appendix D: Distributional impact of the living wage and Alternative Tax/Benefit Reforms

Table AD.1: Impact of the Living Wage and Alternative Tax/Benefit Reforms on Inequality

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|   | Gini | Change  | Atkinsonε = 0.5 | Change | MLDα = 0 | Change | Theilα =1 | Change |
| Baseline | 31.9 |  | 8.5 |  | 17.9 |  | 18.6 |  |
| +LW | 31.8 | -0.2\*\*\* | 8.4 | -0.1\*\*\* | 17.8 | -0.2\*\*\* | 18.4 | -0.2\*\*\* |
|  |  | (0.01) |  | (0.01) |  | (0.01) |  | (0.01) |
| Tax+CB+SI  | 28.8 | -3.2\*\*\* | 6.8 | -1.7\*\*\* | 14.1 | -3.8\*\*\* | 14.5 | -4.1\*\*\* |
| +LW |  | (0.09) |  | (0.18) |  | (0.17) |  | (0.31) |
| Tax+CB+PI  | 26.1 | -5.9\*\*\* | 5.7 | -2.8\*\*\* | 11.4 | -6.5\*\*\* | 12.2 | -6.4\*\*\* |
| +LW |  | (0.10) |  | (0.21) |  | (0.22) |  | (0.33) |

Notes: The change is in ppts relative to the baseline. Significance levels indicated as \*p<0.1, \*\*p<0.05, \*\*\*p<0.01. Standard errors in parenthesis.

Source: Authors’ calculations with EUROMOD and FRS.

Table AD.2: Impact of the Living Wage and Alternative Tax/Benefit Reforms on Poverty

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|   | poverty headcount (%) | change in ppts relative to baseline | poverty gap | change in ppts relative to baseline |
| Baseline | 15.2 |  | 4.5 |  |
|  + LW | 14.9 | -0.4\*\*\* | 4.4 | -0.1\*\*\* |
|  |  | (0.06) |  | (0.01) |
| Tax+CB+SI | 11.9 | -3.4\*\*\* | 3.3 | -1.2\*\*\* |
| +LW |  | (0.15) |  | (0.04) |
| Tax+CB+PI | 9.1 | -6.1\*\*\* | 1.8 | -2.7\*\*\* |
|  +LW |  | (0.23) |  | (0.08) |

Notes: The change is in ppts relative to the baseline. Significance levels indicated as \*p<0.1, \*\*p<0.05, \*\*\*p<0.01. Standard errors in parenthesis.

Source: Authors’ calculations with EUROMOD and FRS.

Table AD.3: Percentage Gaining in Disposable Income Terms from the Living Wage by Household Income Decile and Number of Earners

|  |  |  |  |
| --- | --- | --- | --- |
| Decile | All | 1 earner | 2+ earners |
|  |  | % Gaining |  |
| 1 | 14.2 | 39.4 | 61.9 |
| 2 | 14.2 | 29.7 | 52.1 |
| 3 | 22.4 | 28.7 | 62.9 |
| 4 | 28.3 | 25.3 | 63.5 |
| 5 | 29.2 | 23.0 | 50.6 |
| 6 | 31.3 | 16.7 | 49.6 |
| 7 | 31.2 | 13.1 | 40.4 |
| 8 | 24.6 | 7.0 | 27.7 |
| 9 | 19.1 | 3.9 | 19.4 |
| 10 | 10.9 | 1.2 | 9.0 |
| All | 22.5 | 20.9 | 35.3 |
|  |  |  |  |
| % Gaining 5% or more |
| 1 | 10.9 | 29.6 | 52.0 |
| 2 | 6.6 | 12.5 | 28.2 |
| 3 | 9.2 | 9.6 | 31.0 |
| 4 | 8.9 | 9.5 | 17.1 |
| 5 | 9.9 | 7.6 | 17.5 |
| 6 | 10.5 | 4.9 | 17.3 |
| 7 | 9.5 | 4.3 | 11.1 |
| 8 | 6.0 | 2.1 | 7.2 |
| 9 | 3.0 | 0.8 | 2.6 |
| 10 | 0.4 | 0.1 | 0.4 |
| All | 7.5 | 8.9 | 11.0 |

Source: Authors’ calculations with EUROMOD and FRS.

1. Median earnings are calculated using EUROMOD input data from the FRS after some adjustments including updating to 2014. [↑](#footnote-ref-1)