

The National Minimum Wage, the National Living Wage and the tax and benefit system

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Executive Summary

- NMW families (that is, families that contain a worker who is receiving the NMW) are mostly found in the bottom half of the working-age income distribution, and particularly in the poorest 10%. NLW workers are more evenly distributed, and are most likely to be found in the third decile. NLW families tend to be better off than NMW families because they are paid more per hour, and they are more likely to live with a working partner.
- NMW workers contribute more to their families' income than do NLW workers. This mostly reflects that NMW workers are more likely to be single than NLW workers. The contribution of NMW and NLW earnings to NMW/NLW families' net income falls as we go up the income distribution. NLW workers in families in decile groups 3 or 4 contribute just over a half of their families' net income, on average.
- Forecast increases in the NMW/NLW by 2020-21 will increase net incomes of NMW/NLW families by about 1.5%, on average. Within these families, low-income NMW/NLW families will gain by slightly more than high-income NMW/NLW families, except for the poorest decile group, which contains very few NLW recipients.

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- Announced but not yet implemented tax and benefit changes will have small effects on NMW/NLW families, but the roll-out of UC could lead to considerable income gains for NMW/NLW families in the bottom two income decile groups. This mostly represents families not currently entitled to or receiving legacy benefits or tax credits, particularly those aged under 25 and without children and working fewer than 30 hours per week. Combined with the planned rises in the NLW, NMW/NLW families in the bottom two income decile groups could gain over 8% of net income by 2020-21. This is a remarkably different prospect from previous years, where the impact of welfare cuts would have dominated any projection of the incomes of NMW families.
- The weakest financial incentives to work – i.e. the highest METRs – amongst NMW/NLW workers are found in decile groups 2 to 4, where NMW/NLW workers can pay extra tax and NICs and lose benefit entitlements when earnings rise. If the under 25s move onto UC in line with our assumptions, then the poorest NMW workers could see very large rise in METRs.
- Under current rules for in-work conditionality, when universal credit is fully rolled-out, around 21% of NMW/NLW workers will be subject to in-work conditionality
- A 5% hypothetical rise in the NMW/NLW in 2020-21 would increase the net incomes of NMW/NLW families by an average of under 1.2%. This is a lot less than 5% because some of the rise is lost to extra tax liabilities and foregone earnings, and because some NMW/NLW families have other sources of income. Amongst NMW/NLW families, the poorest families would gain a larger fraction of their income, on average. A rise in NMW/NLW would also look progressive amongst all working-age families where someone is in work, but not amongst all working-age families or the whole population, because it does nothing to directly benefit non-workers.

1. Introduction

By 2020, the NLW is set to increase to 60 per cent of median hourly earnings (currently forecasted to be £8.75 per hour by OBR), corresponding to £17,062 per year for the average NLW worker working full-time at 37.5 hours per week. By then the government has committed to raise the personal tax allowance to £12,500 per year and means-tested benefit system should be nearly fully replaced by the introduction of Universal Credit (which will incorporate part of the cuts to tax credits initially announced in July 2015). The way in which these three major tax and welfare reforms will or will not interact is not at all obvious at first sight.

This research project has five aims:

- To show where families containing NMW and NLW recipients are in the income distribution
- To show the importance of earnings from the NMW and NLW to families containing NMW and NLW recipients
- To show how families containing NMW and NLW recipients are likely to be affected by future rises in the NLW, and by announced but not yet implemented tax and benefit changes
- To show how families containing NMW and NLW recipients would be affected by a hypothetical further rise in the NMW and NLW, and how it would affect the whole working-age income distribution
- To quantify the strength of the financial incentives to earn more faced by NMW and NLW recipients, including an assessment of how many will be affected by in-work conditionality in the long-run

In parts, this paper updates previous work done for the Low Pay Commission by some of the current authors (Brewer, May and Phillips, 2009; Brewer and De Agostini, 2013). It aims to inform the Low Pay Commission's decisions about the path of the NLW from now to 2020, as well as its traditional decisions about the level of the NMW. The analysis will also be useful to analysts investigating the redistributive nature of the NMW and NLW.

The project is based on our projections of the distribution of income in 2017-18 and 2020-21. These are based on data from the Family Resources Survey and the UK part of the EUROMOD tax and benefit model. The analysis takes into account decisions announced on or before, and forecasts published at, the Spring 2017 Budget. Our calculations of the incomes of NMW/NLW families in 2020-21 should not be taken as a literal forecast. Instead, they are a projection of the circumstances of NMW/NLW families that were observed in 2014-15 as if they were facing the policies that we expect to be in effect in 2020-21. Our analysis definitely does not try to predict how the incomes of *actual* NMW/NLW families would change between 2017-18 and 2020-21, and nor do our forecasts reflect employment and demographic changes expected between 2017-18 and 2020-21 other than changes in average earnings and prices.

Section 2 explains the method in more detail and sets out our assumptions. Section 3 contains our main results on where NMW and NLW recipients are in the income distribution (3.1), how families of NMW and NLW recipients will be affected by not-yet-implemented tax and benefit reforms (3.2), the strength of the financial incentive to work (including in-work conditionality) (3.3), and how different family types and families in different regions will be affected (3.4). We conclude by showing how a hypothetical rise in the NMW or NLW in April 2020 would affect the incomes of NMW and NLW families (3.5).

2. Data and methods

This section describes the datasets we used (the Family Resources Survey and the Labour Force Survey) and the EUROMOD-UK tax and benefit microsimulation model. It also describes what assumptions we made when projecting incomes and tax and benefit policy to 2020/21. Further details can be found in Appendix 2.

2.1 Combining the Family Resource Survey and the Labour Force Survey

The key analytical challenge when assessing the interaction between NMW/NLW and the tax-benefit rules is that no single dataset records accurate information on whether someone is paid the NMW/NLW and the information needed to estimate entitlement to benefits and tax credits. This project, following Brewer, May and Phillips (2009), and Brewer and De Agostini (2013), created a synthetic dataset that combines information from the Family Resources Survey (which provides a relatively accurate impression of a household's composition, characteristics and income sources) and the Labour Force Survey (which asks workers directly how much they are paid by the hour, and so provides a more accurate impression of who is paid at or below the NMW/NLW).

We can create this synthetic dataset because there are two measures of hourly wages in the LFS, but only one in the FRS. The single measure in the FRS, that also exists in the LFS, is calculated by dividing respondents' stated weekly earnings by their stated hours worked in a week: we call this the implicit hourly rate. The other measure, only available in the LFS, is collected only from respondents who say that they are paid by the hour: we call this the contracted hourly rate. As has been long known (and set out clearly in Skinner et al. (2002)), the implicit hourly rate suffers from various inaccuracies which means that it tends to over-state the number of employees who are paid at or below the minimum wage. We therefore adapt the procedure described in Skinner et al. (2002) in order to impute to all employees in the FRS a measure of their contracted hourly rate, which we can then use to impute whether or not they are paid at or below the minimum wage. In doing this, it is vital to use covariates common to both datasets. Therefore we estimate a (log) contracted hourly rate regression on a set of covariates common to both datasets. We did this separately for first and second jobs, using the following explanatory factors: (log) implicit hourly rate and (log) implicit hourly rate squared, gender, age and age squared, whether married or not, number of dependent children age 0-4, 5-15 and 16-17, highest qualification, region of residence,

part-time (only for main job), occupation, firm size, industry sector and a dummy for the calendar month when the individual is interviewed. Figure 17 and Figure 18 show that these covariates tend to have very similar distributions in the two datasets, something which gives us confidence that these are sensible to use when undertaking this form of matching. The datasets used were the 2014-15 version of the FRS and the 4 quarters of the LFS that correspond to that financial year.

The results of the matching procedure are shown in Figure 1, which plots the distribution of these contracted hourly rates for three groups:

- All employees in the LFS who report that they are paid by the hour
- All employees in the LFS
- All employees in the FRS

The distribution of contracted hourly rates is very different for the first group to the other two: this is entirely expected, as those employees who are paid by the hour are not a random sample of employees but are more likely to be in low-paying jobs. The distribution of contracted hourly rates is, as it should be, reasonably similar when we compare all employees in the two datasets.

Table 1 reports the (grossed-up) estimates of how many workers are estimated to be paid at or below the NMW and the NLW in the FRS, and also compared to ASHE.² These estimates are very close to those derived from ASHE data (in the second row) calculated including all apprentices.

² The NLW hourly rate in 2017 is £7.50, which backrates to £6.48 in 2014-15, so we count the number of people aged 25 or over paid at or below that amount in 2014-15.

Figure 1 Estimated density of actual and imputed hourly wage rate, LFS and FRS, 2014-15

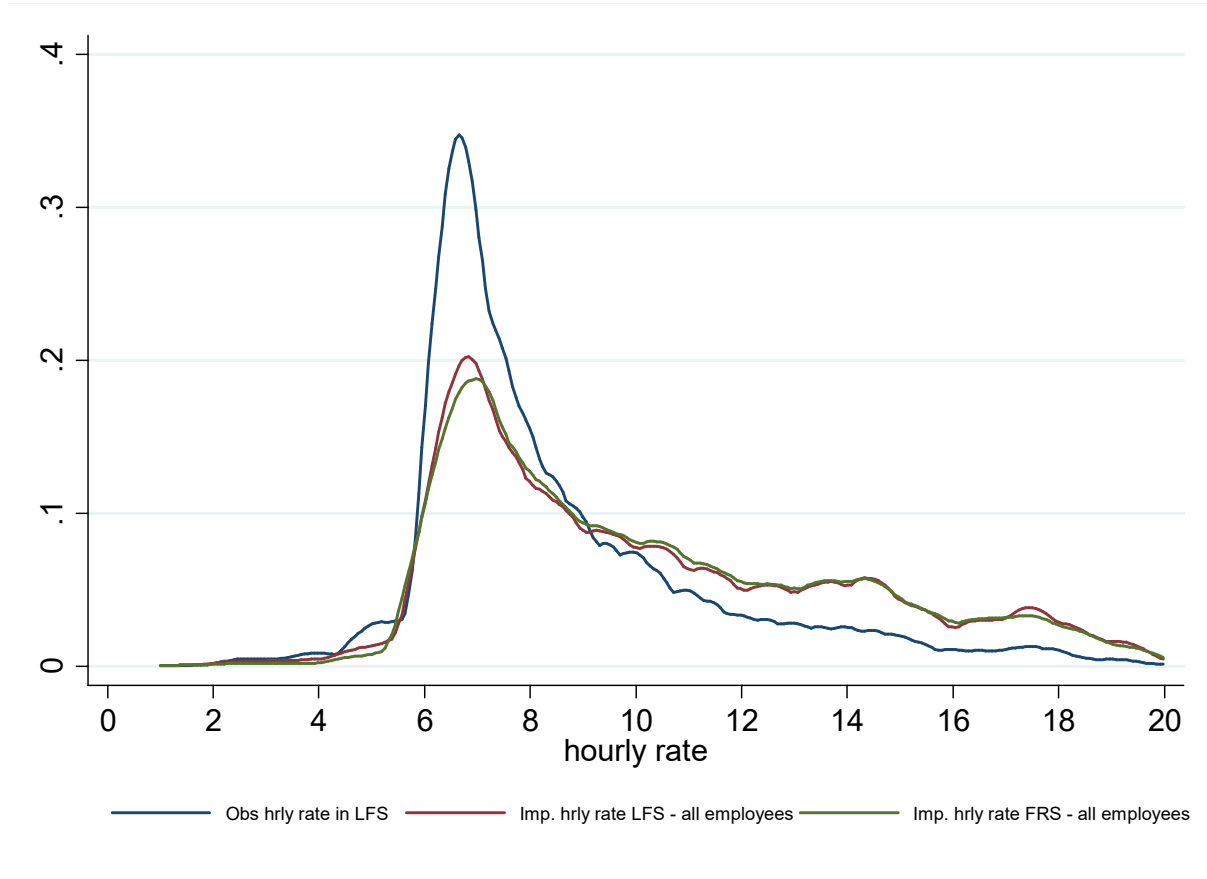


Table 1: Validating FRS imputed NMW/NLW workers against ASHE 2014-15

		16-17	18-20	21-24	25+	Sum
FRS	2014/15	28,811	95,239	212,609	1,004,816	1,341,475
ASHE	2014/15	28,644	121,712	258,950	988,707	1,398,012
	ratioFRS/ASHE	1.01	0.78	0.82	1.02	0.96

Source: authors' calculations using weighted data from FRS 2014/15 as described in the text.

2.2 Estimating households' entitlements to benefits and liabilities to taxes using EUROMOD

The core of our analysis compares the net incomes and work incentives of NMW and NLW households under two hypothetical tax and benefit systems:

- our estimate of the personal tax and benefit system in the current fiscal year, 2017-18 (which we call our “base system”).
- our estimate of the personal tax and benefit system in 2020-21.

To do this, as discussed in the previous section, we use data from the Family Resources Survey 2014/15 but augmented with a more accurate measure of who is being paid at or below the NMW/NLW. In order to use the 2014/15 dataset to estimate the income of NMW and NLW families in 2017-18, we uprate financial variables for households that appear in the 2014/15 FRS (such as earnings, other sources of income, some expenditures which are subsidised by the tax system, such as rental costs and spending on childcare) to levels appropriate for 2017-18 and 2020-21 by using actual changes in earnings and prices to date, together with the latest forecast of these measures made by the Office for Budget Responsibility (see Appendix 1).³ The Government has set a target for the NLW to reach 60% of median hourly earnings by 2020, which by OBR's forecasts means that it will rise to £8.75 per hour. We follow the assumptions made by the OBR and assume that the NMW is increased in line with the average weekly earnings index until 2020⁴. We do not account for any socio-demographic changes; that means our results should be thought of as a projection of how NMW and NLW households in 2014-15 would fare in 2017-18 and 2020-21 under the rates of NMW/NLW set out in Table 2, rather than a forecast.

Table 2 Changes to NMW/NLW rates 2017-2020

	2017	2018	2019	2020
NLW 25+	7.50	7.90	8.30	8.75
NMW 21-24	7.05	7.25	7.50	7.75
NMW 18-20	5.60	5.74	5.90	6.08
NMW 16-17	4.05	4.15	4.27	4.40

Source: Table 1.19 OBR's Supplementary Economy Tables March 2017 <http://budgetresponsibility.org.uk/download/march-2017-economic-and-fiscal-outlook-supplementary-economy-tables/>

In order to estimate the net incomes that NMW and NLW households would have in 2017-18 or 2020-21, we simulate households' entitlements to benefits and liabilities to taxes using the UK part of EUROMOD, the European tax and benefit microsimulation model (see Sutherland and Figari (2013), and further information at <https://www.iser.essex.ac.uk/euromod>).⁵ To do this, we

³ The analysis was finalised in April 2017, and so we use the OBR forecasts from the Spring Budget 2017.

⁴ OBR's Supplementary Economy Tables March 2017 <http://budgetresponsibility.org.uk/download/march-2017-economic-and-fiscal-outlook-supplementary-economy-tables/>.

⁵ The latest published version of the UK component of EUROMOD is De Agostini (2016), although the current version of the model is more up to date than this report suggests.

need to alter the latest publicly-available version of EUROMOD to account for the tax and benefit system in those two years. Some aspects of changes due by 2020-21 can be straightforwardly implemented in EUROMOD (for example, the changes to Universal Credit taper rates in 2017). But others are more difficult to model precisely, and require a more ad hoc but sophisticated approach (these include the rise in the female state pension age; the transfer of recipients from disability living allowance (DLA) to personal independent payment (PIP), and the restrictions on receiving the per-child elements of child tax credit and Universal Credit). We explain these in more detail in Appendix 2.

To project incomes of NMW and NLW households in 2020-21, we need to account for reforms that have been announced at the time of writing, but not yet implemented (i.e. will be implemented on or after April 2018). Specifically, we consider:

- a. abolition of class 2 National Insurance Contributions (NICs)
- b. changes to Local Housing Allowance (LHA) cap (announced at Summer 2015 Budget⁶)
- d. changes to family and per-child elements in Child Tax Credit (CTC) and the correspondent Universal Credit (UC) element
- e. cut in entitlements to Employment Support Allowance (ESA) for the Work-Related Activity Group (WRAG).

But the major change that will take effect by 2020 is the acceleration in the roll-out of Universal Credit (UC), which is replacing almost all means-tested benefits and tax credits for working age people and their families (we call these “legacy benefits”). A key feature of UC for those in part-time work is that it does not have a minimum hours of work rule, unlike the Working Tax Credit which it replaces. This will mean that some of those working fewer hours than the Working Tax Credit rules specify could gain significantly from the new regime. In addition to changes to the way that benefit entitlements are calculated, the conditionality regime faced by UC recipients in work will be substantially different from that which previously applied. In particular, conditionality will apply to two groups of UC recipients who previously faced no forms of conditionality: some part-time workers will face obligations to seek better-paid or longer-hours work, and some adults not in paid work whose partners are in low-paid work will face obligations to look for work.⁷ We discuss this later in section 3.3.

At the time of writing, there was some uncertainty about UC take-up rates and roll-out implementation, hence we had to make assumptions:

- In simulating entitlement to means-tested tax credits and benefits we make some adjustment for non take-up of these payments based on statistics provided by DWP (2016)

⁶

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/443232/50325_Summer_Budget_15_Web_Accessible.pdf

⁷ For an overview of the issues around the change, see Hills (2015), chapter 4. Up to date information can be found at <http://www.dwp.gov.uk/policy/welfare-reform/universal-credit/>

for Income Support, Pension Credit and Housing Benefit and HMRC (2016) for tax credits. Making such adjustments involves selecting randomly within client groups and benefits such that a proportion of those entitled, based on the official statistics, do not receive their entitlement. Clearly this is a rather approximate process and such adjustments are not always made in UK microsimulation analysis of policy changes. However, we believe that it is important to represent those not taking-up their entitlements in the income distribution and in the analysis of policy changes.

- To account for the process of transferring claimants between the legacy benefit system and the Universal Credit system⁸, we follow assumptions made in the OBR's November 2016 report: when modelling 2017/18, we assume that 1 in 10 of eligible families receive UC and 9 in 10 receive legacy benefits; when modelling 2020/21, we assume that 5 in 6 receive UC and 1 in 6 receives legacy benefits (see Chart 4.7 of OBR (2016)). We did not account for the fact that roll-out might have been different for different family types.
- UC is expected to have a higher take-up rate than the benefits that it replaces because it requires only one application (while legacy benefits' claimants need to apply for each benefit or tax credit separately); and there is much less scope for families to "fall between" benefits and tax credits when circumstances change, as can happen under the legacy system. In adjusting for non take-up of Universal Credit, which cannot yet be measured, we seek to minimise the effect on the results of any spurious changes in take-up assumptions, while recognising that there will be some positive effect on the amounts taken up due to a single application procedure. If any of the pre-reform elements (CTC, WTC, Income Support, Housing Benefit etc.) to which a particular benefit unit might be entitled are assumed to be taken up then it is assumed that UC would be taken up under the new regime. This is similar to the assumption used in Treasury modelling (HMT, 2013) although they additionally make the more optimistic assumption that some of those not taking up any of their entitlements to the old benefits and tax credits will nevertheless claim UC (20% of the employed in this group and 10% of the self-employed). In our analysis, if a family becomes newly-entitled to means-tested support through UC then probabilities are applied as for IS under the old system. The resulting average take-up rate of UC (calculated as the number of benefit units modelled to be receiving divided by the number simulated to be entitled) is 82 per cent in 2017-18 and 85 per cent in 2020-21. This is a significant assumption: in reality, take-up of means-tested benefits and tax credits amongst working families is far from complete, and the Government expects fewer working families not to claim UC than fail to claim their current entitlements. If so, such a take-up response would increase the apparent generosity or cost of UC, and increase the income gains amongst low income working families. However, it is also possible that the in-work conditionality regime under UC might deter some families from claiming UC. Our assumption of full take-up is intended both as a pragmatic and agnostic solution.

⁸ See <https://www.parliament.uk/business/publications/written-questions-answers-statements/written-statement/Commons/2016-07-20/HCWS96/>

2.3 Data sample and Income distribution concepts

In this subsection we describe the NMW/NLW sample identified in the Family Resources Survey 2014/15 by the procedure described above. Table 3 shows that NMW workers are on average younger than NLW workers, they are mostly single (67%) and therefore they live in a one earner family (84%). NLW workers are more often found to be in a couple with children (50%) and are most likely to live with a working partner (60%).

Table 3 Descriptive statistics

	NMW workers	NLW workers
Mean Age	19.74 (6.03)	33.04 (19.61)
% Male	48.14	46.23
% living in Family type		
Single	67.42	9.71
Lone parents	10.28	10.06
Couple with children	8.84	50.19
Couple without children	13.45	30.05
% living in:		
Single earner family	83.84	40.09
Two or more earners family	16.16	59.91

Note: Standard deviation in brackets.

In the following section we show how these groups of workers will be affected by the policy reforms announced to take place between 2017-18 and 2020-21. In doing so our main results will look at NMW and NLW families (as opposed to households) defined as those benefit units containing at least one NMW or NLW worker. The results that follow look at the average policy effect for the NMW/NLW population, but also at differences across the income distribution. For this purpose, observations are ranked into decile groups using working-age family net income in 2017 equivalised using the modified OECD equivalence scale. As the results may change when analyzing households or using alternative definitions of income distribution, we show how results change when:

- ranking observations by decile across the whole income distribution or
- ranking observations *where someone is in work* over the working-age income distribution.

Appendix 4 also shows how our results would change, if we used households rather than families.

3. Results

3.1 Where are NMW and NLW workers in the income distribution?

Figure 2 shows how NMW families and NLW families are spread across the working-age income distribution (as well as showing non-working families and working families who earn more than the NMW/NLW, by way of comparison). NMW families are found in the bottom 6 income deciles, with the greatest fraction found in the poorest 10% of families. NLW workers are more evenly distributed across decile groups, and are most likely to be found in the third decile. The fact that NLW families tend to be better off than NMW families reflects both that they are paid more and that they are more likely to live with a working partner. (Appendix 4 shows the same analysis for alternative definitions of the income distribution. The main difference is that, amongst all working-age families *where someone is in work*, both NMW and NLW families tend to be found towards the bottom of the income distribution.)

Figure 2 Working-age families across the working age income distribution, by employment and NMW/NLW status (2017-18)

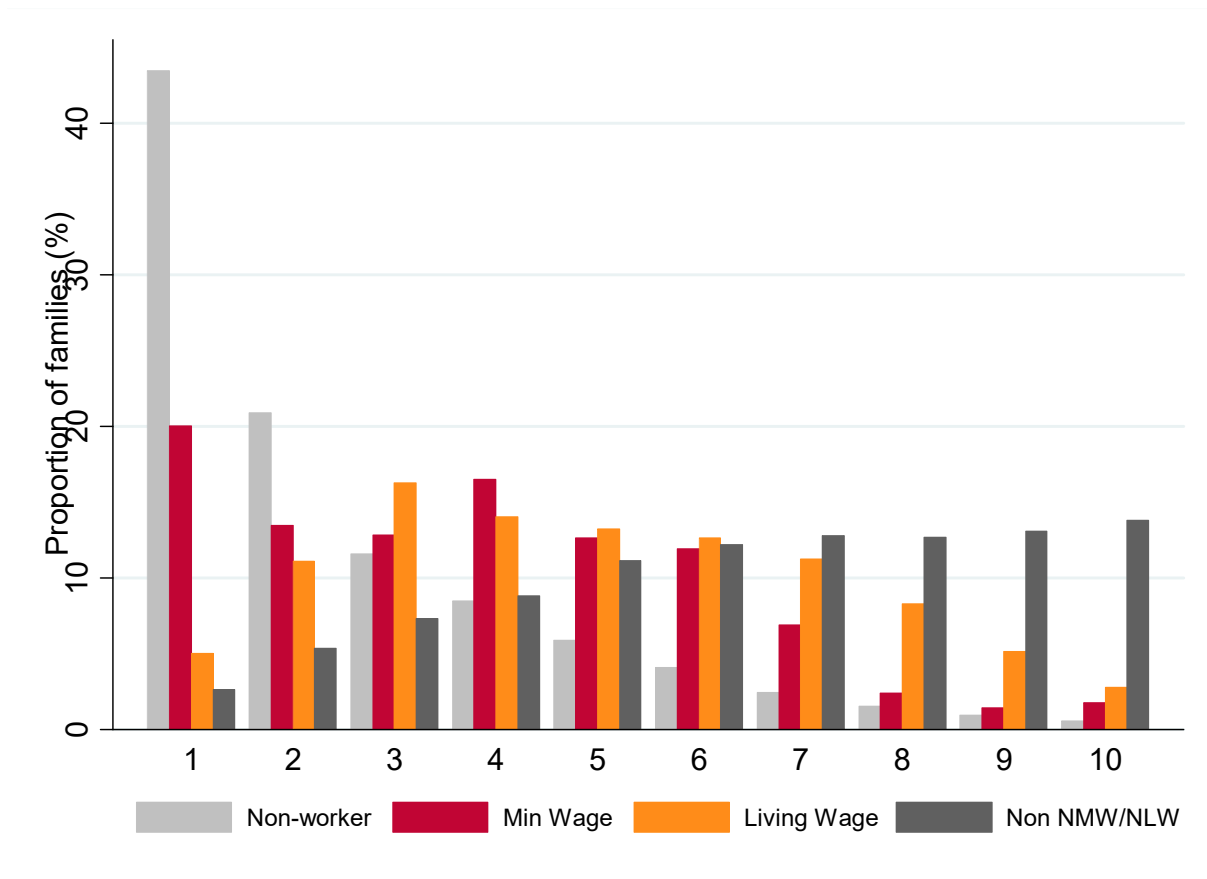


Table 4 gives some details of the estimated distribution of net income of NMW & NLW families in 2017-18, split by according to whether the NMW or NLW job was the main source of earnings in the family, and also including non-working and other working families for comparison.

Table 4 Simulated income distribution of NMW/NLW families in 2017-18 (baseline system)

NMW/NLW family type							
	Non-worker	NMW main job	NMW 2 nd job or 2 nd earner	Above NLW	NLW main job	NLW 2 nd job or 2 nd earner	Total
mean	159.4	219.93	492.71	252.53	423.34	449.31	361.96
p5	0	58.36	211.97	107.41	193.36	159.47	57.99
p10	11.52	88.33	211.97	126.97	220.38	200.77	76.68
p25	61.02	135.03	277.58	183.61	272.04	269.25	191.62
p50	145.95	225.39	376.77	230.01	354.89	382.52	302.1
p75	222.8	285.03	478.85	307.29	459.66	547.29	467.66
p90	309.33	350.81	753.06	416.16	595.36	752.02	664.61
p95	381.13	390.32	1561.58	457.12	679.72	935.62	822.84

Note: Observations are ranked into decile groups using working-age family income in 2017-18 equivalised using the modified OECD equivalence scale. Source: Authors' calculations.

Figure 3 shows the importance of earnings from NMW and NLW jobs to NMW/NLW families (it shows the ratio of “earnings from NMW and NLW jobs” to “net family income” for NMW/NLW families in each decile). This gives a measure of how important NMW/NLW jobs are to the families that contain NMW/NLW workers. The Figure shows two clear patterns:

- In each decile group, NMW workers contribute more to their families' overall income than do NLW workers. This mostly reflects that NMW workers are more likely to be single than NLW workers.
- The contribution of NMW and NLW earnings to NMW/NLW families' net income falls as we go up the income distribution.

It is also important to appreciate how low some of these values are. For example, we showed above the families containing an NLW workers are most likely to be found in the third income decile. For these families in this decile group, earnings from the NLW make up only just over half of total family disposable income, with the rest coming from a partner's earnings or benefit entitlements. Earnings from the NMW, though, do make up a much higher proportion of their families' net income, and especially in the bottom 2 decile groups, where this ratio exceeds 90%. The equivalent analysis at the household level is shown in Figure 4.

Figure 3 Proportion of earnings (%) from NMW and NLW to NMW/NLW families in the working-age income distribution in 2017-18

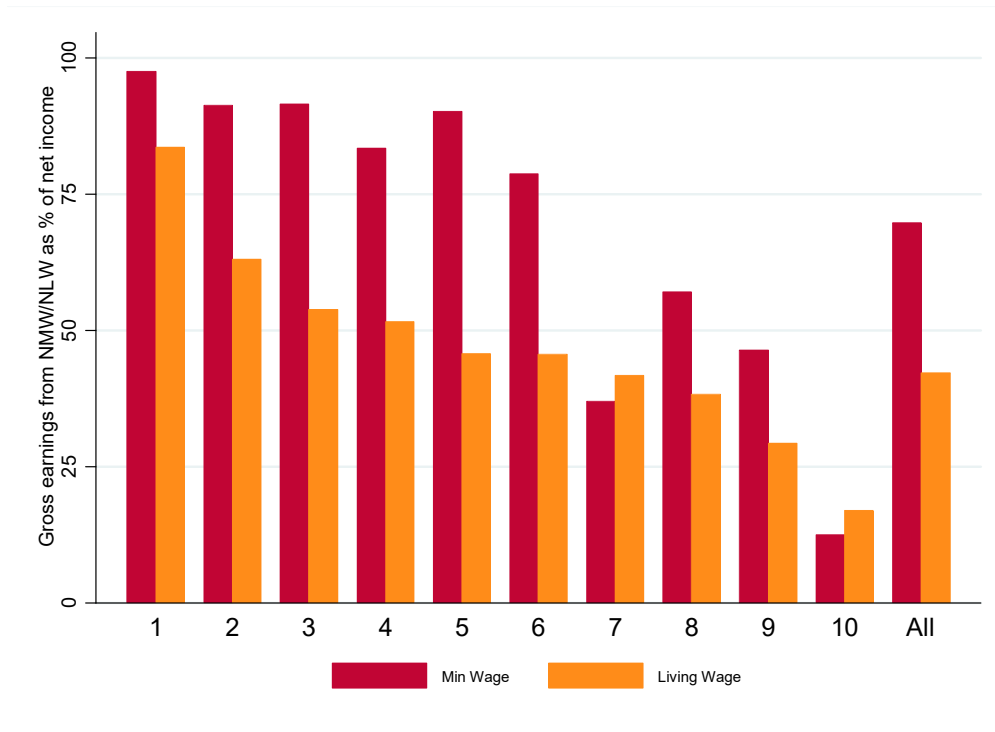
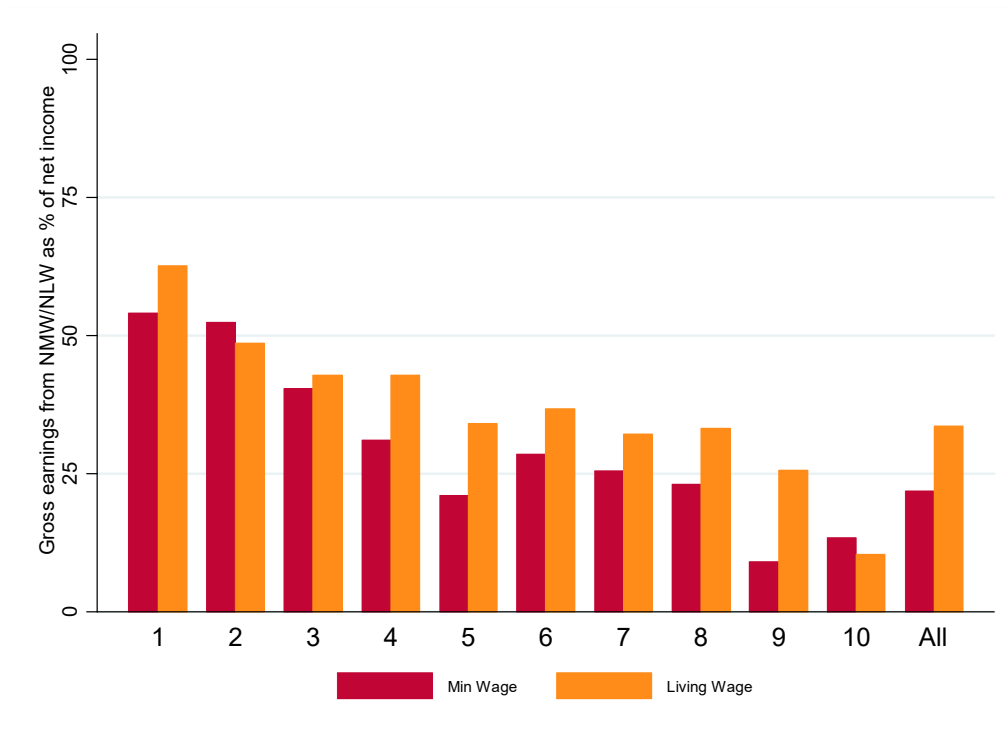


Figure 4 Proportion of earnings (%) from NMW and NLW to NMW/NLW households in the working-age income distribution in 2017-18



As background, Appendix 3 shows our estimates of how the NLW has affected the income distribution in 2017-18 (i.e. we compare our baseline estimates of the income distribution in 2017-18 to one where there is no NLW (i.e. those 25 and over are subject to the NMW instead), holding everything else (including employment) constant).

3.2 How are NMW/NLW families due to be affected by future tax and benefit reforms?

This sub-section reports our main analysis that compares the net incomes of NMW and NLW families (or, in a variant, households) under two hypothetical tax and benefit systems:

- our estimate of the personal tax and benefit system in the current fiscal year, 2017-18 (which we call our “base system”).
- our estimate of the personal tax and benefit system in 2020-21.

We discussed how we estimated these in Section 2; the key points are that we accounted for all announced changes to taxes and benefits as of the Spring Budget 2017⁹, and the roll-out of Universal Credit, and future rates of the NMW and NLW as assumed by the OBR (see Table 2).

The headline results are shown in Figure 5 and Figure 6; Figure 5 analyses changes in family net income and ranks NMW/NLW families by their position in the distribution of net family income, and Figure 6 analyses changes in household net income, and ranks NMW/NLW households by their position in the distribution of net household income.

Each figure contains four panels. The first three panels show the impact of a specific set of changes, and the final (bottom right) panel shows the overall impact. Specifically, the top left panel shows how NMW/NLW families will gain from the forecast changes in the NMW/NLW between 2017-18 and 2020-21 (we have an increase in the NMW because we follow the OBR’s assumptions that the NMW will rise in line with earnings growth. However, this increase is overshadowed by the significant increase in the NLW between 2017-8 and 2020-21). The top right panel shows the change in net income that will arise through the tax and benefit reforms due to take effect after 2017-18 and by 2020-21. The bottom left panel shows the impact of the roll-out of UC between 2017-18 and 2020-21. The bottom right panel adds these all together. Like all our

⁹ This is different from policy changes effect between 2015/16 and 2020/21 that has been estimated by IFS (https://www.ifs.org.uk/uploads/budgets/budget2017/budget2017_tw.pdf) because:

- 1) we look at a subgroup of the whole population,
- 2) we compare two different points in time 2017/18-2020/21,
- 3) we rank families across the working-age income distribution of 2017/18,
- 4) we account for non take-up of benefits and
- 5) we account for UC roll-out.

For comparison, Appendix 4 shows EUROMOD policy changes analysis between 2015/16 and 2020/21. Further details about how EUROMOD results compare to other tax and benefit microsimulation model can be found in De Agostini et al. (2017).

analysis, the results assume families do not alter their employment (or other) decisions in response to policy or NMW/NLW changes.

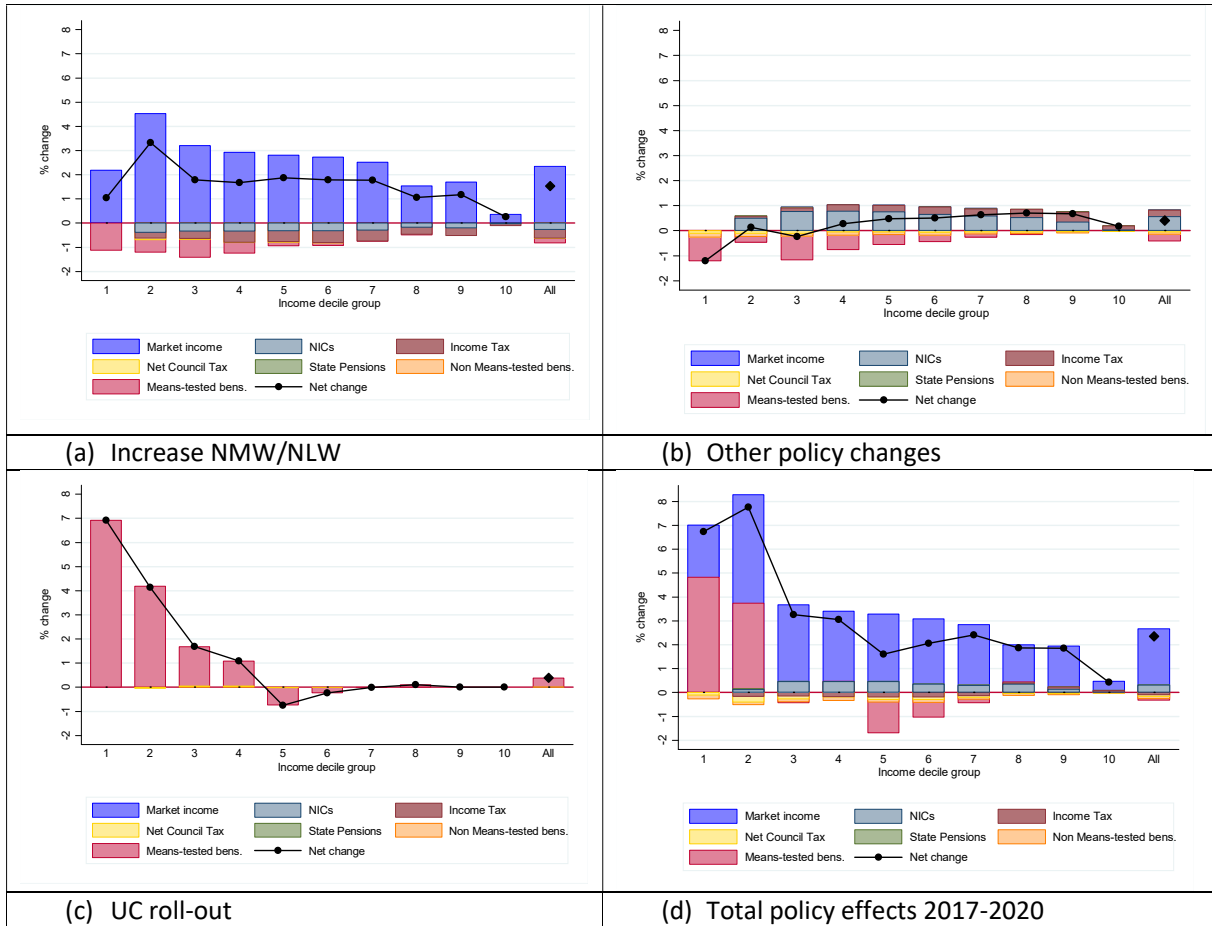
The top left panel of Figure 5 shows that the forecast increases in the NMW/NLW will increase the net incomes of NMW/NLW families by about 1.5%, on average. Within these families, the impact is progressive, in that low-income NMW/NLW families gain by slightly more than high-income NMW/NLW families, except for the poorest decile group, which as we showed in Section 2, contains very few NLW recipients. The top right panel shows that announced but not yet implemented tax and benefit changes will have only small effects on NMW/NLW families. The bottom left panel shows that our assumptions about the roll-out of UC and our assumptions about its take-up would lead to considerable income gains for NMW/NLW families in the bottom two income decile groups. This represents families not currently entitled to or receiving legacy benefits or tax credits, particularly those aged under 25 and without children and working fewer than 30 hours. The combined impact is shown in the bottom right panel: we estimate that NMW/NLW families are set to see incomes rise by over 2% over the next three years. The average change is particularly high – over 7% - amongst NMW/NLW families in the bottom two income decile groups.

This is a remarkably different result from what we would have found had we undertaken this analysis in each of the previous 6 years, where the impact of further welfare cuts would have dominated any projection of the incomes of NMW/NLW families. Of course, this assessment is based on only those welfare changes that we know about as of September 2017, and takes no account of anything announced in the Autumn 2017 Budget (for example).

Figure 6 repeats the analysis but using households as the unit of analysis. Doing so does not change the basic pattern, but makes the pattern of income changes more progressive.

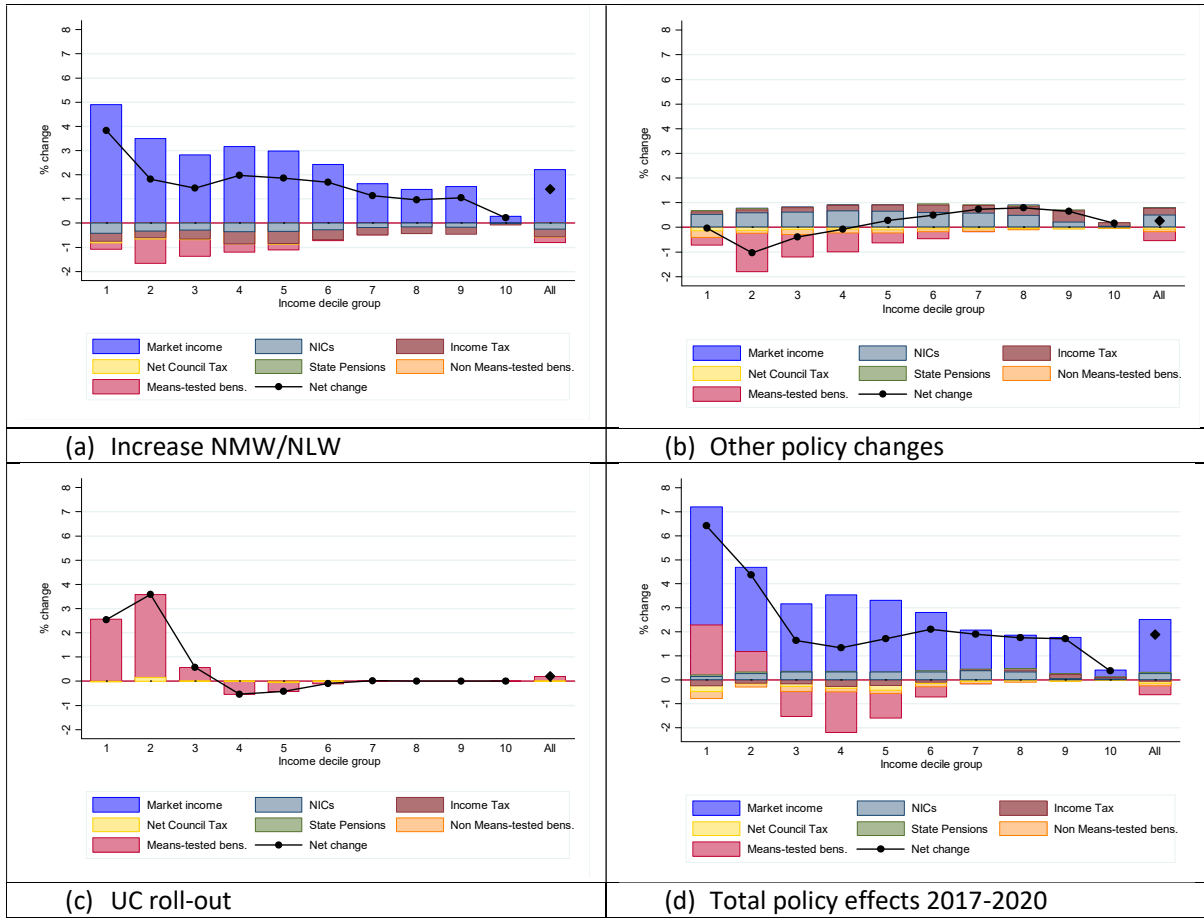
Figure 7 and Figure 8 perform the analysis separately for NMW and NLW families. The mean gain amongst NMW families is around 1%, but almost 3% for NLW families, reflecting the rises in the NLW that we expect between now and 2020-21. Figure 9 and Figure 10 show the changes in incomes that we expect amongst all working-age families, or amongst the whole income distribution (note that this analysis shows the combined impact of the changes to taxes, benefits and the roll-out of UC that apply to all families, with the expected increases in the NMW/NLW, but the top left panel of each Figure does show the distribution impact of the expected increases in the NMW/NLW alone).

Figure 5 Equivalised disposable income real changes (%) from 2017 to 2020 on NMW/NLW families over the working-age income distribution



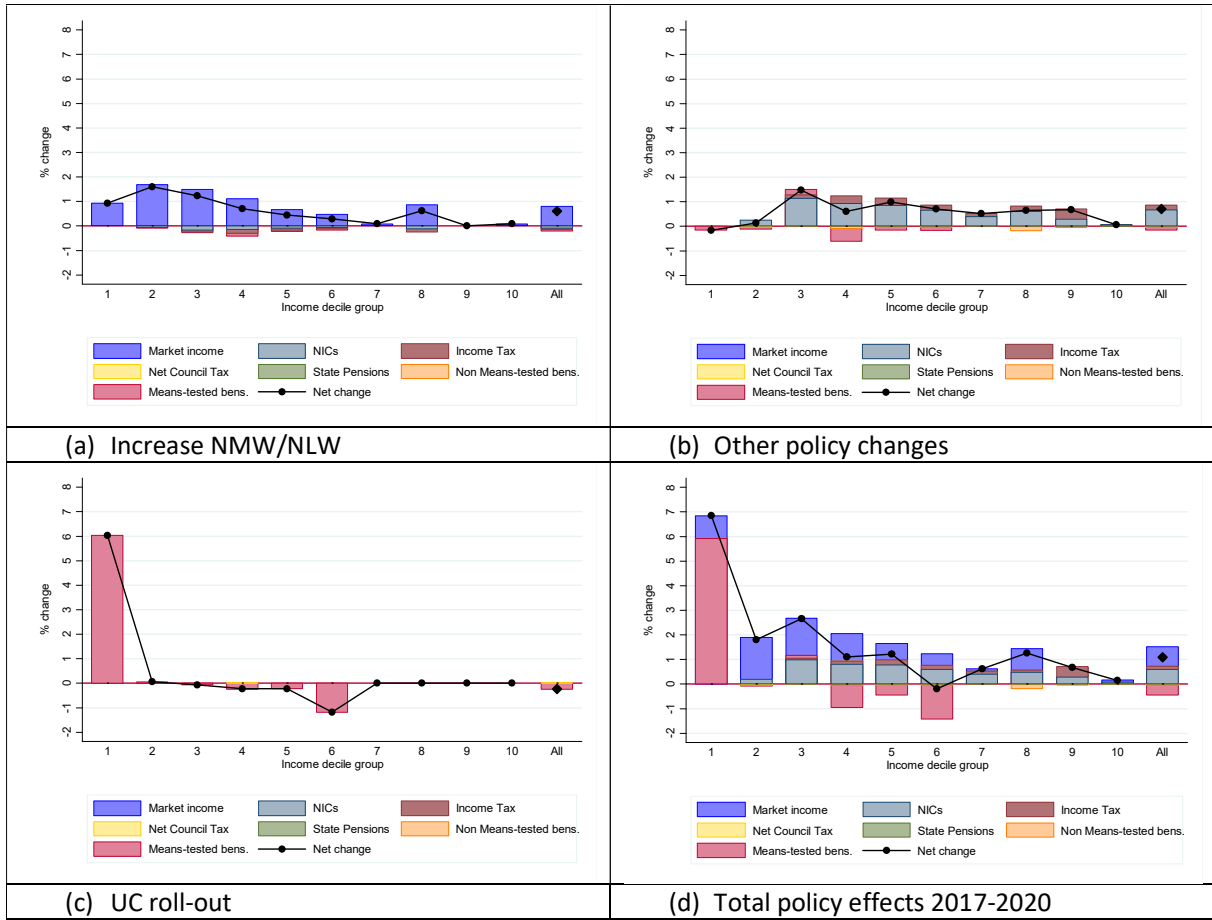
Notes: Observations are ranked into decile groups using working-age family income in 2017 (uprated by CPI to 2020) equivalised using the modified OECD equivalence scale. The simulation assumes partial take-up of means-tested benefits and partial Universal Credit roll-out. Source: Authors' calculations using EUROMOD H0.32.

Figure 6 Equivalised disposable income real changes (%) from 2017 to 2020 on NMW/NLW households over the working-age income distribution



Notes: Observations are ranked into decile groups using working-age household income in 2017 (uprated by CPI to 2020) equivalised using the modified OECD equivalence scale. The simulation assumes partial take-up of means-tested benefits and partial Universal Credit roll-out. Source: Authors' calculations using EUROMOD H0.32.

Figure 7 Equivalised disposable income real changes (%) from 2017 to 2020 on NMW families over the working-age income distribution



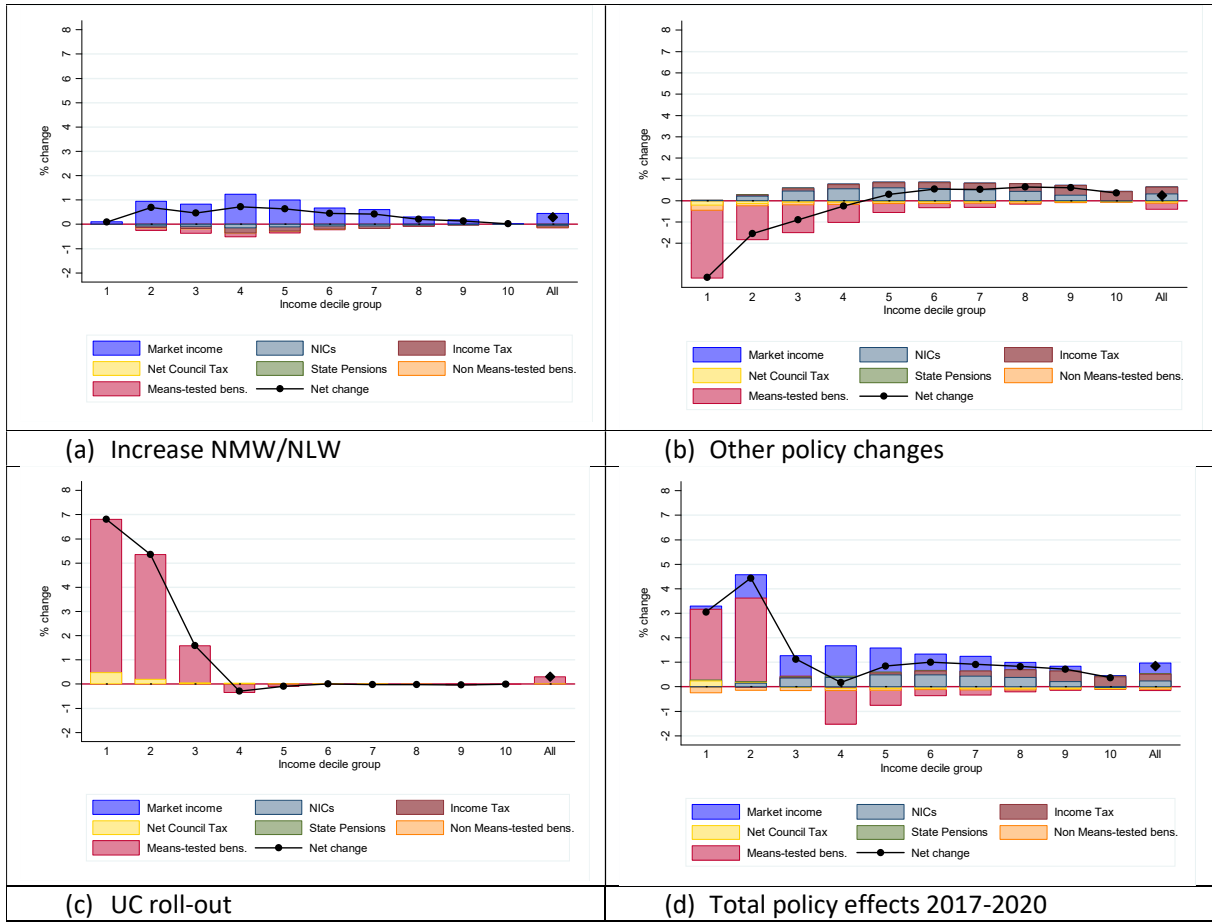
Notes: Observations are ranked into decile groups using working-age family income in 2017 (uprated by CPI to 2020) equivalised using the modified OECD equivalence scale. The simulation assumes partial take-up of means-tested benefits and partial Universal Credit roll-out. Source: Authors' calculations using EUROMOD H0.32.

Figure 8 Equivalised disposable income real changes (%) from 2017 to 2020 on NLW families over the working-age income distribution



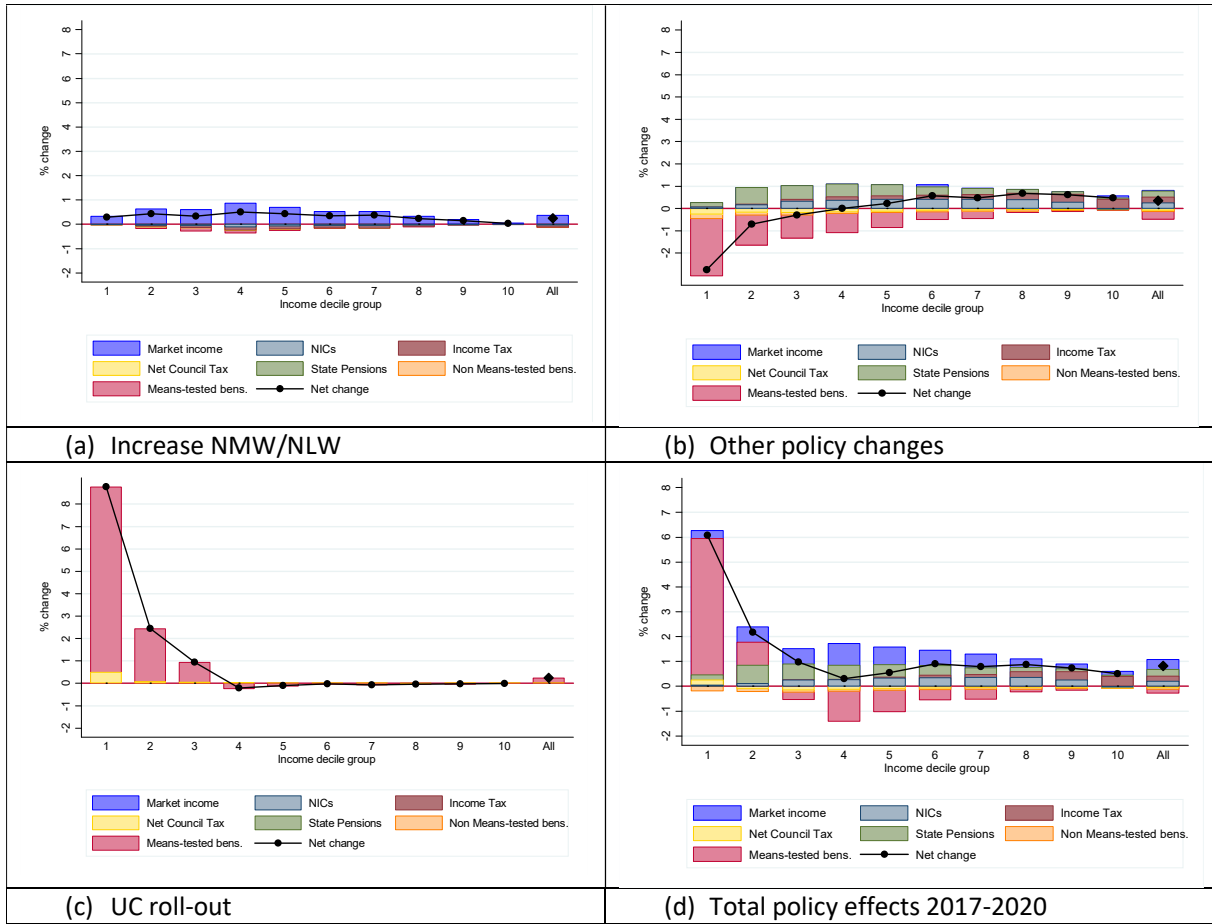
Notes: Observations are ranked into decile groups using working-age family income in 2017 (uprated by CPI to 2020) equivalised using the modified OECD equivalence scale. The simulation assumes partial take-up of means-tested benefits and partial Universal Credit roll-out. Source: Authors' calculations using EUROMOD H0.32.

Figure 9 Equivalised disposable income real changes (%) from 2017 to 2020 on all working-age families over the working-age income distribution



Notes: Observations are ranked into decile groups using working-age family income in 2017 (uprated by CPI to 2020) equivalised using the modified OECD equivalence scale. The simulation assumes partial take-up of means-tested benefits and partial Universal Credit roll-out. Source: Authors' calculations using EUROMOD H0.32.

Figure 10 Equivalised disposable income real changes (%) from 2017 to 2020 on whole population (families) over the (whole population) income distribution



Notes: Observations are ranked into decile groups using the whole population income in 2017 (uprated by CPI to 2020) equivalised using the modified OECD equivalence scale. The simulation assumes partial take-up of means-tested benefits and partial Universal Credit roll-out. Source: Authors' calculations using EUROMOD H0.32.

3.3 Impact across type of families and regions

Figure 11 expands on the analysis in section 3.2 by showing the mean percentage change in incomes for different family types. It compares the net incomes of NMW and NLW families (or, in a variant, households) under two hypothetical tax and benefit systems:

- our estimate of the personal tax and benefit system in the current fiscal year, 2017-18 (which we call our “base system”).
- our estimate of the personal tax and benefit system in 2020-21.

Panels (a) to (c) are for information only, and panels (d) to (f) show the changes for NMW and NLW families. The most striking changes are the projected fall in incomes for lone parents and for some couples with children: these are mostly due to the restrictions that are being gradually rolled-out to the number of per-child additions to means-tested benefits that a family can receive; panels (a) to (c) imply that lone parents who are not NMW/NLW recipients are affected just as much as NMW/NLW recipients.

The panels also show that the family type to gain the most from the NLW rise is single adults; this is likely to be because earnings from the NLW make up such a high fraction of these people’s total income.

Figure 12 shows the mean percentage change in incomes for families in different regions. Obviously there is nothing about the NMW/NLW that varies by region. But the panels do reveal that, although NMW/NLW families in London gain the least from the future rise in the NLW, such families are also set to gain the most from the roll-out of UC: this reflects our assumptions about take-up, and that take-up of housing support is low amongst in-work families, and that high rents make housing support more important in London. Panels (a) to (c) confirm that there is nothing distinctive about NMW/NLW families driving this: it is true of all working-age families.

Figure 11 Equivalised disposable income real changes (%) from 2017 to 2020 by family type

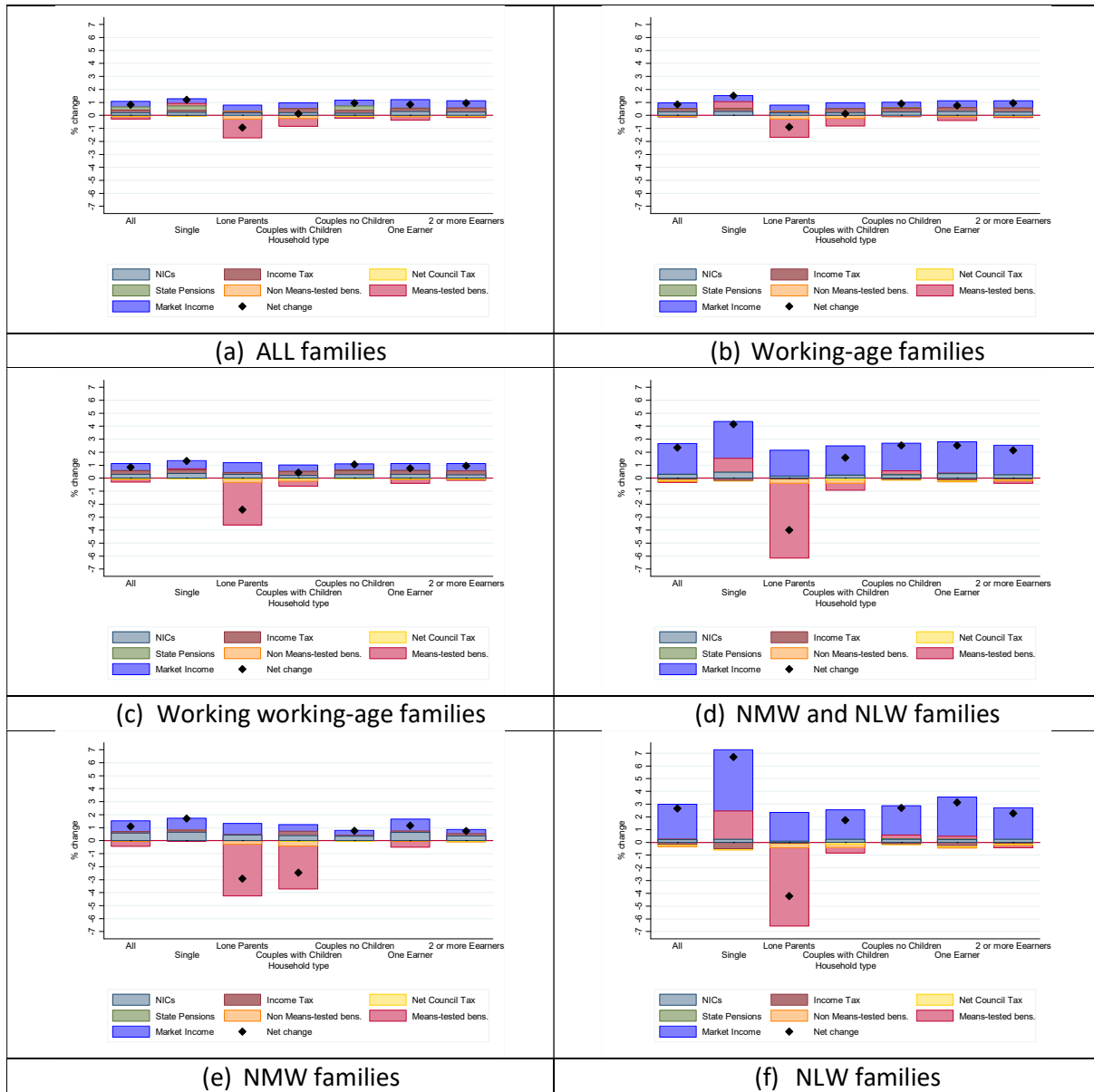
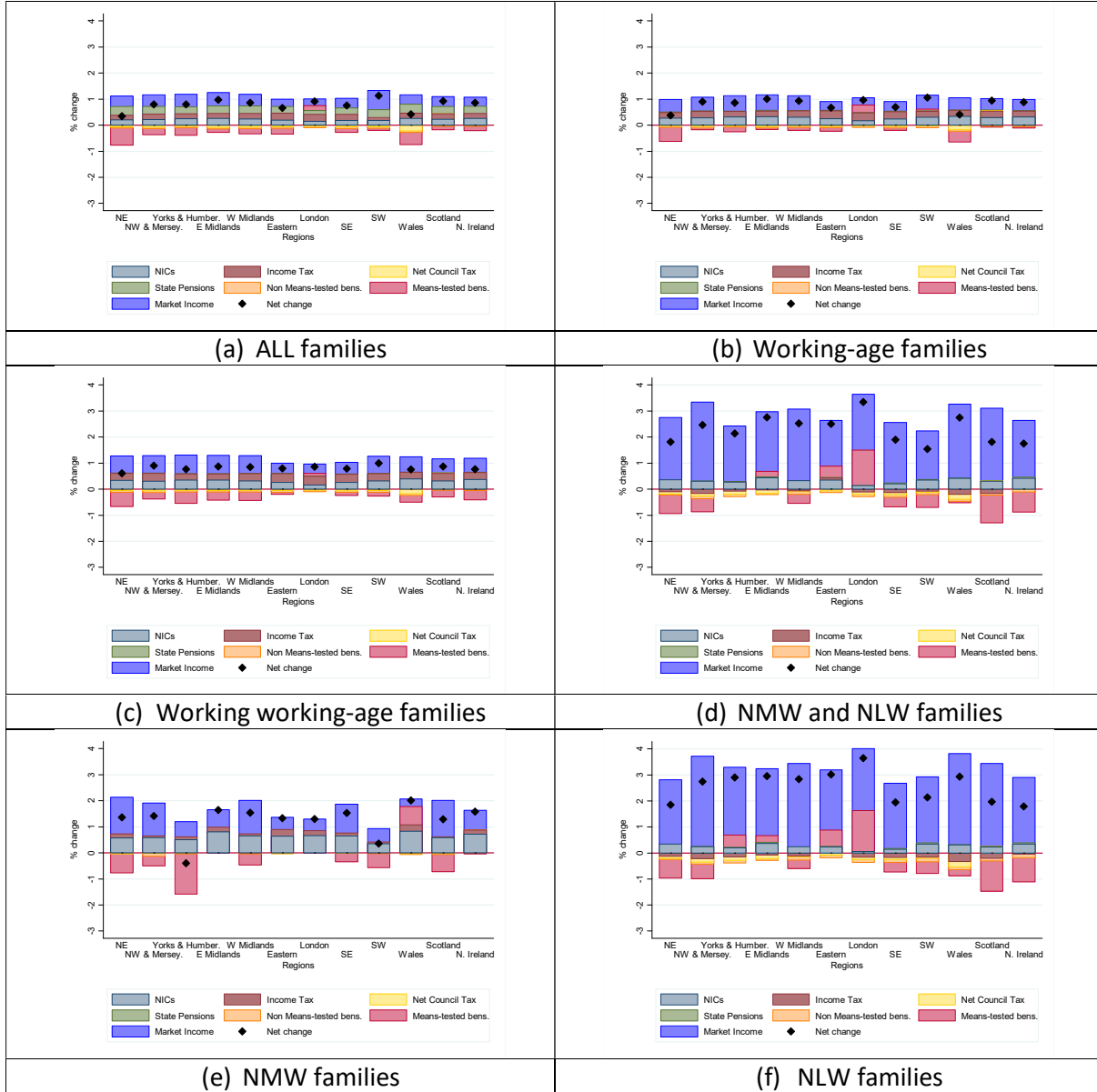


Figure 12 Equivalised disposable income real changes (%) from 2017 to 2020 by region of residence



[Note some more on regional findings?]

3.4 The financial incentive to work faced by NMW/NLW workers

3.4.1 Marginal effective tax rates

This sub-section shows the marginal effective tax rates that NMW/NLW recipients face, how these vary by income and family type, and how they are due to change between now and 2020-21.

A marginal effective tax rate (METR) calculates what fraction of a small rise in earnings – whether due to higher wages or additional hours worked – is lost to additional payments of income tax and National Insurance, and reduced entitlements to tax credits and other means-tested benefits.¹⁰ This is particularly interesting concept for NMW/NLW recipients as it also measures what fraction of any rise in the NMW/NLW is lost to recipients.¹¹

Table 5 shows our estimates of the distribution of METRs across NMW/NLW recipients in 2017-18 and 2020-21. A very common METR is 32%: this is the METR faced by someone who is paying income tax and NI on their additional earnings and who is not receiving any means-tested benefits. Rates higher than that usually arise when a NMW/NLW recipients is entitled to a means-tested benefit or tax credit; rates below that usually arise when a NMW/NLW recipient earns too little to pay income tax.

Table 5 shows that the METRs will rise very slightly on average (so weakening incentives to earn more), and that this pattern is not constant across the distribution. In any case, the changes shown – which are mostly due to our assumptions about the roll-out of UC and the change in the UC taper rate - are fairly small.

The average METRs faced by people with different characteristics are summarized in Table 6. This also includes separate analysis for NMW and NLW recipients. This shows that, although mean METRs are higher for NLW recipients than NMW recipients, the mean METR for NLW recipients is set to fall over the next few years, but the mean METR for NMW recipients is set to rise over the next few years. The former is mostly driven by the cut in the taper rate of UC, and the latter is driven by our assumption about roll-out and take-up of UC amongst working adults under 25, who currently do not get WTC unless they work 30 or more hours a week.

Figure 13 shows our estimates of the mean METRs faced by NMW and NLW recipients in 2017-18 and 2020-21 in each income decile group across the working-age distribution (as well as, for reference, those faced by all workers). It also splits this mean METR according to whether the

¹⁰ We ignore the annual disregard in tax credits when making these calculations. This means that the METRs that we calculate are higher than those faced by NMW/NLW workers in the short-run (when their entitlement to tax credits will not change). Evidence is not clear on how incentives are perceived by NMW/NLW workers.

¹¹ It is tempting to interpret the average METR on NMW/NLW recipients as measuring what fraction of any legislated rise in the NMW/NLW is immediately reacted by the government. In fact, the true fraction would be a little higher than the numbers shown here, as calculations ignore payments of employer NI, which also rise automatically when the NMW/NLW rises. The overall fiscal impact of a rise in the NMW/NLW would obviously depend on many other factors, and would need to reflect the additional cost of paying public sector workers, any increased cost to the public sector if a higher NMW/NLW increases the prices of things bought by the public sector, and the broader fiscal consequences of any resulting changes in the economy, amongst other things.

foregone earnings is going to higher income tax, higher NICs, or reduced payments of means-tested benefits and tax credits. It shows that:

- The impact of a rise in earnings on payments of income tax amongst NMW and NLW recipients rises across the income distribution. The impact of a rise in earnings on payments of NICs is fairly constant across the income distribution, except in the bottom decile group where NMW and NLW recipients earn too little to be liable to NICs. The impact of a rise in earnings on entitlements to means-tested benefits falls away after the third income decile.
- NMW recipients face lower METRs than NLW recipients even in similar parts of the income distribution. This is likely to be because NLW recipients are more likely to be in families that are eligible for means-tested benefits, perhaps because they are more likely to have children.
- Our assumptions about the roll-out and take-up of UC are behind the small rises in the average METR faced by NMW recipients in the bottom 2 decile groups. This is caused by some NMW recipients in those decile groups being modelled by us as not receiving WTC but as receiving UC. This change could either be because they are not entitled to WTC (because they work less than 30 hours a week and do not have children) or they are not claiming WTC (which has a very low take-up rate amongst this group).
- Other than that, there are few discernible changes, and especially so for NLW recipients. Our forecasts imply a fall in mean METRs for NLW recipients in decile groups 2 and 3, and this will likely be thanks to the single taper of UC replacing the sometimes-overlapping tapers of WTC and HB in the legacy tax and benefit system.

Figure 14 repeats this, but using whole-population income deciles, showing very similar patterns.

Table 5 METRs statistics in 2017-18 and 2020-21

	2017-18	2020-21
Mean	39.33	39.49
Median	34.23	33.68
p25	32.00	32.00
p75	42.41	42.00
p5	9.00	5.50
p95	76.00	74.56

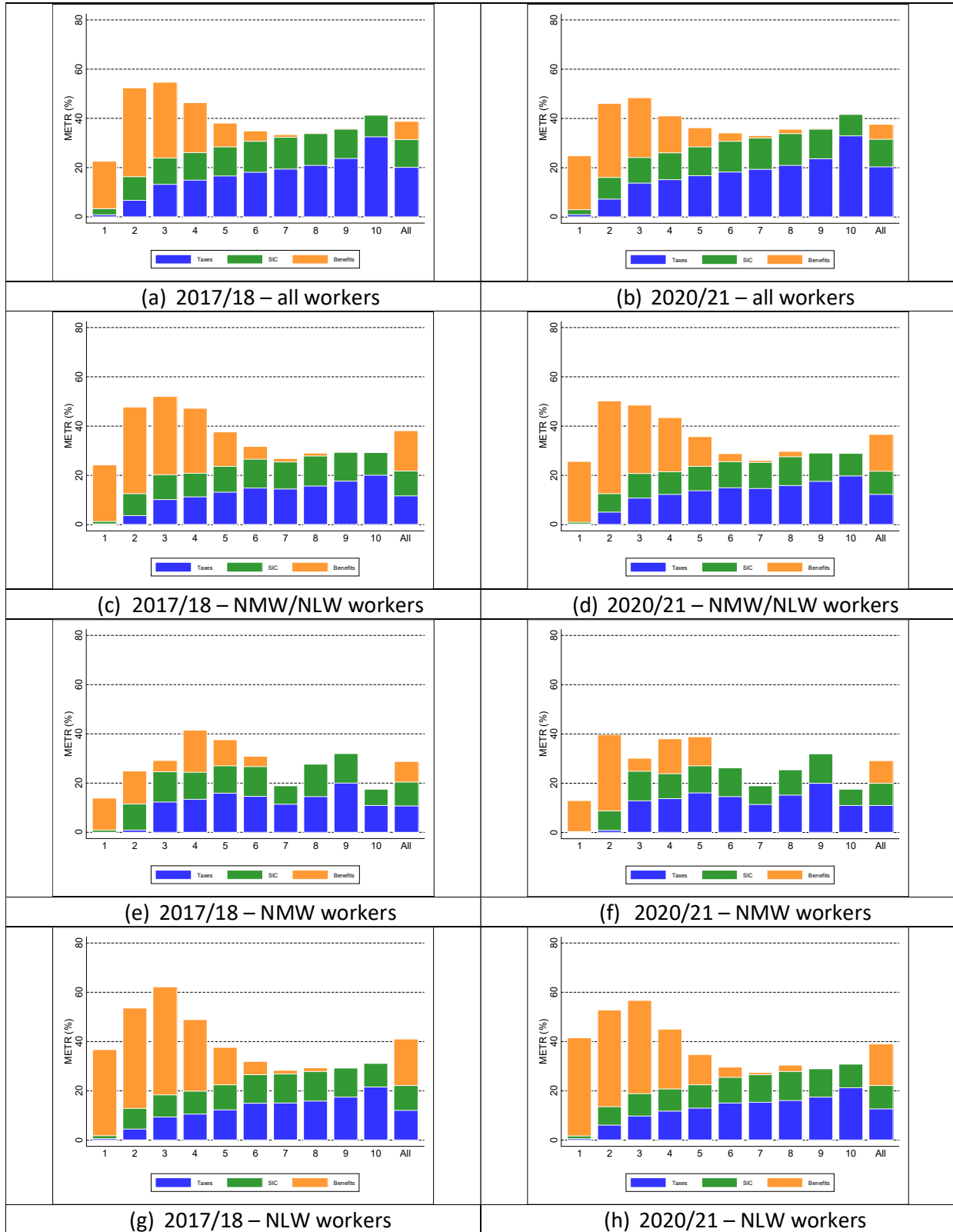
Notes: METRs distribution across working-age family in 2017-18 and 2020-21. The simulation assumes full take-up of means-tested benefits and partial Universal Credit roll-out. Source: Authors' calculations using EUROMOD H0.32.

Table 6 Average METRs by various groups of the population

	2017-18	2020-21
male	39.78	39.03
female	37.83	36.20
Age <30	34.08	33.35
Age 30-50	41.73	40.36
Age 50+	37.12	36.00
Age 18-20	22.29	22.28
Age 21-24	32.51	33.10
Age 25+	40.09	38.76
Skill Low	39.25	37.52
Skill Medium	37.27	36.27
Skill High	39.67	39.26
Employee	39.07	38.06
Main earner	43.49	41.98
Second earner	31.28	30.68
Quintile 1 of earnings dist'n	35.72	31.83
Quintile 2	40.34	38.59
Quintile 3	38.12	37.09
Quintile 4	35.91	36.22
Quintile 5	44.29	44.81
Part time	35.88	33.19
NMW workers	28.86	29.19
NLW workers	41.09	39.10
No NMW/NLW	38.89	37.74

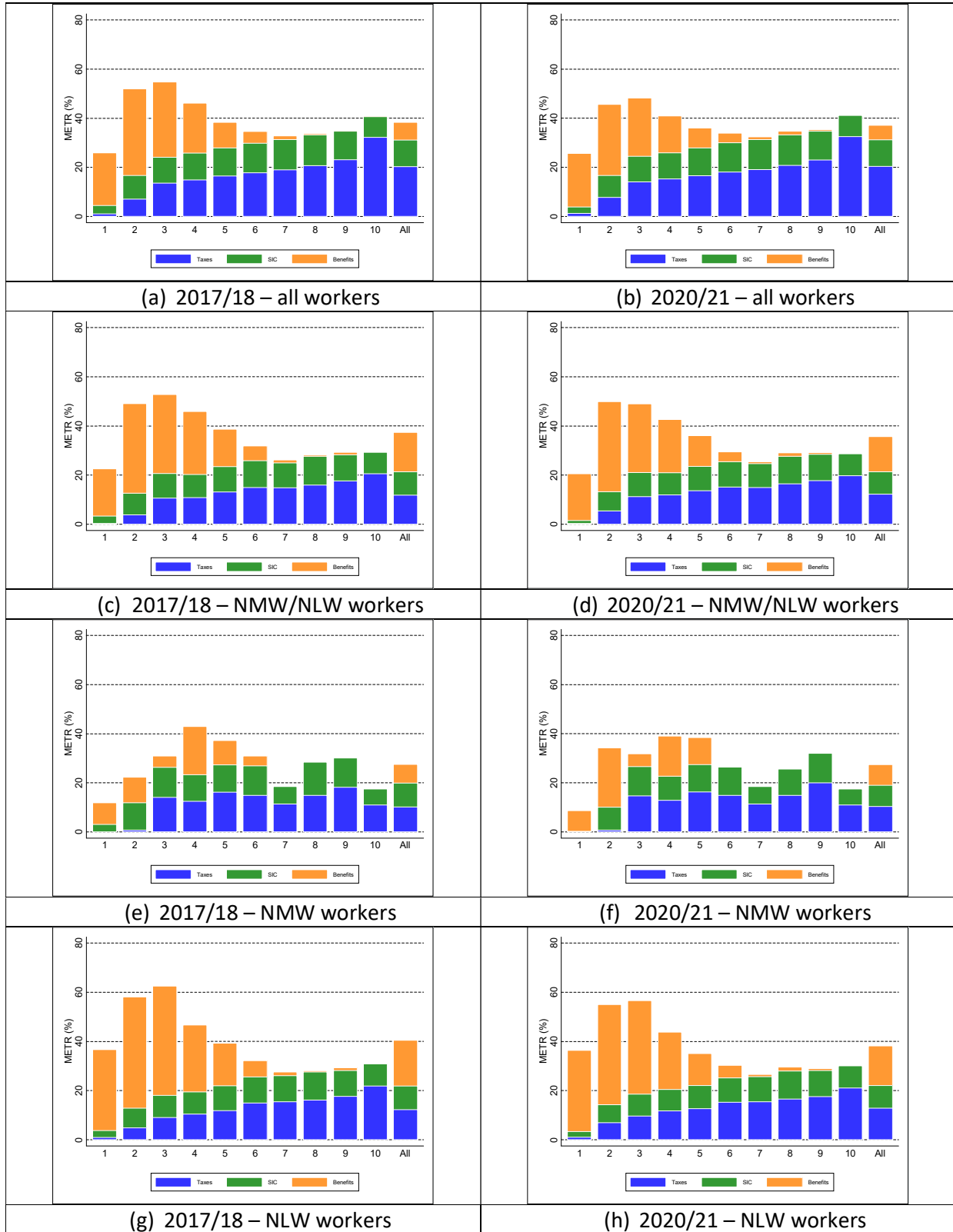
Notes: METRs distribution across working-age family in 2017-18 and 2020-21. The simulation assumes full take-up of means-tested benefits and partial Universal Credit roll-out. Source: Authors' calculations using EUROMOD H0.32.

Figure 13 METR decomposition over the working-age income distribution of 2017-18



Notes: Observations are ranked into decile groups using the working-age income in 2017 (uprated by CPI to 2020) equivalised using the modified OECD equivalence scale. The simulation assumes partial take-up of means-tested benefits and partial Universal Credit roll-out. SIC stands for Social Insurance Contributions and it is used as equivalent to NIC. Source: Authors' calculations using EUROMOD H0.32.

Figure 14 METR decomposition over the whole population income distribution of 2017-18



Notes: Observations are ranked into decile groups using the whole population income in 2017 (uprated by CPI to 2020) equivalised using the modified OECD equivalence scale. The simulation assumes partial take-up of means-tested benefits and partial Universal Credit roll-out. SIC stands for Social Insurance Contributions and it is used as equivalent to NIC. Source: Authors' calculations using EUROMOD H0.32.

3.4.2 In Work Conditionality

The incentive to earn more of NMW/NLW families will also become increasingly affected by in-work conditionality (IWC) under Universal Credit. Table 7 gives our estimates of how many NMW/NLW families will be affected by IWC in 2017/18 and show proportion by family composition.

Table 7 Estimated proportion of NMW and NLW families receiving UC and affected by in-work conditionality

	2017/18			
	NMW	NLW	% of NMW	% of NLW
Single person, no children	277,616	253,316		
Single person, no children, earning less than 35 times NMW/NLW	126,543	125,013	45.58%	49.35%
Lone parents	20,261	93,529		
Lone parent, youngest is aged 12+, earning less than 35 times NMW/NLW	-	17,836	0.00%	19.07%
Lone parent, youngest is aged 5-12, earning less than 25 times NMW/NLW	5,521	36,847	27.25%	39.40%
Lone parent, youngest is aged 3-4, earning less than 16 times NMW/NLW	-	2,630	0.00%	2.81%
Lone parent, youngest is aged 0-2: none	4,524	11,670	22.33%	12.48%
Couple, no children	27,691	391,912		
Couple, no children, jointly earning less than 70 times NMW/NLW	6,823	157,567	24.64%	40.20%
Couple,with children	11,369	350,885		
Couple, youngest child 12+, jointly earning less than 70 times NMW/NLW	-	30,083	0.00%	8.57%
Couple, youngest child 5-11, jointly earning less than 60 times NMW/NLW	-	30,523	0.00%	8.70%
Couple, youngest child 3-4, jointly earning less than 51 times NMW/NLW	-	13,116	0.00%	3.74%
Couple, youngest child 0-2, jointly earning less than 35 times NMW/NLW	3,837	23,142	33.75%	6.60%
	336,937	1,089,642		
Affected by IWC	147,248	448,427	43.70%	41.15%

Notes and Sources: Authors' calculations using EUROMOD H0.32. Estimates of in-work conditionality (IWC) are authors calculations assuming that carers of children aged 0-2 are not subject to IWC, carers of children aged 3-4 need to earn 16 times the relevant minimum wage a week, carers of children aged 5-11 need to earn 25 times the relevant minimum wage a week, and other adults need to earn 25 times the relevant minimum wage a week. Note that this ignores some of the flexibilities that apply to carers of dependent children.

3.5 Impact of hypothetical further increases in the NMW and NLW

Figure 15 and Figure 16 show our estimate of how incomes would change in 2020-21 if the government were to increase (respectively) the NMW and NLW by 5%. They show that across all NMW families, a rise in the NMW of 5% increases net income by an average of just under 1.3%; and the corresponding number is slightly lower (1.1%) for NLW families.

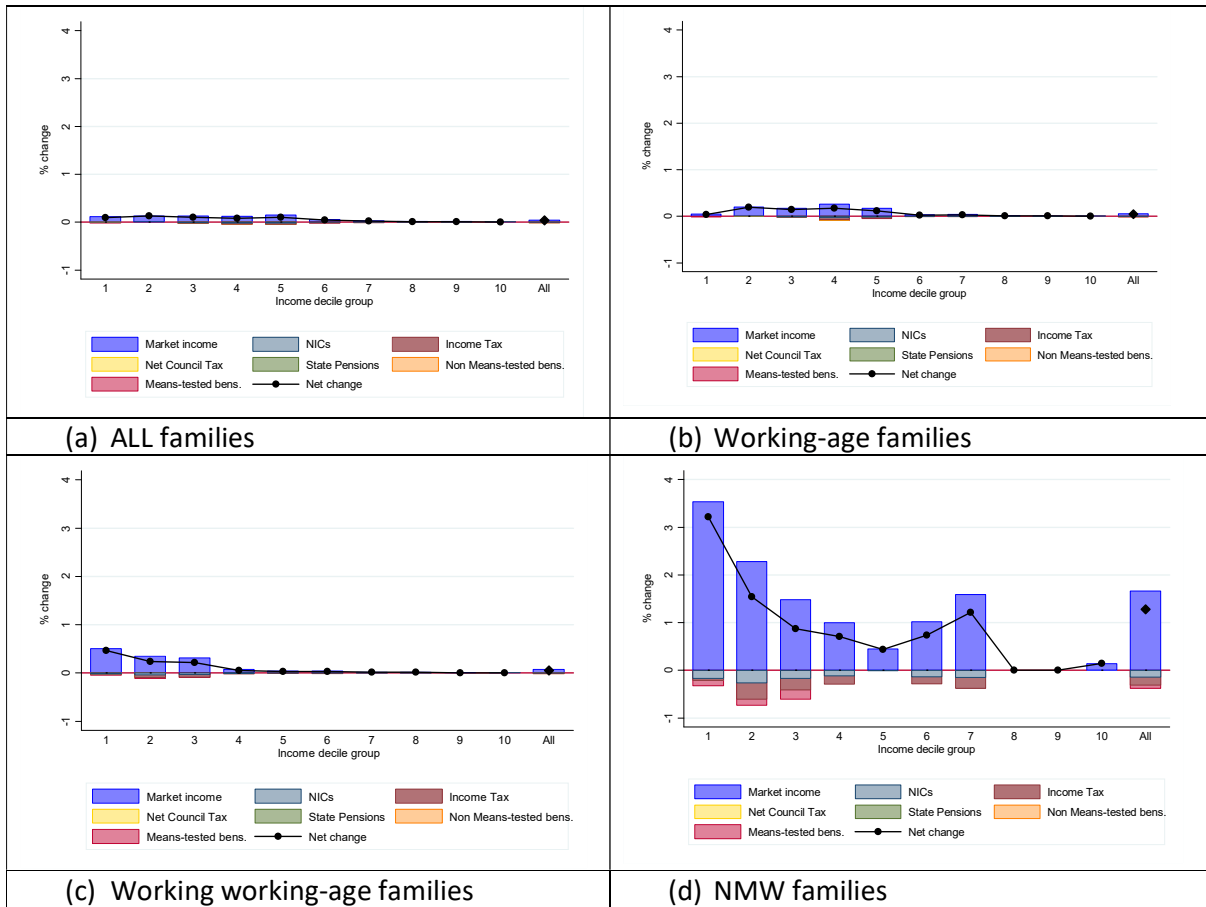
The detailed distributional patterns shown here depend upon three factors that have been shown earlier in this report:

- The importance of earnings from the NMW/NLW to NMW/NLW families, and how that varies across the income distribution.
- The METR faced by NMW/NLW workers, and how that varies across the income distribution.
- The way that NMW/NLW families are located across the income distribution.

Within NMW and NLW families, a rise in the NMW/NLW is progressive, in that poorer NMW/NLW families see incomes rise by a greater fraction than richer ones (and especially so for NMW families).

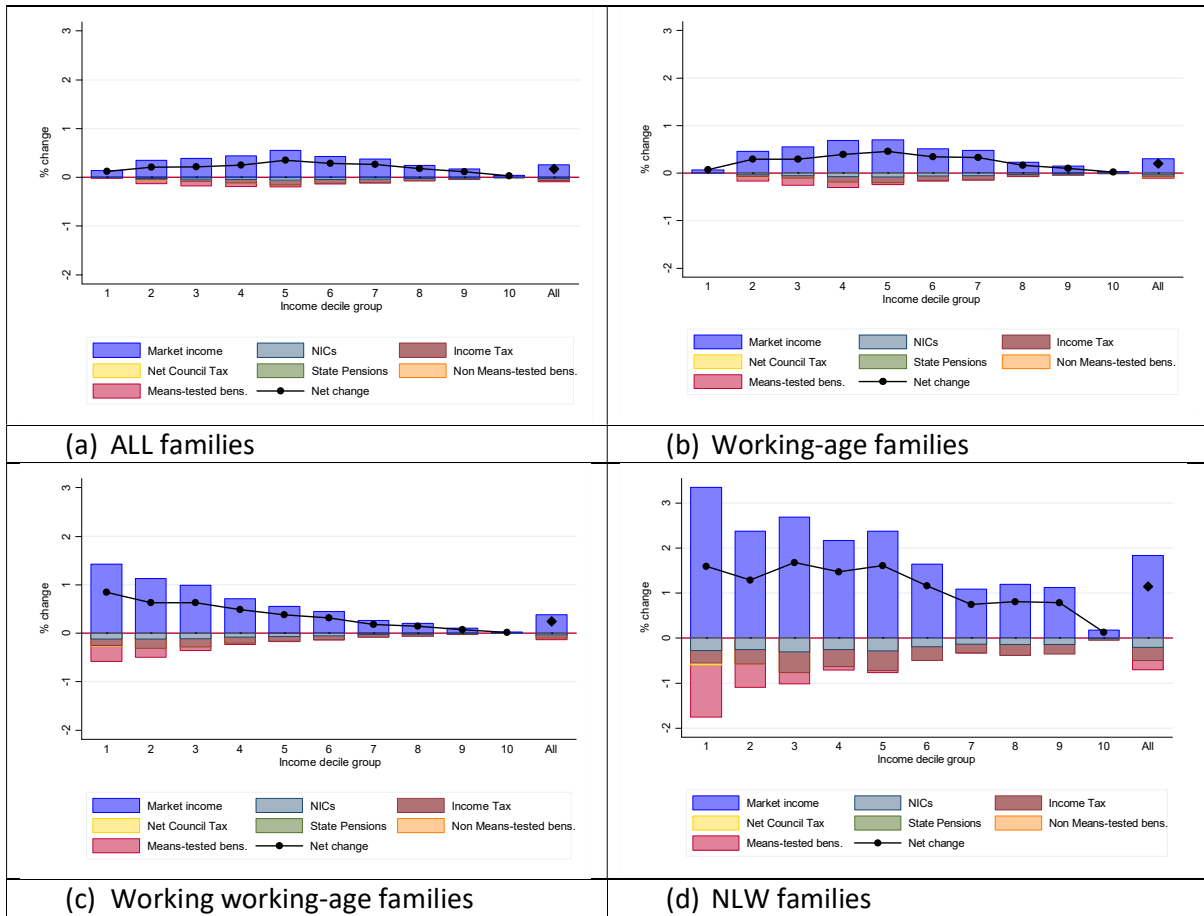
Increases in the NLW also appear progressive when considered amongst all working families of working-age, but not when considered amongst all working-age families or the whole population: this is because the poorest families tend to have no-one in work, and such families cannot gain from a rise in the NMW/NLW. As shown elsewhere in this report, increases in the NMW are better targeted at low income families than the NLW.

Figure 15 Equivalised disposable income changes (%) in 2020-21 following 5% increase in NMW only



Notes: Observations are ranked into decile groups using family income in 2020-21 equivalised using the modified OECD equivalence scale. The simulation assumes partial take-up of means-tested benefits and partial Universal Credit roll-out. Source: Authors' calculations using EUROMOD H0.32.

Figure 16 Equivalised disposable income changes (%) in 2020-21 following 5% increase in NLW only



Notes: Observations are ranked into decile groups using family income in 2020-21 equivalised using the modified OECD equivalence scale. The simulation assumes partial take-up of means-tested benefits and partial Universal Credit roll-out. Source: Authors' calculations using EUROMOD H0.32.

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Appendix 1 Modelled tax-benefit policy changes implemented 2016/17-2020/21

Reforms		When first implemented
Reforms introduced in 2016/17 and 2017/18		
Income tax	Introduce savings allowance	2016/17
Working age	Introduce NLW for NMW workers age 25+	2016/17
Working age	UC to replace WTC, CTC, IS, income-related JSA, income-related ESA and HB	Phased in
Working age	Change childcare support within UC from 70% to 85% of eligible costs	2016/17
Working age	Freeze most working-age benefits and Child Benefit from April 2016 for two years	2016/17
Benefit cap	Exemption from benefit cap for receivers of Carer's Allowance and carer's element of UC (from Autumn 2016) - Announced Budget 2016 ^(a)	Autumn 2016
Working age	UC work allowance frozen at the 2016/17 level for 2017/18	2017/18
Working age	Limit family and child element of CTC and child element of UC to 2 children for new claimants	2017/18
Working age	Cut personal allowance for ESA WRAG new claimants	2017/18
Working age	UC taper rate to decrease from 65% to 63%	2017/18
Working age	<i>Introduction of tax-free childcare for 2-earner families paying formal childcare costs^(b)</i>	<i>[2015/16 (Oct 15)] 2017/18</i>
Reforms announced 2018/19-2020/21		
Working age	Abolition of Class 2 NICs	2018/19
Housing	Downrating of social sector rents	2018/19
Housing	Capping HB in the social rent sector	2018/19
Income tax	Increase personal allowance to reach £12,500p.a. and associated reduction in basic rate limit	2020/21
Working age	NLW to rise to 60% of average earnings	2020/21
Working age	UC to replace WTC, CTC, IS, income-related JSA, income-related ESA and HB	Phased in continue

Notes: ^(a) In Euromod this is taken into account from 2017. ^(b) Not included in our analysis.

CPI – Consumer Prices Index; CTB – Council Tax Benefit; CTC – Child Tax Credit; DLA – Disabled Living Allowance; ESA – Employment and Support Allowance (WRAG - Work Related Activities Group; SG – Support Group); HB – Housing Benefit; IS – Income Support; JSA – Job Seeker's Allowance; LHA – Local Housing Allowance; NIC – National Insurance contribution; PC – Pension Credit; PIP – Personal Independence Payment; UC – Universal Credit; VAT – Value Added Tax; WTC – Working Tax Credit.

Appendix 2 Modelling details and assumptions

Updating to 2017/18

Our simulations are based on FRS data collected between April 2014 and March 2015. Income variables are updated to 2017/18 levels using source-specific indexes as described in Table A2.1. Relevant expenditures, such as housing costs, childcare costs and maintenance payments are also updated as shown.

Table 2.1 Adjusting 2014/15 FRS levels of income and expenditure to 2017/18.

Income source	Updating factor	Factor Source
Employment income, self-employment income	Average weekly earnings index	ONS financial year (March-April) annual average K54U; extrapolated beyond available statistics using OBR earnings forecast Table 3.5 ¹²
Non-simulated benefits (disability, carer's and maternity benefits) and Basic State Retirement pension	Change in main rate of benefit	
Earnings-related pension income (state, occupational and personal)	CPI	
Mortgage interest payment	Change in the mortgage interest rate (annual average)	Bank of England IUMTLMV ¹³ ; extrapolated assuming moves with trend (2 years)
Rent paid or received	Rent element of CPI	ONS ¹⁴ ; extrapolated to 2015 using same method as for earnings
Childcare expenditure	As employment income	
Maintenance paid or received	As employment income	
Other private transfers	As employment income	
Council tax	Change in average band D Council Tax by country	

Generally, no other adjustments are made to the composition of market income or to the characteristics of the population in terms of labour market participation or demographic change. However, there are some important changes in the period 2014/15 to 2017/18 that we account for approximately through adjustments to the data, and which are held constant across the policy scenarios that are simulated. These changes were initiated by previous governments and continued by the current one. They include:¹⁵

¹² <http://cdn.budgetresponsibility.org.uk/March2017EFO-231.pdf>

¹³ <http://www.bankofengland.co.uk/boeapps/iadb/index.asp?first=yes&SectionRequired=I&HideNums=-1&ExtraInfo=true&Travel=NlxIRxSUx>

¹⁴

<https://www.ons.gov.uk/generator?uri=/economy/inflationandpriceindices/bulletins/consumerpriceinflation/mar2017/dda476ac&format=xls>

¹⁵ For more information, see section 3 of De Agostini (2016).

- In the period 2008 to 2014 **Incapacity benefit** (IB) was gradually replaced by **Employment and Support Allowance** (ESA). This involved more stringent tests of capacity to work, time limits on receipt of the non means-tested benefit and the establishment of a means-tested element. The remaining cases in the 2014/15 FRS receiving IB have been adjusted so that they receive the 2015/16 ESA to which they would be entitled. In our simulations of policy change only indexation of the contributory element of ESA is captured. Changes to the income-related component are simulated in the same way as Income Support.
- **Female state pension age** (announced in 1995) is in the process of gradually rising from 60 (in 2009/10) to 65 (in 2018/19) and both male and female state pension ages are then set to rise to 66 by 2020. Since in 2017/18 the state pension age for women was 63 (and nine months in April 2017), we adjust the data so that women aged 61 to 62 (who are observed in the data to receive a pension in 2014/15) no longer receive state pensions and are assumed to be in work, unoccupied or on working age benefits in the same patterns as shown by women aged 59-60 in the data. A state pension age of 63 for women and 65 for men is assumed throughout our analysis.
- In 2011 the maximum rent covered by **Local Housing Allowance** (Housing Benefit for private tenants) were reduced from the median of local rents to the 30th percentile. In our analysis we assume the latter limit (applying in 2011) throughout, but indexed according to prevailing policy (See Appendix 3).

Policy changes

The following policy changes are not included in our analysis because the information in the FRS data is not sufficient: (i) abolition of the 50+ element of WTC for those returning to work; (ii) changes in welfare-to-work and lone parent obligation regimes, or benefit sanctions regimes; (iii) changed treatment of within-year changes in circumstances in WTC; (iv) restricting Sure-Start Maternity Grant to first babies; (v) introduction of UC extra conditionality; (vi) restrictions on pension contributions eligible for tax relief (reduced from £50,000 to £40,000 per year in 2014/15 and from £1.5 million to £1.25 million on a lifetime basis).¹⁶

A further set of changes can only be modelled approximately. These include:

- The conditions of receipt of **Disability Living Allowance** – DLA (to be replaced by the Personal Independence Payment) were tightened in 2013/14 such that it was expected, at the time of the announcement in the June 2010 Budget, that 20 per cent of recipients would lose their entitlement. 2014/15 FRS data record both DLA and Personal Independence Payment (PIP), which will replace the former in the long run. We do not approximate any transition from one to the other and our simulations only capture the effects of indexation.
- In 2013/14 **Council Tax Benefit** (CTB) was abolished and responsibility for supporting low income households with their Council Tax was devolved to local authorities. In this analysis we follow Adam and Browne (2013) and assume that local authorities in England chose to apply a scheme similar to the old CTB, but cutting by 10.4% the maximum amount of support that non-pensioners can claim when liable for Council Tax. This is based on the average reduction made by local authorities in

¹⁶ These tend only to affect people with the very highest incomes, and may affect their savings patterns and incomes in the long run, rather than immediately, depending on how they adjust their behaviour, which is hard to allow for. In addition, there are transitional protection schemes in place.

England in 2013–14, in response to the cut in funding from central government. Council Tax Support (CTS) is assumed to remain unchanged for pensioner households as well as for household in Scotland and Wales.

- From 2017/18 the family element of CTC/UC is only paid to new claims that include a child born before 6 April 2017. Similarly, the child element of CTC/UC is not payable for third and subsequent children born on or after 6 April 2017. Since these changes only affect families with new births and then (towards the end of 2018) new claims, no one will see their benefit income fall in the short period. But these are substantial changes to the long run generosity of the system. Hence, in this analysis we assume no immediate effect in 2017/18 fiscal year, while in 2020/21 we award the family element only if there is a child age 3 or more. Similarly for the child element of CTC/UC in 2020/21, we restrict eligibility based on the number of children age 3 or more.
- From 2017/18 new ESA claimants in the Work Related Activities Group (WRAG) receive per week the same amount as jobseekers allowance claimants (£73.1 per week), in practice abolishing the WRAG component of ESA (which will reduce from £29.05 per week to zero) and the equivalent element of UC. This change will not create immediate losses of benefit income in our base year (2017/18), because only new recipients are affected. Ultimately though, all claims will be assessed under the new, less generous, rules, which is what we assume will happen by 2020/21.

In modelling the introduction of Universal Credit (UC) some further assumptions have been made, including:

- The treatment of limits on the amount of **housing cost support** for owner occupiers with mortgages who are not in paid work and the treatment of waiting time for this support are assumed to mirror what is done in the corresponding element of Income Support (IS). (In each case the limits and waiting times are not modelled.) This avoids spurious gains or losses due only to different treatments, even if the treatments themselves are both too generous, which will to some extent affect where the household is situated in the income distribution.
- The definition of **non-dependants** in Housing Benefit for pensioners and in Council Tax Support (which is assumed to follow the same structure as Council Tax benefit) assumes that assessed income includes income from UC (as was the case for CTC and WTC but not IS).
- **Council Tax Support** is assumed to be automatically passported to those on UC who would have been eligible for IS (or income-related JSA or ESA) under the pre-reform system.

Non take-up of means-tested payments

In simulating entitlement to means-tested tax credits and benefits we make some adjustment for non take-up of these payments based on statistics provided by DWP (2016) for Income Support, Pension Credit and Housing Benefit and HMRC (2016) for the tax credits. Making such adjustments involves selecting randomly within client groups and benefits such that a proportion of those entitled, based on the official statistics, do not receive their entitlement. Clearly this is a rather approximate process and such adjustments are not always made in UK microsimulation analysis of policy changes. However, we believe that it is important to represent those not taking-up their entitlements in the income distribution and in the analysis of policy changes. In adjusting for non take-up of Universal Credit, which cannot yet be measured, we seek to minimise the effect on the results of any spurious changes in take-up assumptions, while recognising that there will be some positive effect on the amounts taken up due to a single application procedure. If any of the pre-

reform elements (CTC, WTC, Income Support, Housing Benefit etc.) to which a particular benefit unit might be entitled are assumed to be taken up then it is assumed that UC would be taken up under the new regime. This is similar to the assumption used in Treasury modelling (HMT, 2013) although they additionally make the more optimistic assumption that some of those not taking up any of their entitlements to the old benefits and tax credits will nevertheless claim UC (20% of the employed in this group and 10% of the self-employed). In our analysis, if a family becomes newly-entitled to means-tested support through UC then probabilities are applied as for IS under the old system. The resulting average take-up rate of UC (calculated as the number of benefit units modelled to be receiving divided by the number simulated to be entitled) is approximately 80 per cent.

Simulating the Universal Credit rolling-out process

In 2017/18, the baseline year for this analysis, Universal Credit (UC) is still on its rolling-out phase¹⁷, which will continue until 2022. In order to take into account the transferring process between the legacy benefit system and the Universal Credit system we followed OBR and when modelling 2017/18 we assumed that 1 in 10 eligible claimants receive UC and 9 in 10 receive legacy benefits; when modelling 2020/21, we assumed that 5 in 6 eligible claimants receive UC and 1 in 6 receives legacy benefits (see OBR (2016)). We do not account for the fact that roll-out might be different for different family types.

NMW/NLW projection to 2020/21

The NLW and NMW used in this analysis follow OBR’s projections from March 2017.

Table 8 NMW/NLW rates 2017-2020

	2017-18	2018-19	2019-20	2020-21
NLW 25+	7.5	7.9	8.3	8.75
NMW 21-24	7.05	7.25	7.5	7.75
NMW 18-20	5.6	5.74	5.9	6.08
NMW 16-17	4.05	4.15	4.27	4.4

Source: Table 1.19 OBR’s Supplementary Economy Tables March 2017
<http://budgetresponsibility.org.uk/download/march-2017-economic-and-fiscal-outlook-supplementary-economy-tables/>

Equivalisation methodology

In order to take into account the fact that larger households require a higher net income to achieve the same economic well-being and standard of living as a household of a smaller size, we adjust household’s net income using the OECD’s modify equivalence scale using a single person household as reference household. The household equivalised net disposable income is then used to calculate income decile groups.

¹⁷ See <https://www.parliament.uk/business/publications/written-questions-answers-statements/written-statement/Commons/2016-07-20/HCWS96/>

Appendix 3 Default indexation assumptions

Tax-benefit element	Default indexation for the fiscal year starting April 2017	Changes up to April 2020	Rounding conventions
Income tax personal allowance ¹⁸	CPI	By April 2020 to reach £12,500p.a.	Rounded up to nearest £10 pa
Income tax Basic Rate limit	CPI		Rounded up to nearest £100 pa
Income tax starting rate limit for savings income	CPI		Rounded up to nearest £10 pa
Income tax threshold for additional (top) rate	Fixed in cash terms		
Income tax income limit for tapered withdrawal of personal allowances	Fixed in cash terms		
Income tax threshold for Child Benefit clawback	Fixed in cash terms		
NICs lower earnings limit	CPI		Rounded down to the nearest £1 pw
NICs Primary Threshold/Lower Profits Limit	CPI		Rounded down to the nearest £1pw/£5pa
NICs Upper Earnings Limit/Upper profits Limit	Aligned with the income tax Higher Rate Threshold ¹⁹		
NICs small Earnings Exception	CPI		Rounded up to the nearest £10 pa
NICs Class 2 rate	CPI		Rounded to the nearest 5p pw
Disability, Carer's and Maternity benefits	CPI		
Income-tested benefits	CPI		
Basic State Pension	Highest of earnings, CPI or 2.5%		
Pension Credit Guarantee Credit	Earnings		

¹⁸ From 2015/16, when it is introduced, the transferable marriage tax allowance will be uprated in proportion to the personal allowance.

¹⁹ This is equal to the Personal Allowance + Basic rate Limit.

Pension Credit Maximum Savings Credit	CPI	
Child Benefit	CPI	Rounded to the nearest 5p pw
Child Tax Credit and Working Tax Credit most elements	CPI	Rounded to the nearest £5 pa
Child Tax Credit family element	Fixed in cash terms	
Working Tax Credit maximum eligible childcare costs	Fixed in cash terms	
Most earnings and other disregards in benefit assessments; capital limits in income related benefits; minimum payments of benefits and tax credits	Fixed in cash terms	
Non-dependent deductions from Housing Benefit	CPI	
Winter Fuel Allowance	Fixed in cash terms	
Local Housing Allowance local reference rent caps by size of accommodation	Fixed in cash terms	
Benefit cap		
Tax-free childcare support	Fixed in cash terms	
Council Tax	OBR assumptions	

Notes: CPI – Consumer Prices Index calculated as the annual change up to the previous September;

For projections to 2017/18 and beyond, OBR assumptions about the evolution of CPI, earnings and Council Tax (by country) are used. Sources: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/597335/PU2055_Spring_Budget_2017_web_2.pdf Budget 2017 policy costings Annex A http://webarchive.nationalarchives.gov.uk/20130129110402/http://www.hm-treasury.gov.uk/d/junebudget_costings.pdf

Budget 2010 (June) policy costings Annex A (first time this was published)

http://www.hm-treasury.gov.uk/d/budget2010_annexa.pdf Budget 2010 (April) Annex A2

<http://budgetresponsibility.org.uk/efo/economic-fiscal-outlook-march-2017/>

Appendix 4: Additional figures

This appendix provides some additional figures.

The figures below show that covariates we use in our matching process are well balanced between the LFS and the FRS.

Figure 17: Comparing covariates distribution in LFS 2014/15 and FRS 2014/15

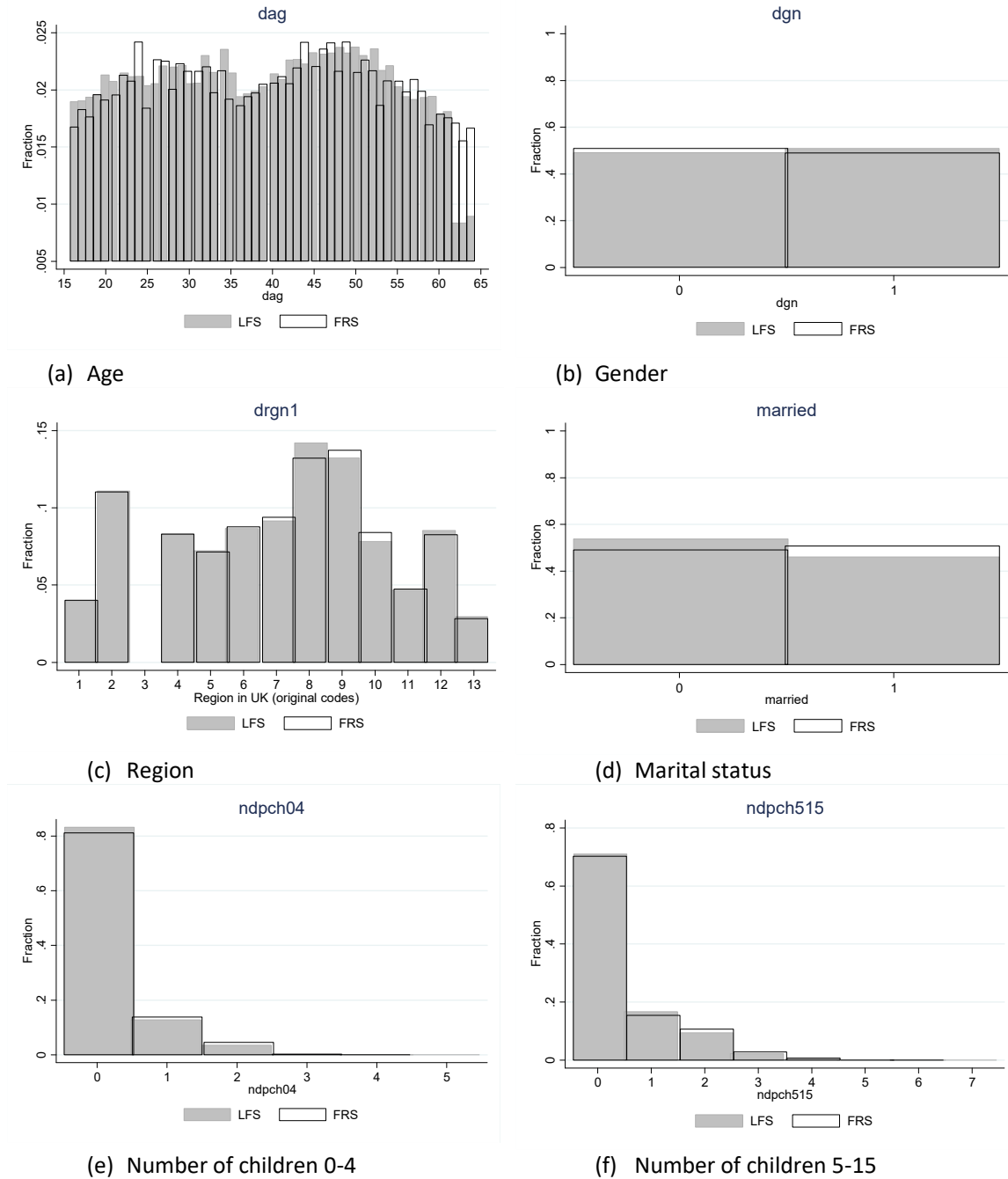
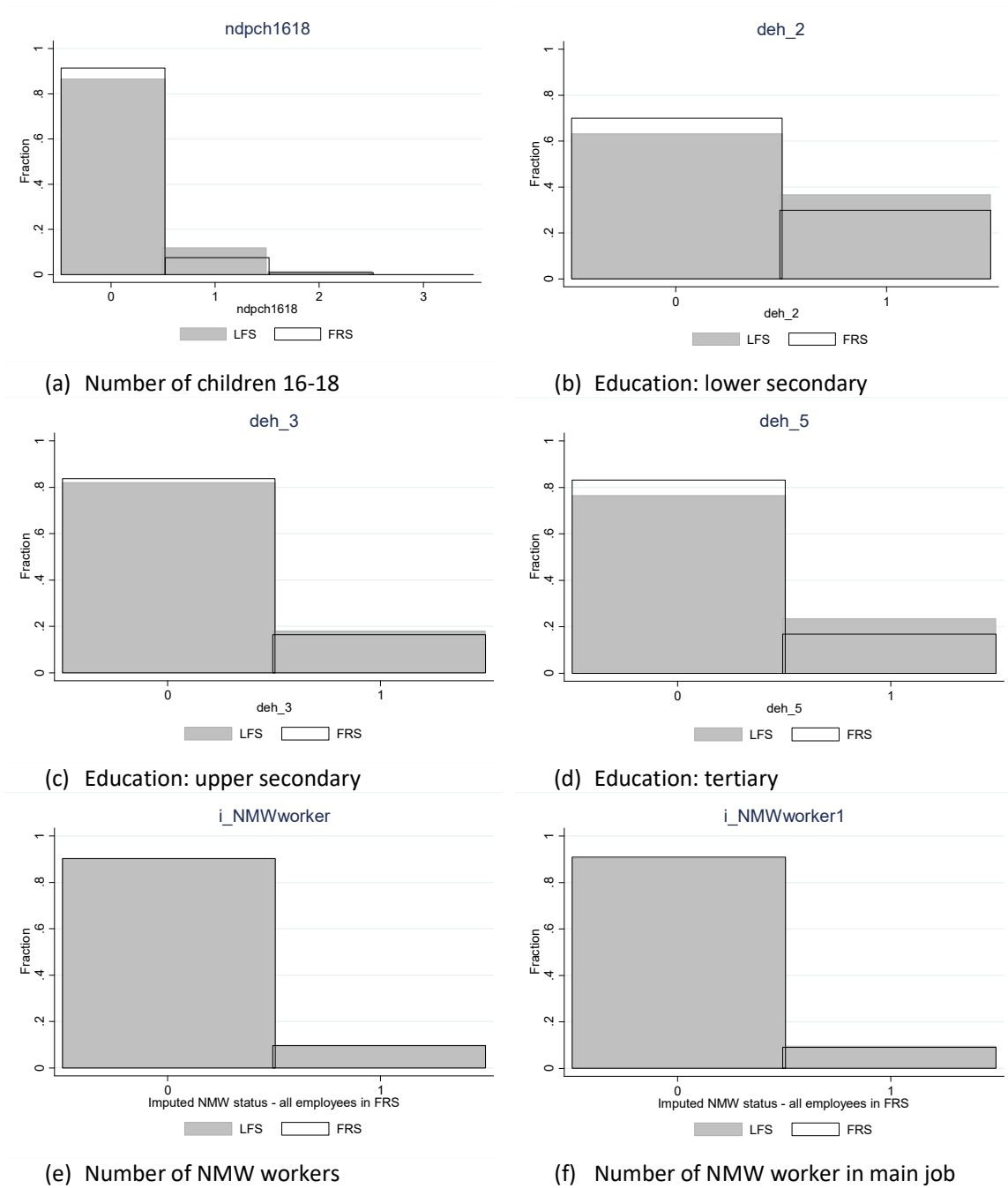


Figure 18: Comparing covariates distribution in LFS 2014/15 and FRS 2014/15 (cont.)



The figures below show the distribution of NMW/NLW families across the whole population income distribution.

Figure 19 Working-age families across the whole population income distribution, by employment and NMW/NLW status (2017-18)

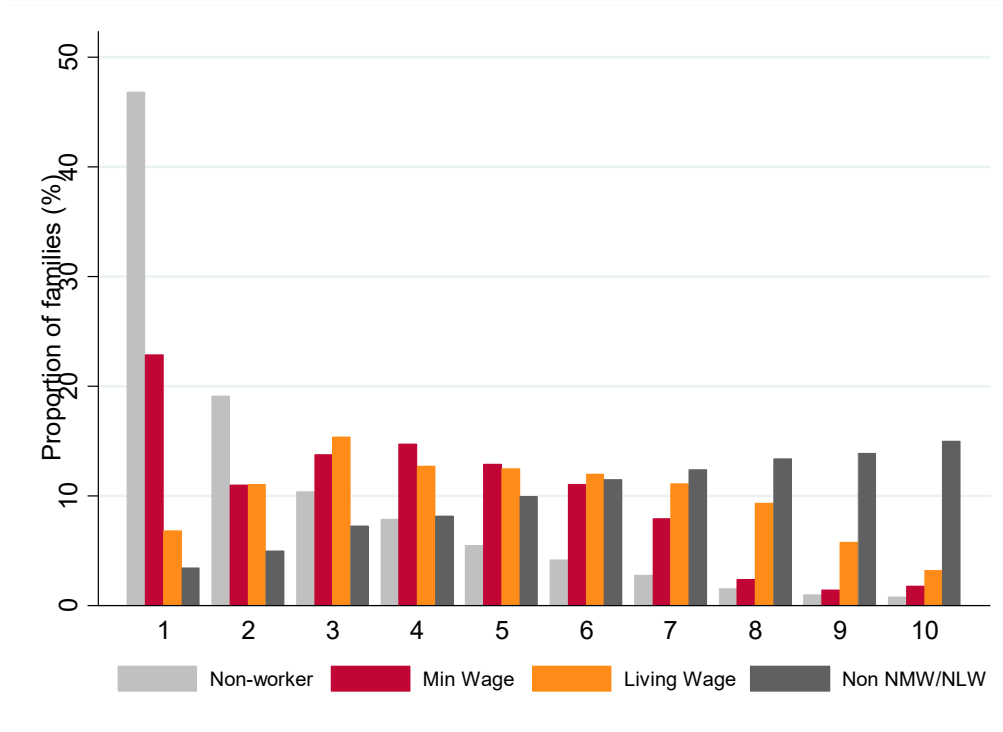


Figure 20 Working-age families across the working working-age income distribution, by employment and NMW/NLW status (2017-18)



For historical interest, Figure 21 estimates what difference we think the NLW made to the incomes of NMW/NLW families in 2017-18. It does this by comparing our baseline 2017-18 tax and benefit system to one where NLW recipients receive the NMW. As expected, the NLW has a positive effect on household net income, although the interaction with the rest of the tax-benefit system means a rise in tax paid and some losses of means-tested benefits (particularly for households at the bottom half of the income distribution) that partially offset the rise in earnings. The impact is rather smaller in decile group 1 as there are relatively few NLW workers in the bottom 10% of the working-age income distribution.

Figure 22 repeats this but looks at changes in net household income, and ranks households by their position in the distribution of working-age household income.

Figure 21 Impact of introducing NLW on income composition of NMW/NLW families in 2017-18 with partial legacy benefits and partial UC roll-out)

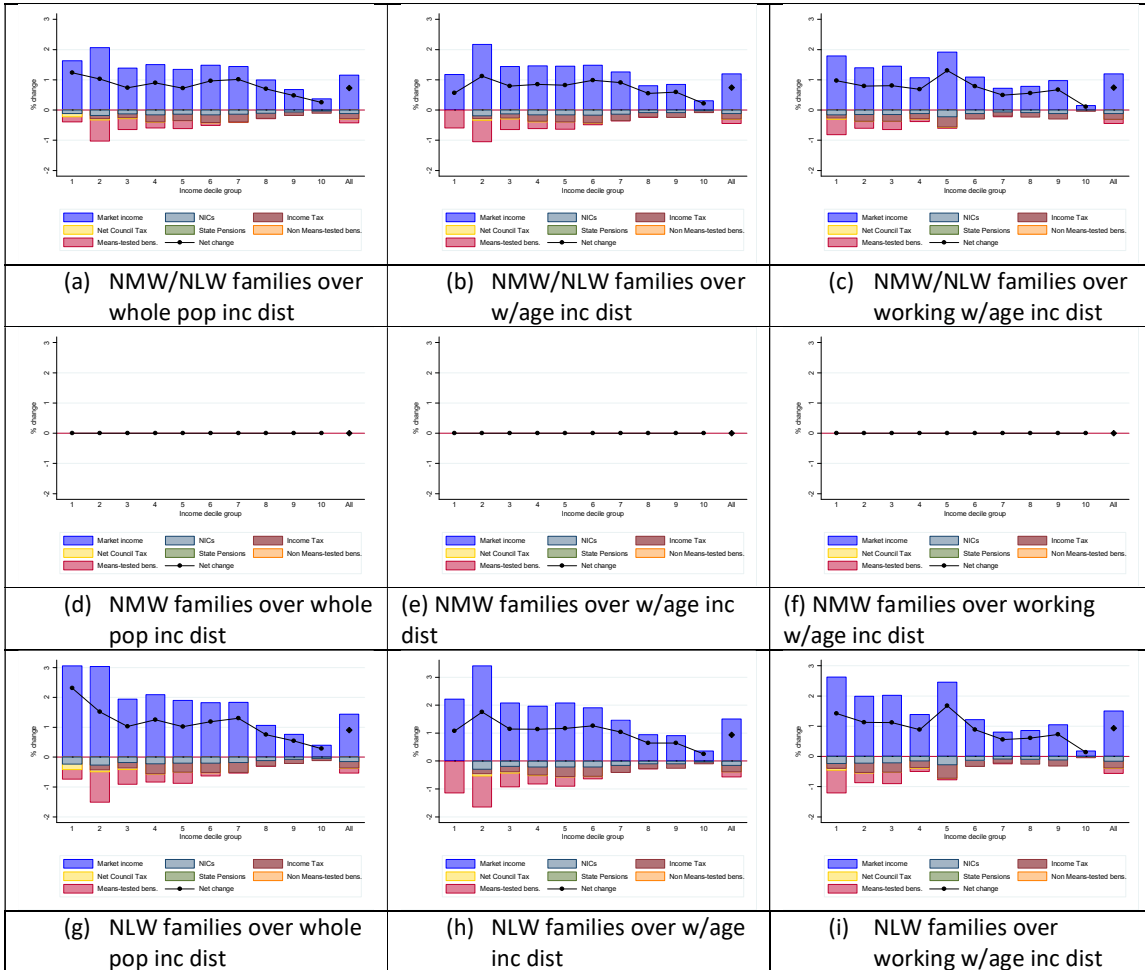
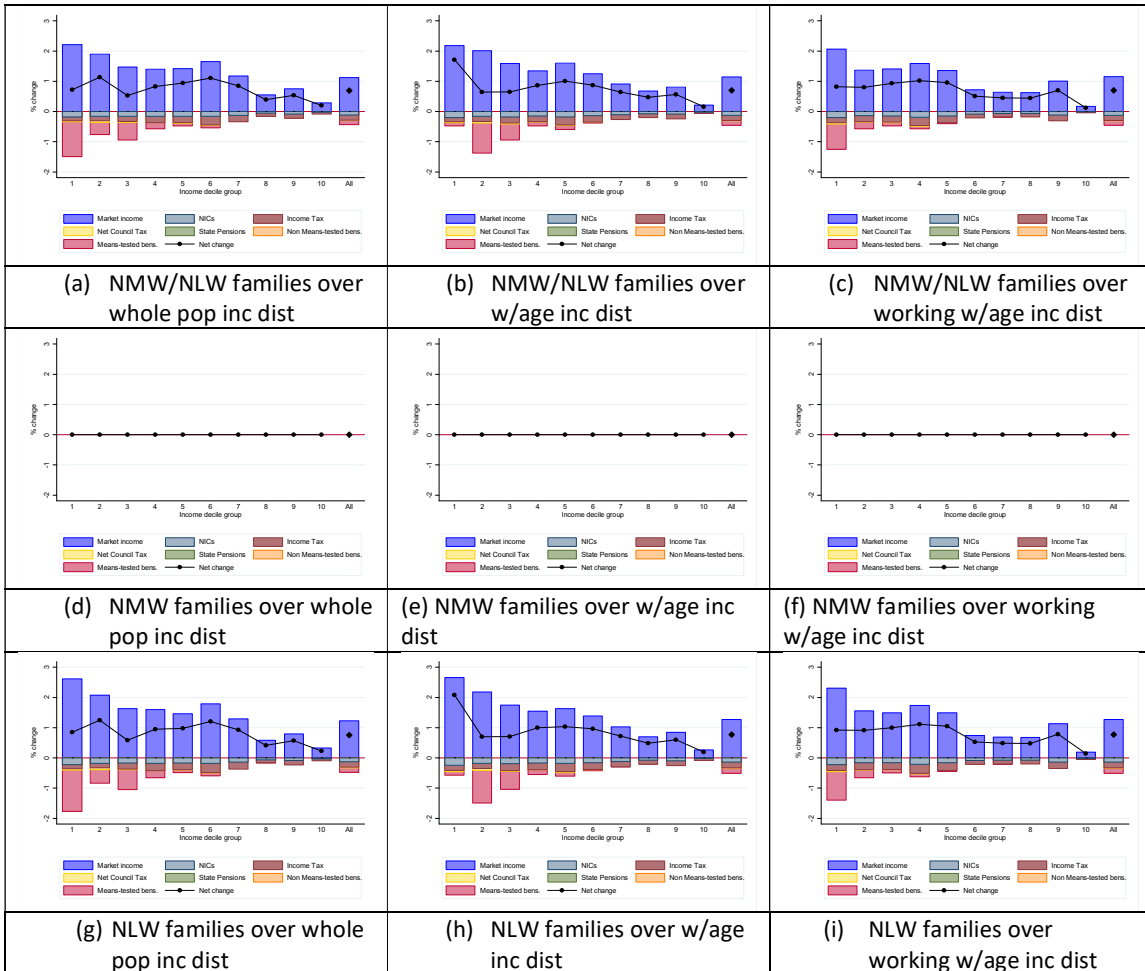
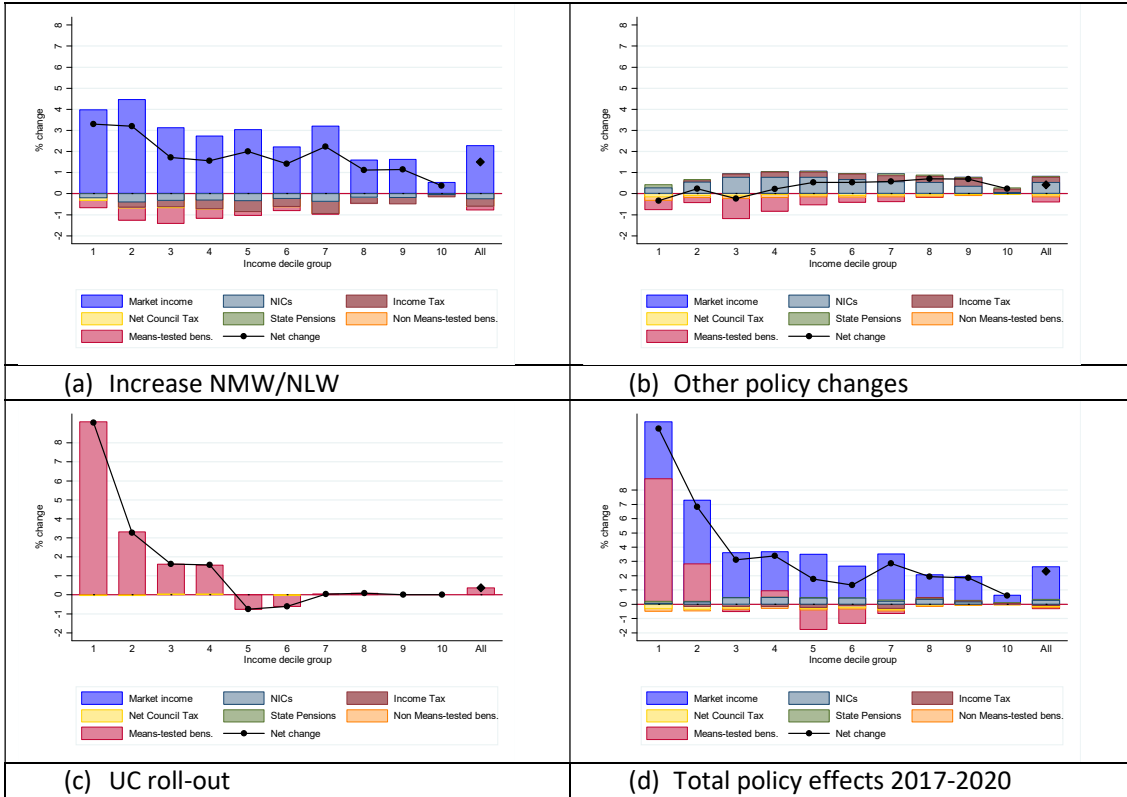


Figure 22 Impact of introducing NLW on income composition of NMW/NLW households in 2017-18 with partial legacy benefits and partial UC roll-out)



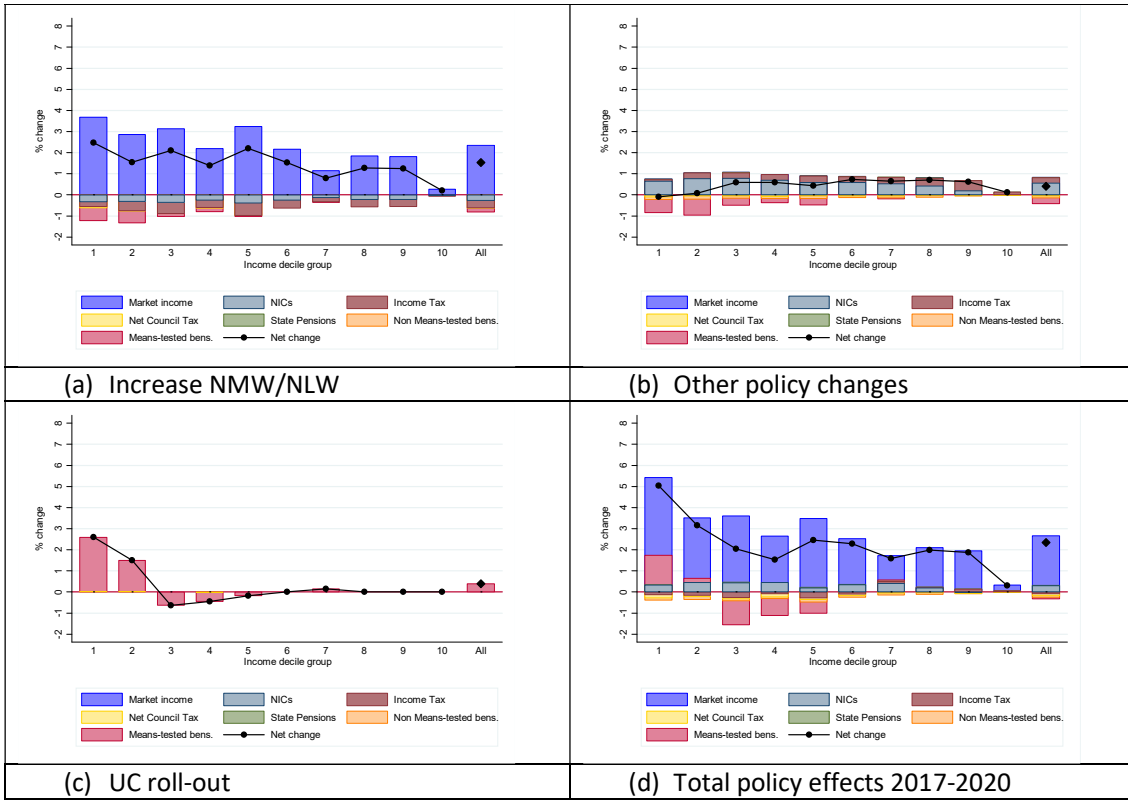
The Figures below show our projections of how incomes of NMW/NLW families will change but using different ways of measure the income distribution.

Figure 23 Equivalised disposable income real changes (%) from 2017 to 2020 on NMW/NLW families over the whole population income distribution



Notes: Observations are ranked into decile groups using the whole population income in 2017 (uprated by CPI to 2020) equivalised using the modified OECD equivalence scale. The simulation assumes partial take-up of means-tested benefits and partial Universal Credit roll-out. Source: Authors' calculations using EUROMOD H0.32.

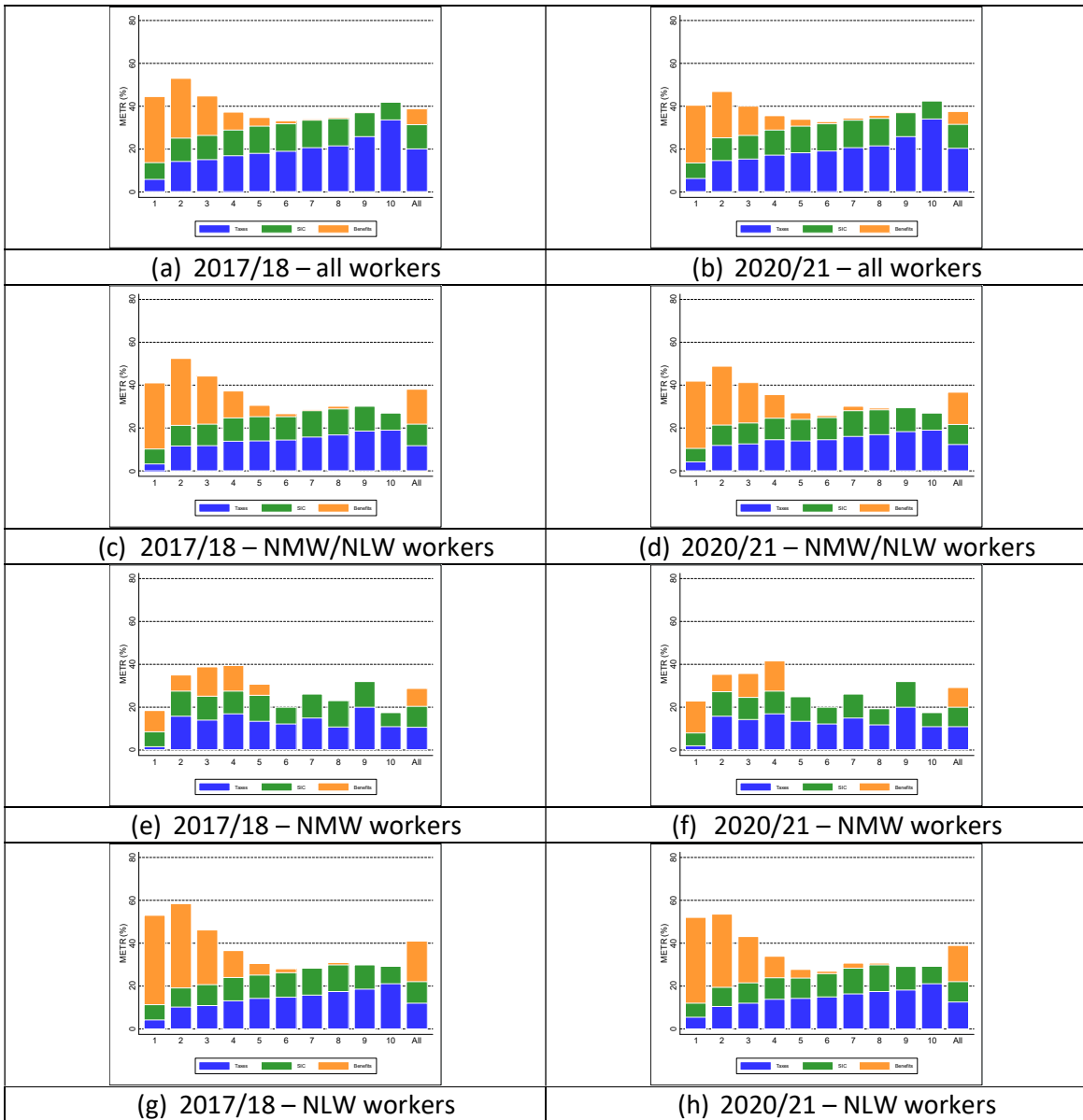
Figure 24 Equivalised disposable income real changes (%) from 2017 to 2020 on NMW/NLW families over the working working-age income distribution



Notes: Observations are ranked into decile groups using the working working-age income in 2017 (uprated by CPI to 2020) equivalised using the modified OECD equivalence scale. The simulation assumes partial take-up of means-tested benefits and partial Universal Credit roll-out. Source: Authors' calculations using EUROMOD HQ.32.

The Figure below shows mean METRs by income decile, but with a different ways of measuring the income distribution.

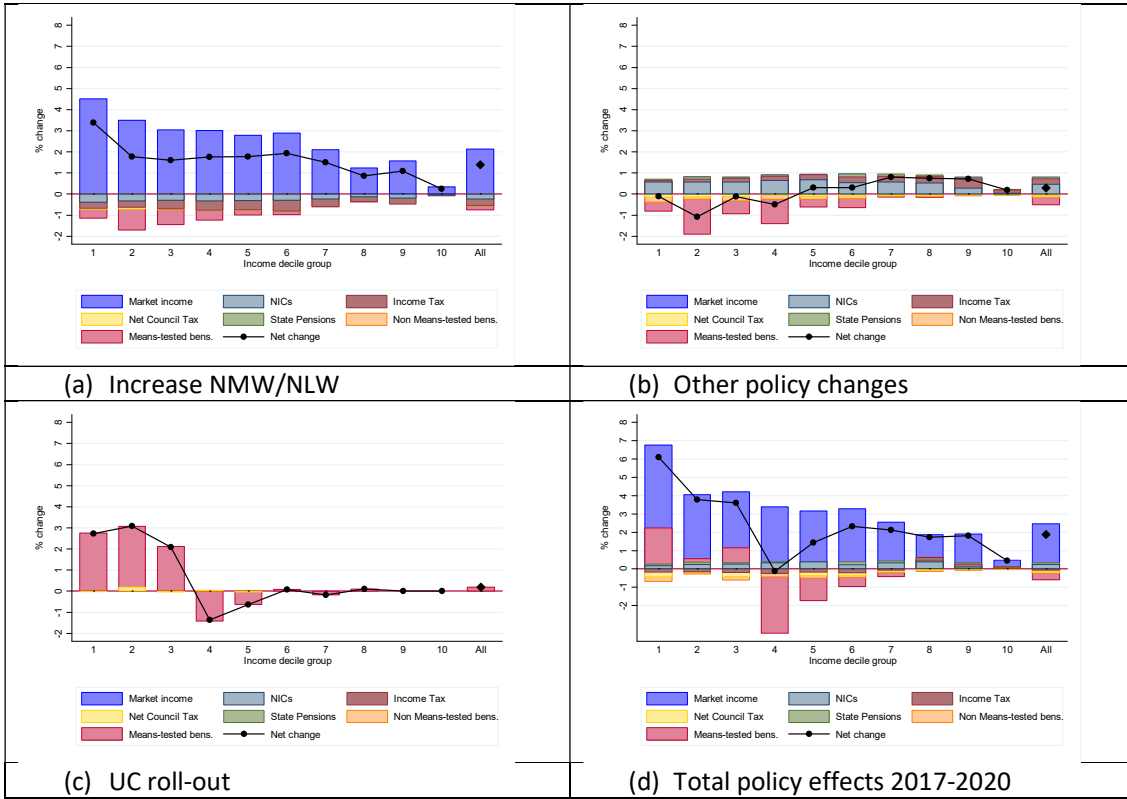
Figure 25 METR decomposition over the working working-age income distribution of 2017-18



Notes: Observations are ranked into decile groups using the working working-age income in 2017 (uprated by CPI to 2020) equivalised using the modified OECD equivalence scale. The simulation assumes partial take-up of means-tested benefits and partial Universal Credit roll-out. Source: Authors' calculations using EUROMOD HQ.32.

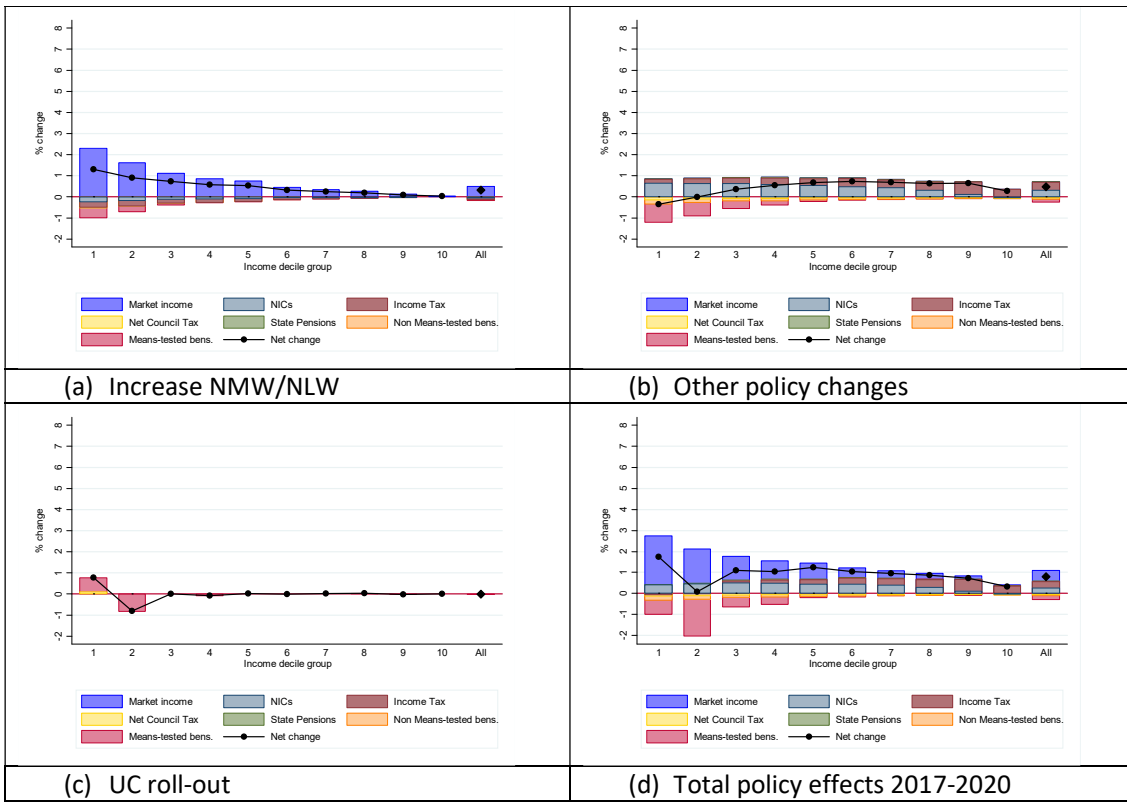
RANKING HOUSEHOLDS

Figure 26 Policy changes effects between 2017 and 2020 on NMW/NLW households (ranking households)



Notes: Observations are ranked into decile groups using the whole population income in 2017 (uprated by CPI to 2020) equivalised using the modified OECD equivalence scale. The simulation assumes partial take-up of means-tested benefits and partial Universal Credit roll-out. Source: Authors' calculations using EUROMOD HQ.32.

Figure 27 Policy changes effects between 2017 and 2020 on ALL households over the working working-age income distribution (ranking households)



Notes: Observations are ranked into decile groups using the working working-age income in 2017 (uprated by CPI to 2020) equivalised using the modified OECD equivalence scale. The simulation assumes partial take-up of means-tested benefits and partial Universal Credit roll-out. Source: Authors' calculations using EUROMOD HQ.32.

Figure 28 Policy changes effects between 2015 and 2020 on ALL households over the whole population income distribution (ranking households, assuming full take-up of benefits and all changes fully in place)

