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**The National Minimum Wage and its  
interaction with the tax and benefits  
system: a focus on Universal Credit**

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# The National Minimum Wage and its interaction with the tax and benefits system: a focus on Universal Credit<sup>1</sup>

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## Abstract

This paper uses the UK module of EUROMOD to examine the likely impact of Universal Credit (UC) on the incomes and work incentives of families containing NMW workers (“NMW families”). It in part updates previous work done for the Low Pay Commission (Brewer, May and Phillips, 2009). The analysis was completed after the 2012 Autumn Statement, but before the Spring 2013 Budget, and so does not reflect any changes to personal taxes and benefits for 2014-15 announced then.

**JEL classification:** C15, H24, H31, H53

**Keywords:** microsimulation; income distribution; universal credit; national minimum wage; work incentives.

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## Executive Summary

This paper examines the likely impact of Universal Credit (UC) on the incomes and work incentives of families containing NMW workers (“NMW families”). It in part updates previous work done for the Low Pay Commission (Brewer, May and Phillips, 2009). The analysis was completed after the 2012 Autumn Statement, but before the Spring 2013 Budget, and so will not reflect any changes to personal taxes and benefits for 2014-15 announced then.

### Methods

The analysis uses a tax and benefit microsimulation model. As no single household dataset records accurate information on whether someone is paid the NMW and the information needed to estimate entitlement to benefits and tax credits, this project created a synthetic dataset which 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). The datasets used were the 2009-10 version of the FRS and the 4 quarters of the LFS, which correspond to that financial year.

Several aspects of the UC reform are ignored in this analysis, usually for simplicity. The most important two are that the analysis assumes Universal Credit is implemented fully in October 2014, and abstracts from the complicated phase-in and the transitional protection, and that the analysis ignores Council Tax Benefit, given the uncertainties over its likely reformed state under UC. The analysis is static, in that it assumes families do not alter their employment (or other) decisions in response to Universal Credit, and it assumes full take-up of all benefits and tax credits. If Universal Credit does succeed in increasing take-up rates and encourages more people to work, then the impact on incomes will be greater (more positive) than this analysis suggests.

### Results: NMW families in the income distribution (under Universal Credit)

Families for whom NMW jobs are the main source of earnings tend to be found in the bottom half of the income distribution, peaking in decile groups 3 and 4. Families for whom NMW jobs are a secondary source of earnings tend to be found in the top half of the income distribution, peaking in decile groups 6 and 7. That they have higher incomes than families for whom earnings from NMW are the main sources of earnings should be unsurprising, and reflects that almost all NMW families for whom NMW jobs are a secondary source of earnings are two-earner couples. Families for whom NMW jobs are a secondary source of

earnings have a distribution of income that is closer to that of non-NMW families than it is families for whom NMW jobs are the main source of earnings.

For NMW families for whom a NMW job is the main source of earnings, and who are in the bottom half of the income distribution, gross earnings from NMW jobs typically make up around 70% of net income. Unsurprisingly, families for whom NMW jobs are a secondary source of earnings derive less of their income from NMW jobs, typically around 30%. NMW families with children typically derive less of their income from NMW earnings, mostly because low-income families with children can be entitled to much more income from benefits and tax credits than low-income families without children.

### **Results: impact of UC on incomes and work incentives**

There is no consistent evidence that NMW families are more likely to win or lose from the UC reform than other families with the same level of weekly earnings. On average, mean incomes are slightly higher after UC, consistent with the long-run impact of UC being to increase entitlements to state support, and the bottom half of the income distribution looks to gain slightly, and the top half to lose slightly, on average. Both families for whom NMW jobs are the main source of earnings and families for whom NMW jobs are a secondary source of earnings are forecast to lose (very) slightly from UC. But families for whom NMW jobs are a secondary source of earnings are forecast to lose more, consistent with the redistributive nature of the pattern of winners and losers.

Under the current benefits system, all claimants of Job Seekers Allowance (JSA) and some claimants of Employment and Support Allowance (ESA) and Income Support (IS) have to undertake various activities in order to maintain eligibility for these benefits; this is normally referred to as “conditionality”. UC will extend conditionality (in other words, a requirement to take steps to look for better-paid or jobs with longer hours) to some families who are in work. We estimate around 250,000 families containing NMNW workers will be subject to conditionality.

Across all families, Universal Credit reduces the number facing very weak incentives (measured by having a marginal effective tax rates (METRs) in excess of 80%; the METR measures the fraction of earnings lost to withdrawn benefits and taxes paid when working one extra hour) but increases the number facing weak incentives, measured by having a METRs between 60% and 80%. On average, METRs fall slightly. But there is much more change when broken down by family type: single adults tend to see METRs rise under UC; lone parents see large falls in METR, on average, under UC; couples with children for whom the NMW is the main source of earnings also see large falls in METRs, on average, under UC; couples without children tend to see the highest METRs fall under UC, but experience small falls overall.

### **Results: Impact on NMW families of a rise in the NMW under UC**

NMW families which see incomes change by small (large) amounts after a rise in the NMW are either those in which NMW workers are facing high (low) METRs, or those in which other sources of income make earnings from NMW a relatively unimportant (important) income source. Across the bulk of the income distribution, a 10% rise in the NMW leads to an increase in net family income amongst NMW families of around 3%; this is around 4% for families where the NMW is the main source of earnings, and around 2% for families where the NMW is the secondary source of earnings. Families without children gain the most from a rise in the NMW, reflecting that they will tend to face lower METRs than families with children because they are less likely to be in receipt of UC.

### **Results: Impact on NMW families on incentives to work of non-workers in couples**

On average, Universal Credit reduces the financial payoff from working (which is measured with the participation tax rate (PTR), calculated as the proportion of gross earnings lost in withdrawn benefits or taxes paid when moving into work) of potential secondary earners (on the assumption that they would earn the NMW), and this is evident for families where the main earner is paid the NMW, as well as those with higher wages. This arises mostly because the headline withdrawal rate that applies in UC is to be set at a higher headline rate than under tax credits at present (65% vs 41%). For those working full-time, this is partly offset by the fact that the UC taper is against net income, rather than gross income (which would normally strengthen work incentives). But for those working part-time, the fact that the UC taper is against net income, rather than gross income, is less pertinent as their earnings will lie below the income tax personal allowance. This is especially noticeable for potential secondary earners in couples with children, who see very large increases in their PTRs. These rises in PTRs occur both because single-earner couples with children tend to gain from the introduction of UC, and because of the higher headline withdrawal rate under UC; both factors mean that, compared to the current tax and benefit system, there is more state support to be lost when the potential secondary earner moves into work, and it is lost faster as the earnings of the potential secondary earner rise.

## 1. Introduction

This paper examines the likely impact of Universal Credit (UC) on the incomes and incentives of families containing NMW workers (hereafter called “NMW families”<sup>2</sup>). It is in part an update of previous work done for the Low Pay Commission (Brewer, May and Phillips, 2009), but now looks ahead to the likely personal tax and benefit system of 2014-15. It contributes to the literature, which explores the interaction between the national minimum wage (NMW) and the UK personal tax and benefit system, and the distributional impact of the national minimum wage (NMW) (or the extent to which the NMW is an effective tool in reducing income-based measures of poverty). The analysis reflects announcements in the December 2012 autumn statement, but was completed before the Spring 2013 Budget, and so will not reflect any changes to personal taxes and benefits for 2014-15 announced then.

Universal Credit, which is due to be introduced from October 2013, will represent a very substantial reform to the system of means-tested benefits and tax credits for working-age families. The core of the reform is that almost all means-tested welfare benefits and in-work tax credits will be combined into a single programme, Universal Credit. It will be administered by the Department for Work and Pensions (DWP), and will be payable to families where no one is in work, and to families on a low income where someone is in work. The government hopes that Universal Credit will make it easier for claimants to claim benefits, make the gains to work more transparent, and reduce the amount spent on administration and lost in fraud and error. As well as these 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 currently applies. In particular, conditionality will apply to two groups of UC recipients who currently face no forms of conditionality: some part-time workers will face obligations to seek better-paid or longer-hours work, and some non-working adults whose partners are in low-paid work will face obligations to look for work.<sup>3</sup>

The analysis uses microsimulation methods, combining the UK component of the EUROMOD tax and benefit microsimulation model (the latest published guide to the UK component is Sutherland et al (2012), although the current version of the model is more up to date than this report suggests, and a recent example of its use is Callan et al. (2011)) with a synthetic dataset which combines information from the Family Resources Survey (which provides a

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<sup>2</sup> We use families to mean the same thing as tax unit or benefit unit; in other words, an adult, his or her partner, and any dependent children. This definition of “family” is a different concept from the “household”.

<sup>3</sup> For more on UC, see Brewer, Browne and Jin (2011, 2012a, 2012b) and Tarr and Fin (2012) and Pennycook and Whittaker (2012). Up to date information can be found at this website: <http://www.dwp.gov.uk/policy/welfare-reform/universal-credit/>

relatively accurate impression of a household's composition, characteristics and income sources) and the Labour Force Survey (which provides a relatively accurate impression of the hourly wage earned by workers). Microsimulation methods are ideally suited for this work, as they provide the ability to estimate the disposable income of NMW families under actual or hypothetical tax and benefit policy scenarios, and to estimate concepts such as the marginal effective tax rate. As well as being a good summary measure of the financial incentive facing workers to earn a little bit more (or penalty to earning a little bit less), the marginal effective tax rate also helps determine the extent to which the net income of a NMW family changes when the NMW is increased.

Our overall aim is to examine the likely impact of Universal Credit (UC) on the incomes and incentives of families containing NMW workers. We do this by analysing incomes and incentives under two hypothetical tax and benefit systems:

- our estimate of the personal tax and benefit system in October 2014, assuming that Universal Credit has not been implemented at all and accounting for announced changes in the UK tax and benefit system that are due to take place by October 2014 (which we call our “base system”).<sup>4</sup>
- our estimate of the personal tax and benefit system in October 2014, assuming that Universal Credit has been fully implemented (which we call our “Universal Credit system”).

Neither of these systems corresponds to what we actually expect the tax and benefit system to look like in October 2014 (which is why we describe both as hypothetical). In reality, the government plans to introduce Universal Credit from October 2013 but with a complex phase-in over the following three to four years, and with a form of transitional protection for those families who are moved across from the current benefits and tax credits to Universal Credit. Our analysis abstracts from this complicated phase-in and the transitional protection in order to give an impression of how, in the long-run, NMW families will be affected by Universal Credit. The analysis is also static, in that it assumes families do not alter their employment (or other) decisions in response to Universal Credit.

Our main research questions are then:

- where do NMW families lie in the income distribution?
- what is the impact of UC on incomes of NMW families?
- How many adults in NMW families are likely to be affected by conditionality under UC?

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<sup>4</sup> The main changes to the personal tax and benefit system affecting those of working age due between April 2012 and October 2014 are: further real rises in the income tax personal allowances, further freezes in child benefit and the withdrawal of child benefit from high-income families; the below-inflation uprating of many benefits in April 2013 and April 2014; various reforms to Housing Benefit and Local Housing Allowance; the benefits cap; freezes to elements of working tax credit. We also allow for the gradual replacement of IB with ESA, and the gradual rise in the female state pension age: see Appendix B for details.

- how important are earnings from NMW jobs to NMW families?
- What are the marginal effective tax rates facing NMW workers, and how do they change under UC?
- What is the impact of a rise in the NMW on the incomes of NMW families under UC?
- What are the incentives to work of non-working adults in NMW families, and how does this change under UC?

In this analysis, we make three key distinctions. First, we analyse the impact on NMW families according to where families lie in the distribution of income (measured using equivalised net family income). Second, we split NMW families according to whether the earnings from the NMW are the main source of earnings in the family. Third, we split NMW families into four family types according to the number of adults, and whether dependent children are present.

The rest of the paper is organised as follows. Section 2 describes the data we use, and the procedure for combining information from the LFS and the FRS. Section 3 contains our main results. Section 4 looks at the impact of UC on the incentive to work of non-working adults in NMW families. Section 5 concludes. Appendices contain more detail on the tax and benefit modelling.

## 2. Data and methods

This section describes the data and methods we use, including the procedure for combining information from the LFS and the FRS, and details behind some of the modelling of tax and benefit reforms implemented since 2010.

### 2.1. Combining the Family Resources Survey and the Labour Force Survey

Our analysis uses microsimulation methods, combining the UK component of the EUROMOD tax and benefit microsimulation model (the latest published guide to the UK component is Sutherland et al (2012), although the current version of the model is more up to date than this report suggests, and a recent example of its use is Callan et al. (2011)) with a synthetic dataset which 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 provides a relatively accurate impression of the hourly wage earned by workers).

But the key issue in assessing the interaction between the NMW and the tax and benefit system is that no single survey or administrative dataset records accurately both whether a worker receives the NMW and the characteristics of that workers' family or household needed to estimate entitlement to means-tested benefits and tax credits:

- the Family Resources Survey does record the weekly earnings and the weekly hours worked by all workers, but it is well-known that taking the ratio of these two quantities produces a biased estimate of the worker's actual hourly wage (see, for example, Skinner et al. (2002)).
- the Labour Force Survey records accurately (although see Fry and Ritchie (2012)) the hourly pay of those workers paid by the hour, but does not record all the income sources and family and household characteristics that are needed to simulate accurately tax liability and benefit entitlement of families containing NMW workers.

Therefore, this project created a synthetic dataset which combines information from the Family Resources Survey and the Labour Force Survey.<sup>5</sup> The datasets used were the 2009-10 version of the FRS, and the 4 quarters of the LFS that correspond to this financial year.

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<sup>5</sup> Brewer, May and Philips (2009) pursued what can be thought of as the opposite approach to this, by imputing into the Labour Force Survey estimates of housing costs, self-employment income and unearned income, based on the observed relationship between these income sources and the characteristics of households observed in the Family Resources Survey, and then using this augmented Labour Force Survey as

The analysis relies on the fact that 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, and should correspond to their contractual hourly rate: 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.<sup>6</sup>

In doing this, it is vital to use a set of 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, weekly earnings, weekly hours, 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.

The principle behind this method is simple: we assume that two employees in different datasets but with similar characteristics (as listed above) share the same contractual hourly rate (and/or share the same NMW status). The procedure takes five steps:

- for employees in the Labour Force Survey who have reported a contracted hourly rate, estimate a (log) contracted hourly rate regression
- for employees in the Labour Force Survey who have reported a contracted hourly rate, and for all employees in the Family Resources Survey, use the estimated regression coefficients to construct a predicted contracted hourly rate
- with the predicted contracted hourly rate for each employee in the Family Resources Survey, find the employee in the LFS whose predicted contracted hourly rate is the

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the main dataset for analysis. Our method involves imputing only one piece of information (a worker's NMW status (and the hourly rate), given his/her weekly earnings, weekly hours worked and other household characteristics), rather than several (housing costs, self-employment income and unearned income). And by basing our analysis on the Family Resources Survey, it is easier to relate the results of our analysis to other analyses that use this data. Furthermore, Brewer, May and Phillips (2009) had some difficulty in constructing an appropriate set of grossing weights with which to analyse the distribution of family income for the Labour Force Survey.

<sup>6</sup> We make use of a small tolerance in this, defining someone as being paid at or below the minimum wage if their hourly rate is below £5.78 if aged 22 and over, below £4.82 if aged 18-21 or below £3.58 if aged 16-17 and interviewed before October 2009. For those interviewed after October 2009, the thresholds are respectively £5.85, £4.88 and £3.62 per hour.

closest match (smallest absolute distance away). Impute the actual contracted hourly rate of this LFS employee to the FRS employee.

- For each employee in the Family Resources Survey, calculate their implied NMW status (using the categories “paid at or below the NMW” and “paid above the NMW”) based on the imputed contracted hourly rate.
- For each family in the Family Resources Survey, calculate their implied NMW status (using the categories “not working”, “contains a NMW worker, and the earnings from the NMW are the largest sources of earnings within the family”, and “contains a NMW worker, and the earnings from the NMW are not the largest sources of earnings within the family”).

This procedure is applied separately for those age 16-17, 18-21 and 22+ to reflect the youth NMW rates, and separately for first and second jobs. We also carried out the same exercise within the LFS only (in other words, we imputed a contracted hourly rate to each employee in the LFS who is not paid by the hour). Note that we do not use the imputed contracted hourly rate to adjust the measure of weekly earnings or weekly hours worked observed for employees in the Family Resources Survey; instead, the process described above simply generates indicators for being paid at or below the NMW. These indicators may in some cases appear inconsistent with the information on weekly earnings or weekly hours worked reported to the Family Resources Survey, but this is also the case for some employees in the Labour Force Survey who are paid by the hour, and that it can occur legitimately if the figure for weekly earnings includes bonuses, or if the figure for hours worked includes unpaid overtime, or if the employee is sometimes paid at a higher hourly rate. The exception to this is when we calculate the change in family income that would result from a rise in the NMW (section 3.5). When we perform this calculation, we replace the weekly earnings of those workers we think are paid the NMW by an amount equal to their weekly hours multiplied by their imputed contracted hourly rate.

The results of this procedure are shown below. In Figure 2.1, we show the distribution of these contracted hourly rates for three groups:

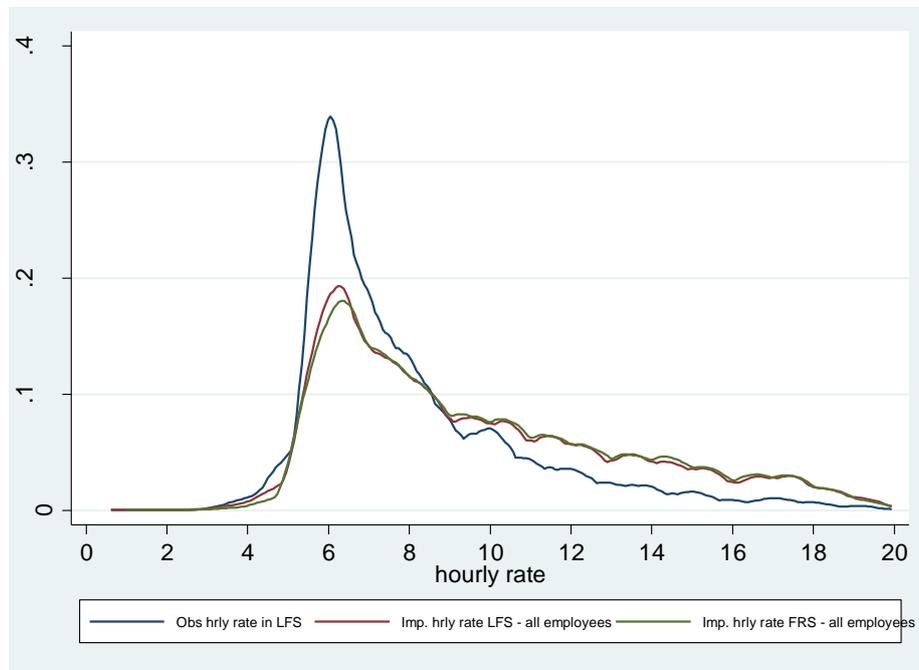
- All employees in the LFS who report that they are paid by the hour
- All employees in the LFS
- All employees in the FRS.

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 2.1 summarises how many workers in the two datasets are estimated to be paid at or below the national minimum wage. Data from the LFS gives a slightly higher estimate of the

number paid at or below the NMW than does data from the FRS (1.4m vs 1.2m, respectively).

Figure 2.1. Estimated density of actual and imputed hourly wage rate, LFS and FRS, 2009-10.



Source: authors' calculations using weighted data from FRS 2009/10 and corresponding LFS data as described in the text.

Table 2.1. Estimated number of NMW workers in the LFS and FRS, 2009-10

		Number of cases		Grossed-up number of cases	
		Those paid by the hour	All	Those paid by the hour	All
LFS	1 <sup>st</sup> job	2,067	2,712	1,069,437	1,411,289
	2 <sup>nd</sup> job	130	160	63,134	77,736
FRS	1 <sup>st</sup> job	n/a	1,110	n/a	1,228,843
	2 <sup>nd</sup> job	n/a	76	n/a	90,049

Source: authors' calculations using weighted data from FRS 2009/10 and corresponding LFS data as described in the text.

## 2.2. Creating the baseline and reform systems in EUROMOD

This paper makes use of 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>).<sup>7</sup> This section outlines the main steps involved in updating the latest published version of the UK component of EUROMOD to 2014.

We use data from the Family Resources Survey 2009/10 (the latest available) on 21,582 families in the UK. It provides detailed information on private income sources and other characteristics that determine tax liability and benefit and tax credit entitlements. In order to use these data to simulate the UK 2014 tax and benefit system, we need to take account of changes since 2009/10 to financial variables (such as earnings, other sources of income, and some expenditures which are subsidised by the tax system, such as rental costs and spending on childcare), tax liabilities and benefit entitlement. To do that, we update financial variables (i.e. earnings, wages, etc) in our 2009/10 data to their projected level in 2014 by using actual changes in earnings and prices to date, together with the latest forecast of these measures, as made by the Office for Budget Responsibility (see Appendix 1).<sup>8</sup> We do not account for socio-demographic changes.

We use EUROMOD to account for announced changes in the UK tax and benefit system that are due to take place by April 2014. Some of these changes can be straightforwardly implemented in EUROMOD (for example, the changes to taper rates and hours requirements in tax credits in 2012; the total household benefit cap (from 2013), and the withdrawal of child benefit from families earning more than £50,000 (from 2013)). But others are more difficult to model precisely, and require a more ad hoc but sophisticated approach (the rise in the female state pension age, the reforms to local housing allowance (LHA), and the transfer of recipients from incapacity benefit (IB) to employment support allowance (ESA)). We explain these in more detail in Appendix 1.

Our main analysis then compares incomes and work incentives under two hypothetical tax and benefit systems:

- our estimate of the personal tax and benefit system in October 2014, assuming that Universal Credit has not been implemented at all (which we call our “base system”).
- our estimate of the personal tax and benefit system in October 2014, assuming that Universal Credit has been fully implemented (which we call our “Universal Credit system”).

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<sup>7</sup> The latest published version of the UK component of EUROMOD is Sutherland et al (2012), although the current version of the model is more up to date than this report suggests, and a recent example of its use is Callan et al. (2011).

<sup>8</sup> The analysis was finalised in December 2012, and so we use the OBR forecasts from the Autumn Statement 2012.

We do not attempt to describe the nature of the reform in detail here. For more information, we refer readers to Brewer, Browne and Jin (2011, 2012a, 2012b), Tarr and Fin (2012), Pennycook and Whittaker (2012) and <http://www.dwp.gov.uk/policy/welfare-reform/universal-credit/>. At the time of writing, there was still uncertainty about how some aspects of UC would be implemented, and so we had to make assumptions. In general, where DWP has not clearly defined how some rules will be applied, we assume that the current rules will be maintained, with our aim being to ensure that families did not appear to be losing or gaining in our simulations simply due to assumptions we made about not-yet-confirmed elements of the reform. Some of the specific areas are as follow:

- Calculation of UC includes a base personal allowance based on those in Jobseekers Allowance (JSA). New information on the treatments of young people (age 16-17) not living with their parents or foster parents have become available from DWP 's website during the development of this project and we took them into account. Specifically, single 16-17 year olds not able to be supported by their family (i.e. cannot get contact) will get the same basic amount as single under 25 year olds. Young lone parents receive the same amount as any other lone parent over 18. Couples where one member is under 18 are assumed to receive the same amount as they got before UC is introduced.
- We “switch off” support for mortgage interest provided through Income Support.<sup>9</sup>
- As it remains unclear how the UC will interact with the new localised Council Tax Rebate system, we omit Council Tax and Council Tax Benefit out of both the baseline system and the UC system.
- In reality, the government plans to introduce Universal Credit from October 2013 but with a complex phase-in over the next three to four years, and with a form of transitional protection for those families who are moved across from the current benefits and tax credits to Universal Credit. Our analysis abstracts from this complicated phase-in and the transitional protection in order to give an impression of how, in the long-run, NMW families will be affected by Universal Credit.
- UC is expected to have a higher take-up rate than the benefits that it replaces because it requires only one application (while currently one needs 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 current system. As we lack a credible prediction of the take-up rate of UC, we assume full take up, and then, in order to make the base and UC systems comparable, we assume full take-up also for the base system.<sup>10</sup>

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<sup>9</sup> This assumption has almost no consequences for our analysis of NMW families, almost none of whom will be entitled to support for mortgage interest.

<sup>10</sup> 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

### 3. Results

This section contains the results of our analysis. We first show where NMW families lie in the income distribution under our “base system” (which describes a hypothetical tax and benefit system of October 2014 in which Universal Credit has not been implemented). We then show what is the impact of UC on incomes of NMW families (and, as an aside, we estimate how many adults in NMW families are likely to be affected by conditionality under UC).

We then show how important earnings from NMW jobs are to NMW families, what are the marginal effective tax rates facing NMW workers (and how UC will change this), and what impact a rise in the NMW has on the incomes of NMW families under Universal Credit.

In this analysis, we make three key distinctions:

- First, we analyse the impact on NMW families according to where families lie in the distribution of income (measured using equivalised net family income).
- Second, we split NMW families according to whether earnings from the NMW are the main source of earnings in the family.
- Third, we split NMW families into four family types according to the number of adults, and whether dependent children are present.

Families are eligible to receive UC if at least one adult in the family is of working age, and the family’s income is low enough, and so our population of interest for the analysis in this chapter is all families (benefit units) which contain at least one adult who is of working-age.

We take the family as the unit of analysis, and incomes are equivalised using the Modified OECD equivalence scale.<sup>11</sup> Choosing the family, rather than the household, as the unit of analysis can have important implications. For example, a household containing a young adult earning the NMW but living with other well-paid adults who are in different “families” (ie, either unrelated adults, or perhaps the siblings or parents of the NMW-earning young adult) might appear to have a high household income, but the young adult earning the NMW might appear to have a low family income. If we had taken the household as the unit of analysis, and thus analysed the position of NMW households in the household income distribution, then we might expect to find the NMW to be less well correlated with having a low (household) income than what we find in this report when using the family.

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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. We note in the text where results might be substantially different had we taken a different approach.

<sup>11</sup> We use families to mean the same thing as tax unit or benefit unit; in other words, an adult, his or her partner, and any dependent children. This definition of “family” is different concept from the “household”.

The analysis is static, in that it assumes families do not alter their employment (or other) decisions in response to Universal Credit, and it assumes full take-up of all benefits and tax credits.

### **3.1. National minimum wage workers in the income distribution**

This section analyses where NMW families are estimated to lie in the distribution of income amongst all working-age families (defined as a family or benefit unit containing at least one person of working-age).

Table 3.1 shows the distribution of equivalised disposable income among the working-age population. Figure 3.0 shows the composition of each income decile group by employment and NMW status (showing, for example, that 87% of families in the bottom income decile group are non-working families). Figure 3.1 shows equivalent information by plotting the fraction of families of a given employment and NMW status that are in each income decile group (so a fraction of more than 10% means that NMW families are over-represented in that part of the income distribution), and Figure 3.2 does the same but excludes non-working families and breaks NMW families into those for whom earnings from the NMW are the main source of earnings, and those for whom it is not the main source of earnings.

The tables and figures show that:

- Families for whom NMW jobs are the main source of earnings tend to be found in the bottom half of the income distribution, peaking in decile groups 3 and 4, but our estimates suggest they are to be found in families all across the income distribution.
- Families for whom NMW jobs are a secondary source of earnings tend to be found in the top half of the income distribution, peaking in decile groups 6 and 7. That they have higher incomes than families for whom earnings from NMW are the main sources of earnings should be unsurprising, and reflects that almost all NMW families for whom NMW jobs are a secondary source of earnings are two-earner couples.
- Families for whom NMW jobs are the secondary source of earnings have a distribution of income that is closer to that of non-NMW families than it is families for whom NMW jobs are the main source of earnings.

Figures 3.3 to 3.6 and Figures A1.1 to A1.4 in Appendix 1 repeat the analysis by family type (single adult, lone parent, couple with dependent children, couple without dependent children) respectively including and excluding non-workers. In all Figures 3.3 to 3.6, the denominator is all families in an income decile, while in Figures A1.1 to A1.4 the denominator is all working families in an income decile; the scales on the vertical axes reflect the prevalence of each family type. These show little difference in the location of families that contain a NMW earner by family type, except that couples without children

with a NMW earner seem to be concentrated in slightly higher income deciles than couples with children with a NMW earner.

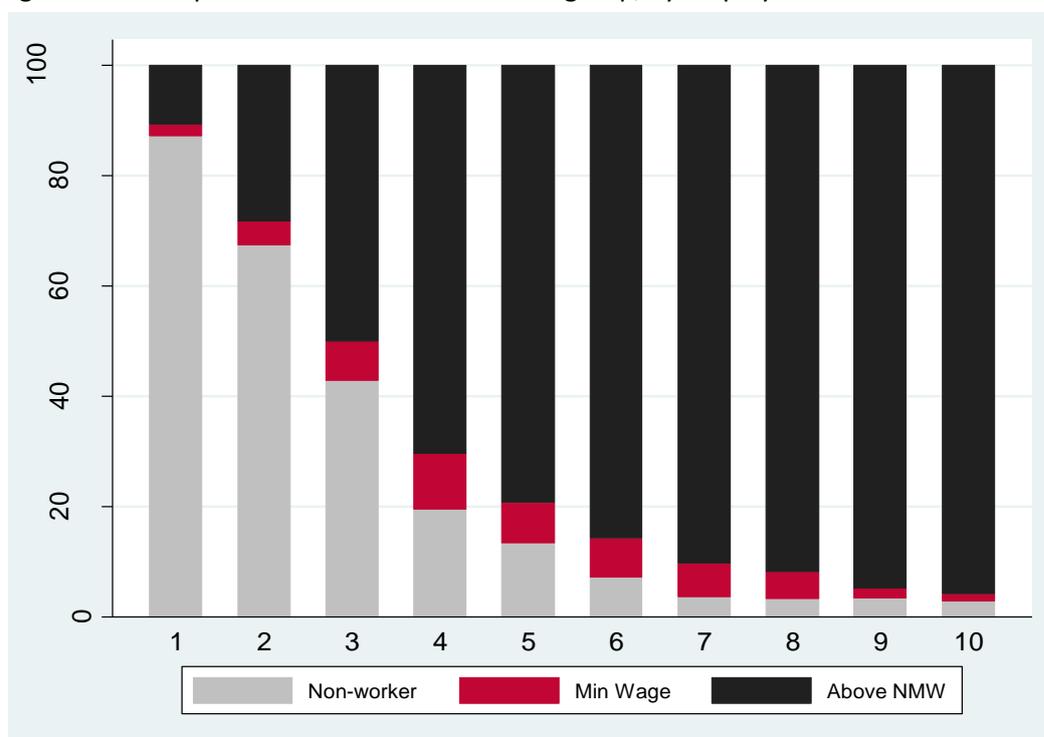
Table 3.1. Simulated income distribution of NMW families in 2014, under base system (equivalised £/wk, 2014 prices)

	Non-worker	NMW main job	2nd job or 2nd earner	Above NMW	Total
mean	142.91	231.97	341.78	408.51	324.72
p5	30.59	97.05	189.17	155.52	57.47
p10	56.53	111.6	215.93	188.49	74.62
p25	61.75	170.3	253.91	244.61	167.54
p50	125.94	215.25	323.35	344.74	266.06
p75	180.51	263.9	400.46	494.92	416.99
p90	243.46	341.17	484.5	683.9	603.97
p95	305.06	426.42	559.33	848.01	762.48

Source: authors' calculation from simulated data representing 2014-5.

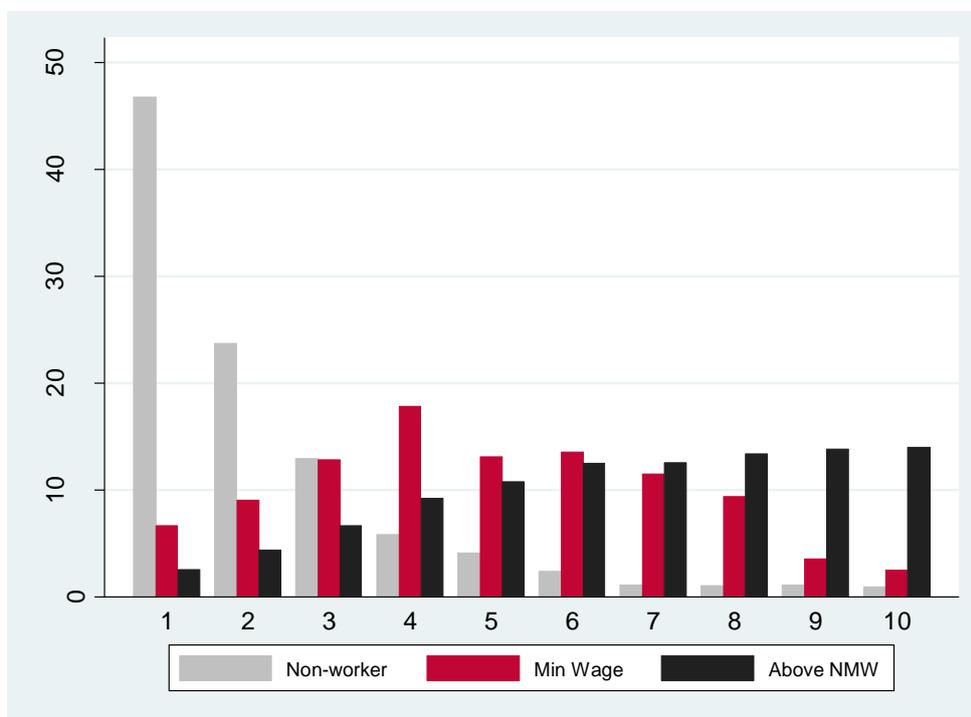
Notes: "Non-worker" means no adult in the family works. "NMW main job" means that earnings from the NMW job is the main source of earnings for the family. "2<sup>nd</sup> job or 2<sup>nd</sup> earner" means that earnings from the NMW job is not the main source of earnings for the family (either there is a partner with a higher-paying job, or the NMW worker has another job with a higher hourly rate). "Above NMW" means all working adults in the family are paid more than the minimum wage.

Figure 3.0. Composition of each income decile group, by employment and NMW status of family.



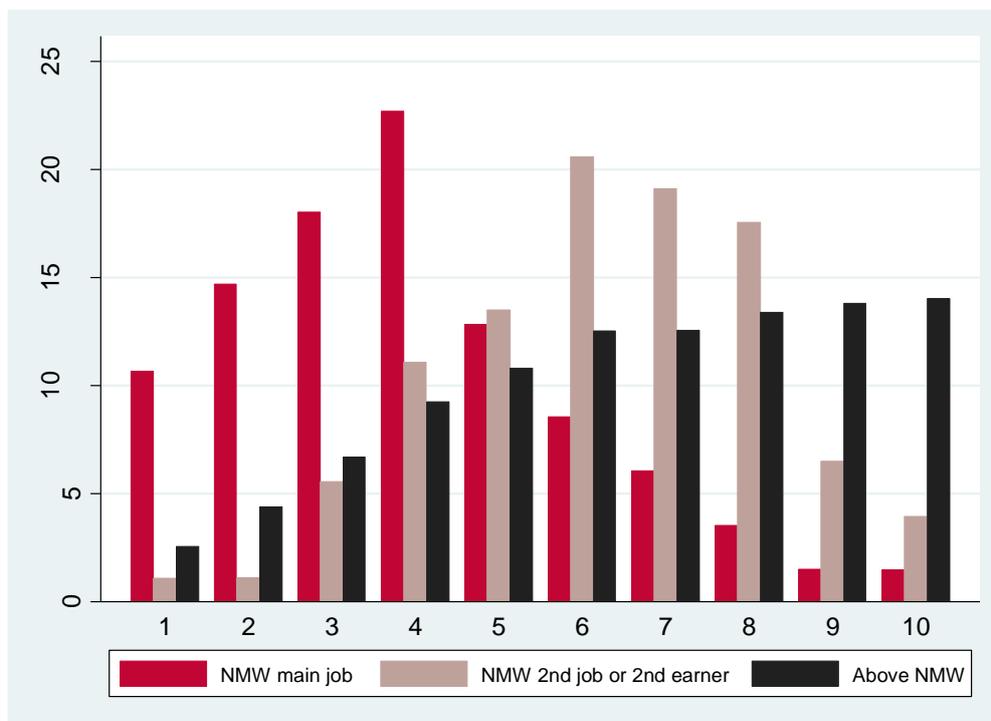
Notes and Sources: as for Table 3.1. MinWage corresponds to families containing a NMW worker. "Above NMW" corresponds to families containing a worker who earns more than the NMW.

Figure 3.1. The position of families in the working-age income distribution, by employment and NMW status.



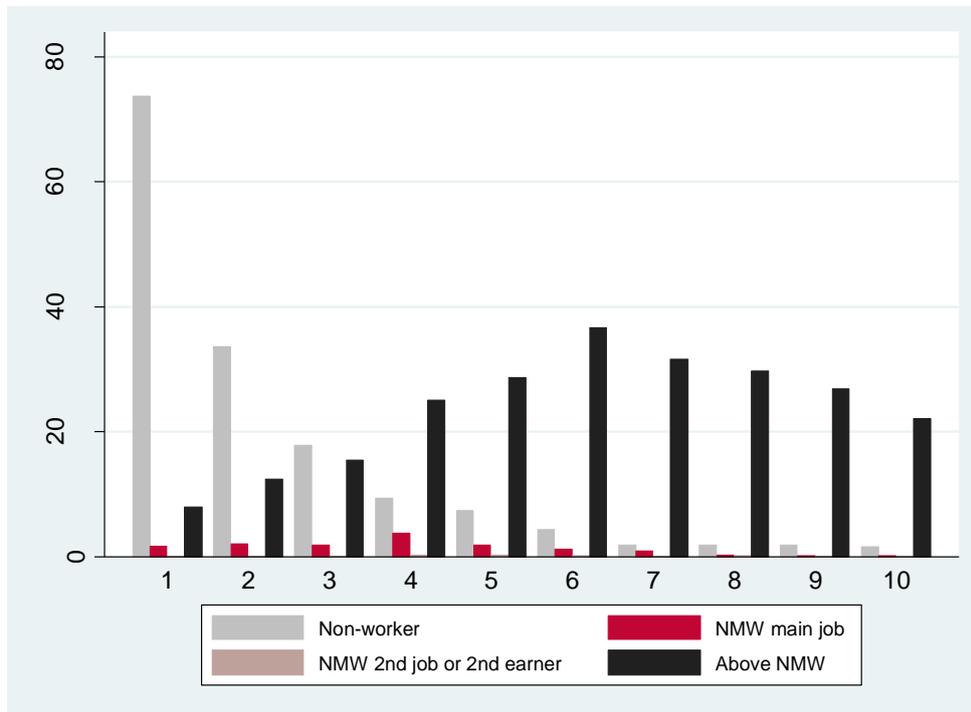
Notes and Sources: as for Table 3.1 and Figure 3.1.

Figure 3.2. The position of working families in the working-age income distribution, by employment and NMW status in the main job and other jobs.



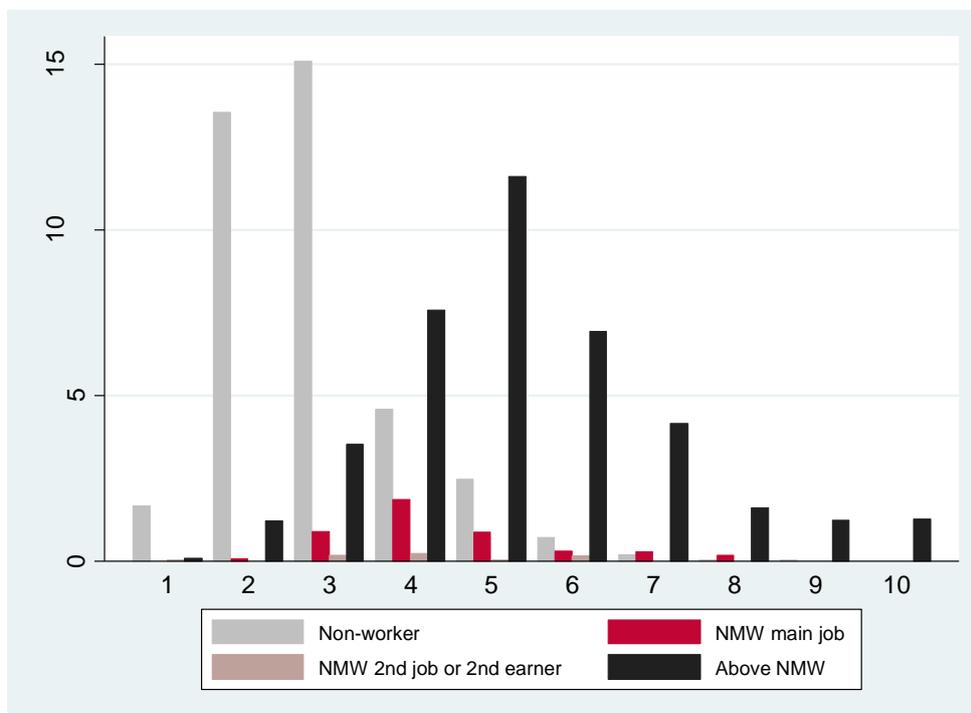
Notes and Sources: as for Table 3.1 and Figure 3.1. Each bar represents the proportion of families of that type in each decile group of working families.

Figure 3.3 The distribution of single adult families across the income distribution, by employment and NMW status



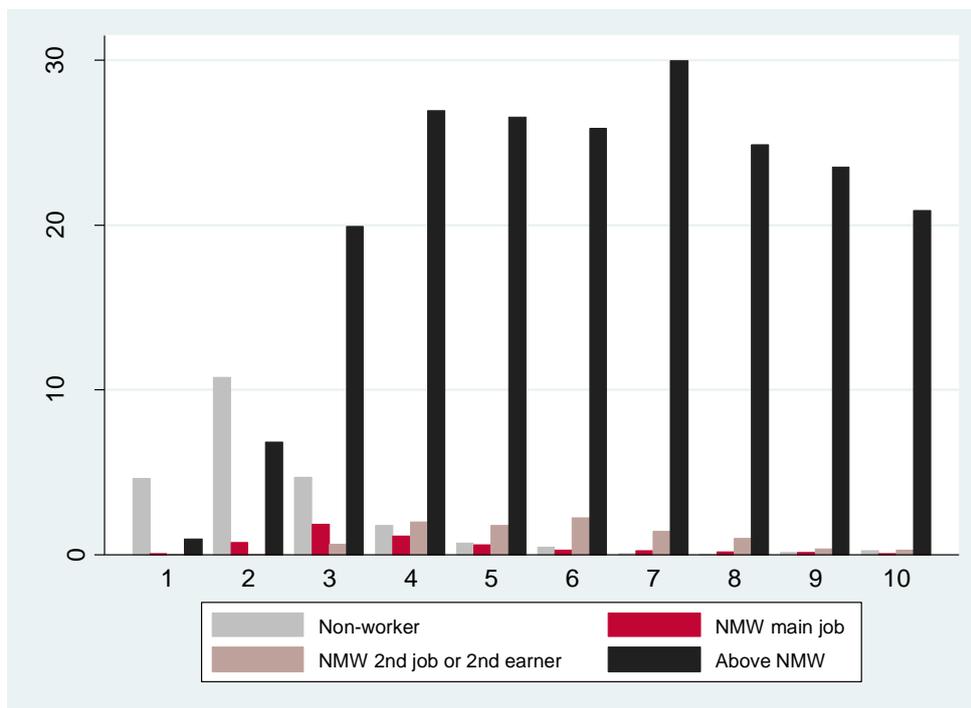
Notes and Sources: as for Table 3.1 and Figure 3.1. Denominator is all working families, so graph shows that single people not in work make up just over 70% of bottom income decile group.

Figure 3.4 The distribution of lone parent families across the income distribution, by employment and NMW status



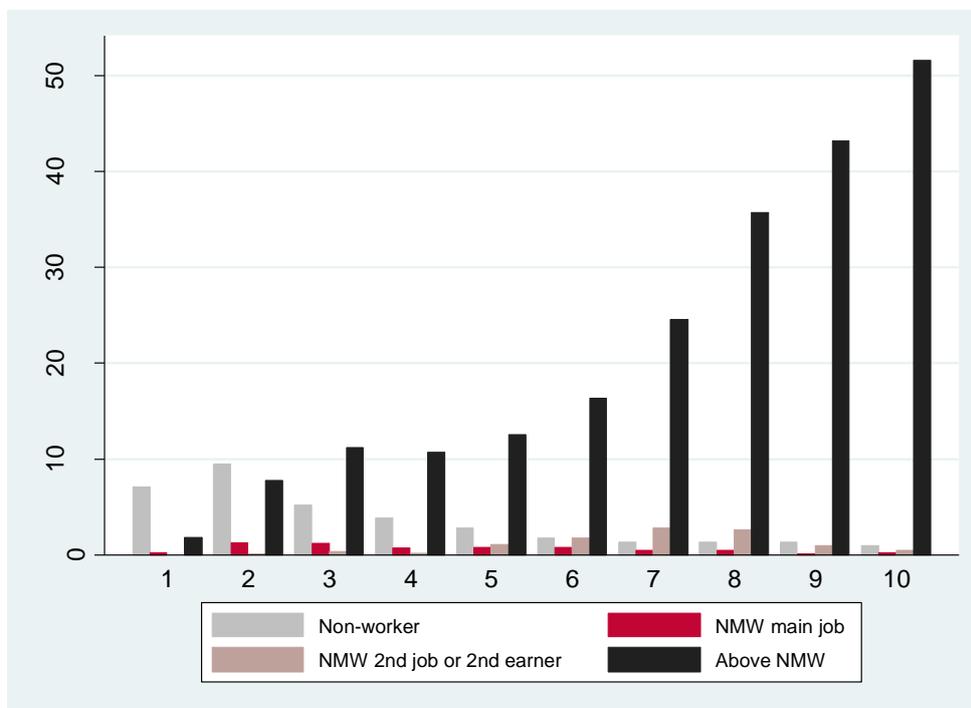
Notes and Sources: as for Table 3.1 and Figure 3.1. Denominator is all working families, so lone parents not in work make up just over 13% of 2<sup>nd</sup> income decile group.

Figure 3.5. The distribution of couples with children across the income distribution, by employment and NMW status



Notes and Sources: as for Table 3.1 and Figure 3.1. Denominator is all working families, so couples with children not in work make up just over 10% of 2<sup>nd</sup> income decile group

Figure 3.6 The distribution of couples without children across the income distribution, by employment and NMW status



Notes and Sources: as for Table 3.1 and Figure 3.1. Denominator is all working families, so couples without children not in work make up 10% of 2<sup>nd</sup> income decile group.

### 3.2. Impact of Universal Credit on income of NMW families

This section estimates the impact of Universal Credit (UC) on the income of NMW families.

These estimates have been calculated by comparing families' net incomes under two (hypothetical) tax and benefit systems: an estimate of the personal tax and benefit system in October 2014, assuming that Universal Credit has not been implemented at all, and an estimate of the personal tax and benefit system in October 2014, assuming that Universal Credit has been fully implemented. As discussed in Section 2, this impact has been estimated under a number of important assumptions, including:

- transitional protection and the phase-in of UC have been ignored
- council tax benefit and its replacement have been ignored
- several simplifications have been made where policy under UC is still not yet clear or where the number of affected cases is very small
- we have assumed full take-up in all systems

Table 3.2 shows the distribution of equivalised disposable income before and after UC among the working-age population, split by NMW type. Table 3.3 analyses the change in mean income by family type and employment and NMW status. Figures 3.7 and 3.8 show the average change in family income in £ and as a % of income by income decile group and according to whether there are any NMW workers in the family. Figures 3.9 and 3.10 do the same, but classifying NMW families according to whether or not the NMW provides the main source of earnings in the family.

The results shown in these tables and figures are broadly in line with previous estimates in Brewer, Browne and Jin (2012a&b) and DWP (2012). In particular:

- Mean incomes are slightly higher under UC, consistent with the long-run impact of UC being to increase entitlements to state support.
- The bottom half of the income distribution tends to gain slightly, and the top half to lose slightly, on average.<sup>12</sup> But, as Brewer, Browne and Jin (2012a) show, these small average changes conceal a great deal of variation in the way that family incomes are affected by UC.
- Both families for whom NMW jobs are the main source of earnings and families for whom NMW jobs are a secondary source of earnings are forecast to lose (very) slightly from UC. But families for whom NMW jobs are a secondary source of earnings are forecast to lose more, consistent with the redistributive nature of the pattern of winners and losers.

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<sup>12</sup> There are a number of differences between the analysis in this paper and those presented in Brewer, Browne and Jin (2012a&b). Perhaps the most innocuous-seeming, but of practical importance, is that the results in this paper use the modified OECD scale to equivalised household incomes, consistent with what is done by official documents, whereas most analysis using the IFS model uses the McClements equivalence scale.

- Unsurprisingly, there is no consistent evidence that NMW families are more likely to win or lose than other working families with the same total weekly earnings.

Table 3.4 contains our estimates of how many families that contain a worker will also contain someone subject to conditionality under Universal Credit (it is not yet clear how conditionality will apply to families with children, and so we have given two options for some families). Overall, we estimate around 250,000 families containing NMW workers will be subject to conditionality. Just under half of these are single adult families (where it will clearly be the NMW worker who is being encouraged to increase hours worked or the hourly pay). The other half (which are couple families) will consist of some families where it is the NMW worker, some families where it is his/her partner, and some families where it is both adults that are subject to in-work conditionality.

Table 3.2. Net disposable income (£ per week) under 2014 baseline and under UC by employment and NMW status (working-age families)  
2014-15 Baseline

NMWtype_bu	Non-worker	NMW main job	2nd job or 2nd earner	Above NMW	All
Mean	142.91	231.97	341.78	408.51	324.72
p5	30.59	97.05	189.17	155.52	57.47
p10	56.53	111.6	215.93	188.49	74.62
p25	61.75	170.3	253.91	244.61	167.54
p50	125.94	215.25	323.35	344.74	266.06
p75	180.51	263.9	400.46	494.92	416.99
p90	243.46	341.17	484.5	683.9	603.97
p95	305.06	426.42	559.33	848.01	762.48

Universal Credit

NMWtype_bu	Non-worker	NMW main job	2nd job or 2 <sup>nd</sup> earner	Above NMW	All
mean	146.89	231.45	340.09	408.85	326.05
p5	2.52	106.38	188.09	153.18	57.09
p10	54.36	114.49	215.19	190.1	80.25
p25	61.59	167.26	252.51	245.37	170.83
p50	128.7	214.57	322.14	345.11	268.2
p75	191.53	262.64	400.46	495.28	417.25
p90	257.17	346.94	484.5	683.9	603.51
p95	319.47	426.42	559.33	847.25	762.69

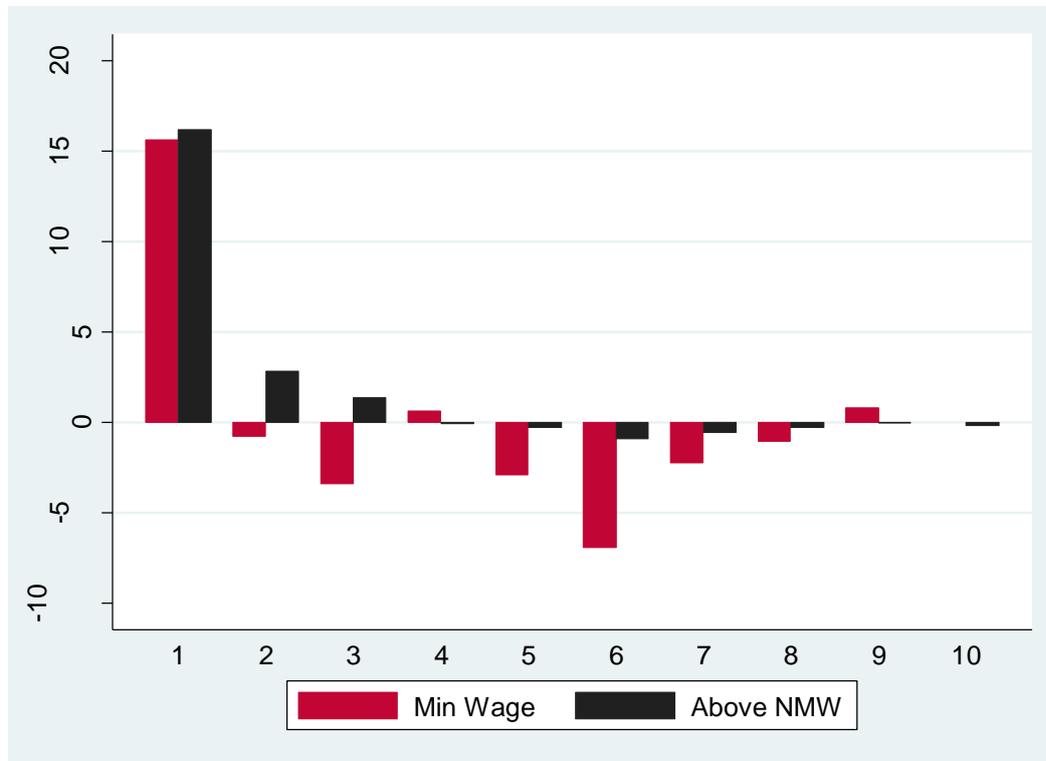
Notes and Sources: as for Table 3.1 and Figure 3.1

Table 3.3. Changes in mean weekly equivalised disposable income by employment and NMW status and family type

Family type	NMW type	Before UC (£)	After UC (£)	Difference (£)	Difference %
Single adult	Non-worker	125.41	138.98	13.56	10.82
<b>single adult</b>	<b>Min Wage</b>	<b>226.96</b>	<b>227.66</b>	<b>0.70</b>	<b>0.31</b>
single adult	Above NMW	368.15	369.37	1.22	0.33
lone parent	Non-worker	174.13	152.70	-21.42	-12.30
<b>lone parent</b>	<b>Min Wage</b>	<b>238.14</b>	<b>229.76</b>	<b>-8.38</b>	<b>-3.52</b>
lone parent	Above NMW	285.28	280.09	-5.19	-1.82
couple with children	Non-worker	165.39	137.50	-27.89	-16.86
<b>couple with children</b>	<b>Min Wage</b>	<b>280.67</b>	<b>279.78</b>	<b>-0.89</b>	<b>-0.32</b>
couple with children	Above NMW	370.25	370.25	0.00	0.00
couple w/o children	Non-worker	199.71	192.93	-6.78	-3.40
<b>couple w/o children</b>	<b>Min Wage</b>	<b>337.89</b>	<b>335.83</b>	<b>-2.06</b>	<b>-0.61</b>
couple w/o children	Above NMW	487.36	487.38	0.02	0.00

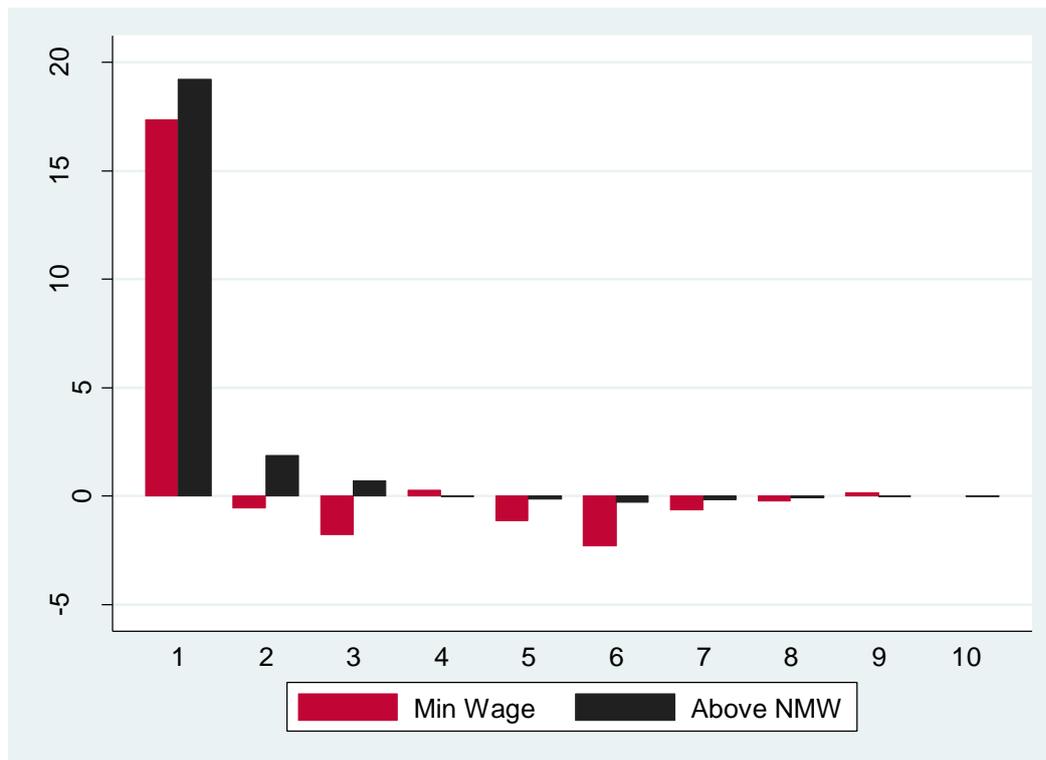
Notes and Sources: as for Table 3.1 and Figure 3.1

Figure 3.7 Average weekly change (£) in equivalised net family income over the working-age income distribution, by employment and NMW status



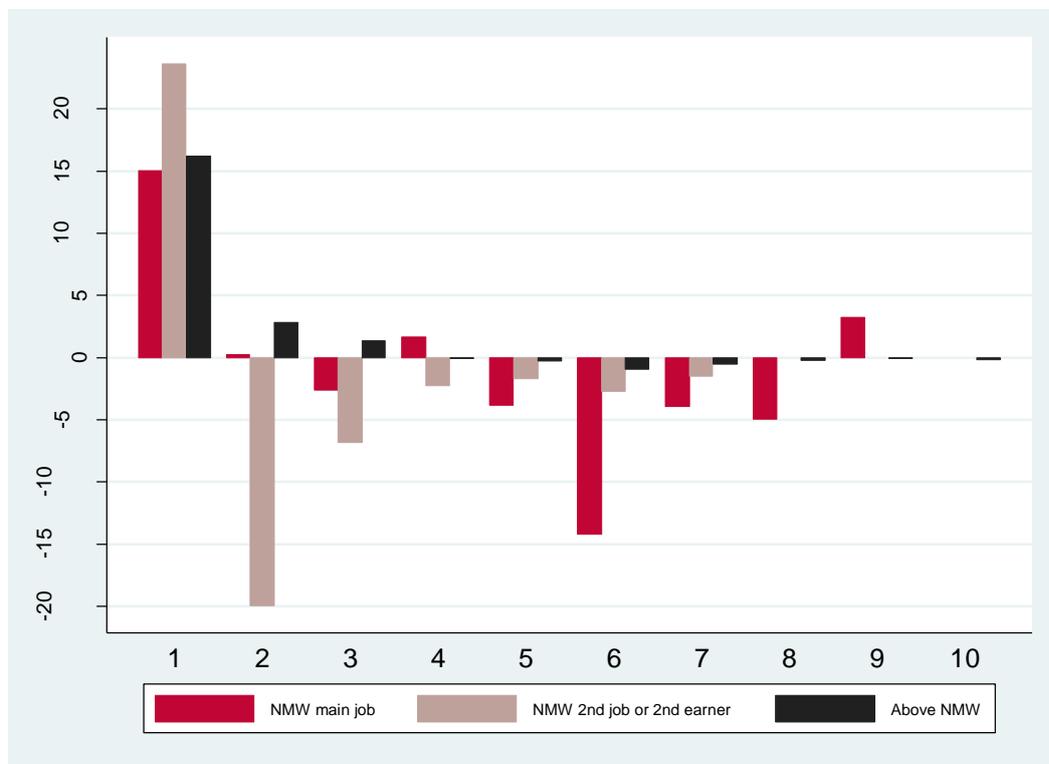
Notes and Sources: as for Table 3.1 and Figure 3.1

Figure 3.8 Average weekly change (%) in equivalised family net income over the working-age income distribution, by employment and NMW status



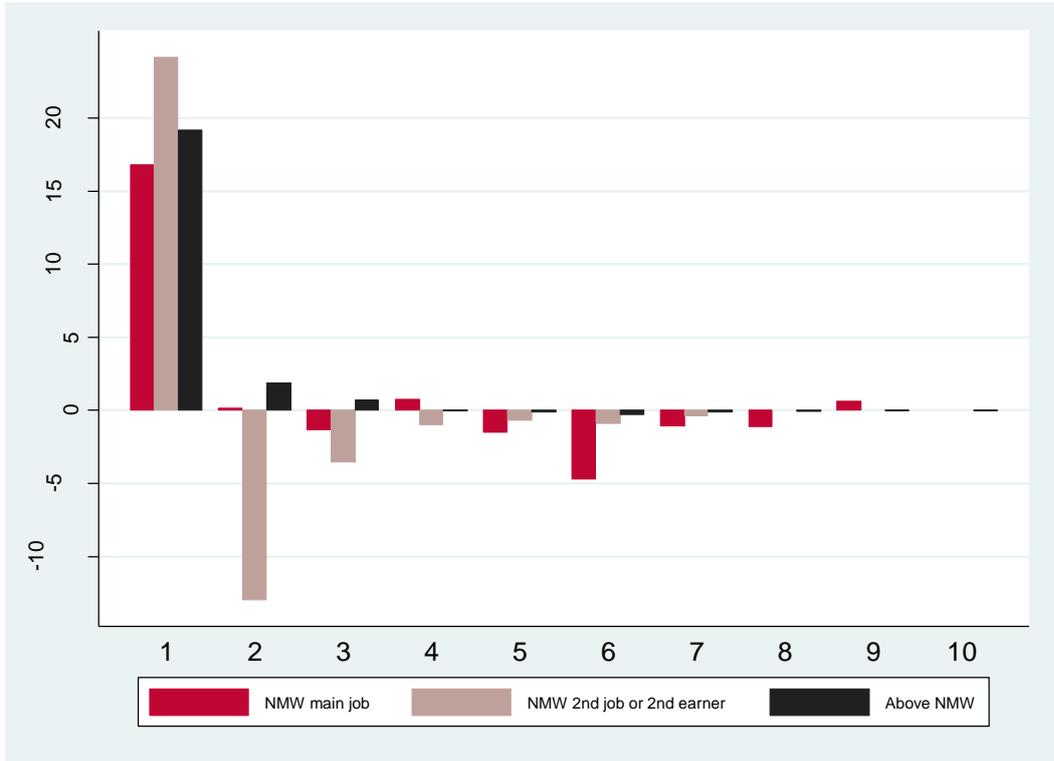
Notes and Sources: as for Table 3.1 and Figure 3.1.

Figure 3.9 Average weekly change (£) in equivalised net family income over the working-age income distribution, by employment and detailed NMW status



Notes and Sources: as for Table 3.1 and Figure 3.1

Figure 3.10 Average weekly change (%) in equivalised net family income over the working-age income distribution, by employment and detailed NMW status



Notes and Sources: as for Table 3.1 and Figure 3.1

Table 3.4. Estimated number of families receiving UC and affected by in-work conditionality

	Non-worker	Min Wage	Above NMW
Single person, no children, earning less than 35 times min wage	3,800,000	100,267	540,191
Option (a) Lone parent, youngest is aged 5-12 earning less than 16 times min wage	333,329	15,696	39,856
Option (b) Lone parent, youngest is aged 5-12 earning less than 35 times min wage	333,329	42,603	145,681
Lone parent, youngest is aged 13+ earning less than 35 times min wage	163,867	20,320	89,982
Couple, no children, jointly earning less than 70 times min wage	477,946	52,741	345,611
Couple, youngest child <5, jointly earning less than 35 times min wage	295,735	30,028	161,749
Option (a) Couple, youngest child 5-12, jointly earning less than 51 times min wage	140,555	15,696	157,820
Option (b) Couple, youngest child 5-12, jointly earning less than 70 times min wage	140,555	27,964	262,973
Couple, youngest child 13+, jointly earning less than 70 times min wage	110,885	19,314	149,707
total with (a)	5,322,317	254,062	1,484,916
total with (b)	5,322,317	293,237	1,695,894

Notes and Sources: as for Table 3.1 and Figure 3.1

### 3.3.Share of income from national minimum wage jobs

This section estimates the importance of earnings from NMW jobs to the income of NMW families.<sup>13</sup> As well as being of interest in its own right, this is also one of the factors that helps determine to what extent the income of NMW families goes up when there are statutory increases in the NMW.

For NMW families in each income decile group, Figure 3.11 shows gross earnings from NMW jobs as a share of all gross earnings. Figure 3.12 shows gross earnings from NMW jobs as a share of net income (note that income tax and national insurance payments mean that this ratio can exceed 100%), and Figure 3.13 breaks this down further by family type.

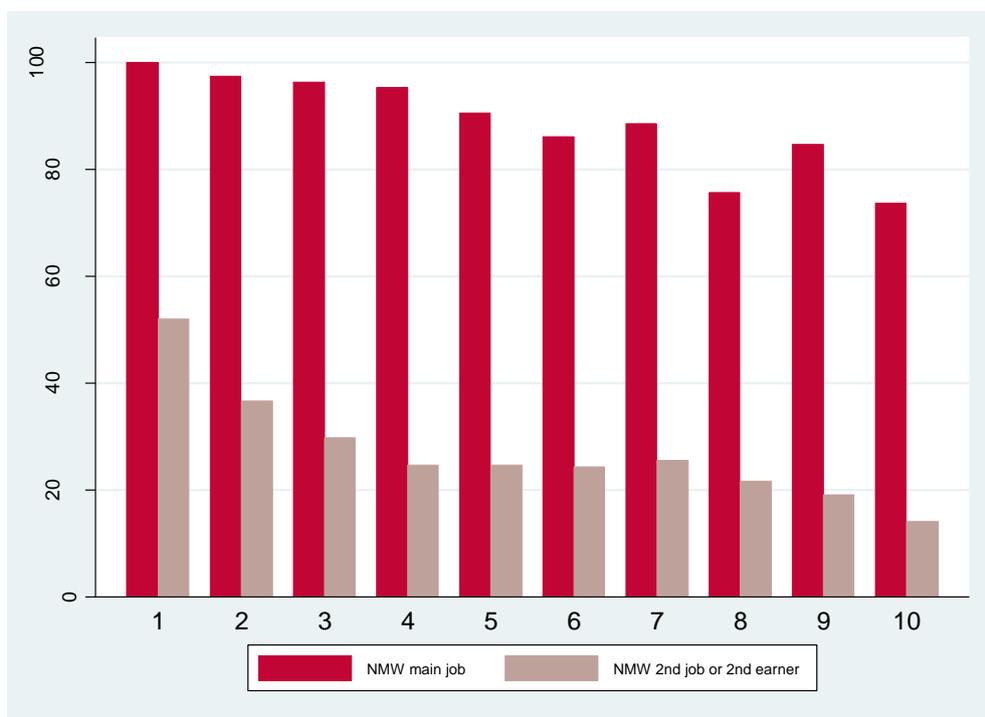
The key findings are:

- For NMW families for whom a NMW job is the main source of earnings, and who are in the bottom half of the income distribution, gross earnings from NMW jobs typically make up around 70% of net income. Unsurprisingly, families for whom NMW jobs are a secondary source of earnings derive less of their income from NMW jobs, typically around 30%.
- NMW families which contain children typically derive less of their income from NMW earnings, mostly because low-income families with children can be entitled to much more income from benefits and tax credits than low-income families without children. For example, a low-income couple with children whose main (or only) job is paid the NMW derives no more than 60% of their net income from NMW earnings, compared to close to 100% for a low-income single adult.

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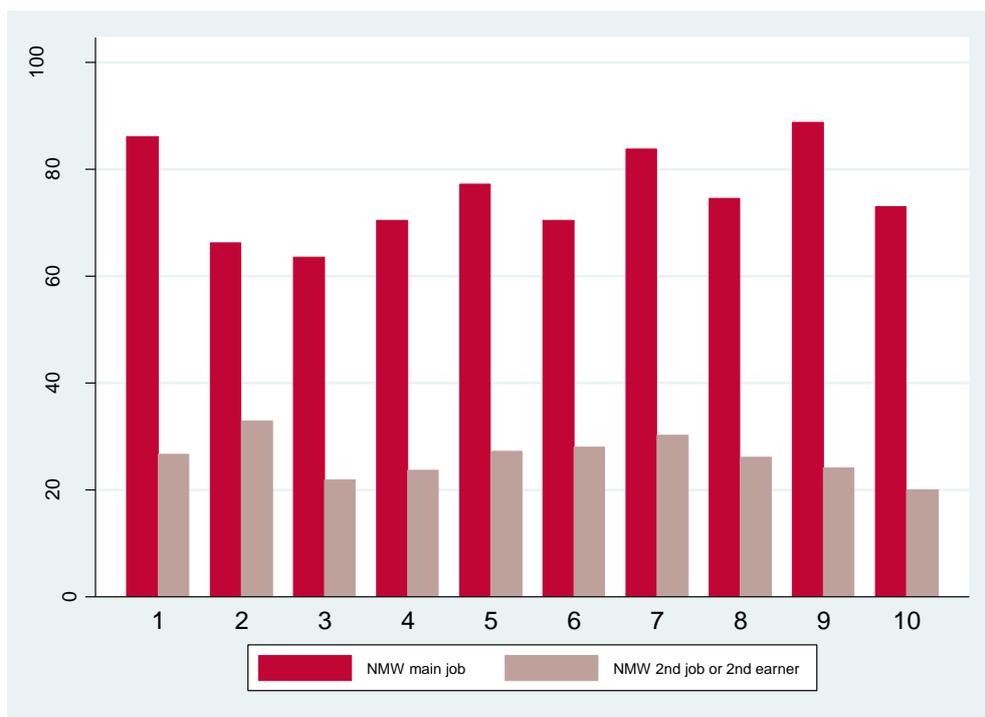
<sup>13</sup> The calculations have been done under our 2014 baseline system. Analysis under our 2014 UC system would give extremely similar results, as the impact of UC on the incomes of NMW families in each decile group is very small, on average.

Figure 3.11 Total earnings from NMW jobs as proportion of total family earnings, by employment and NMW status and income decile



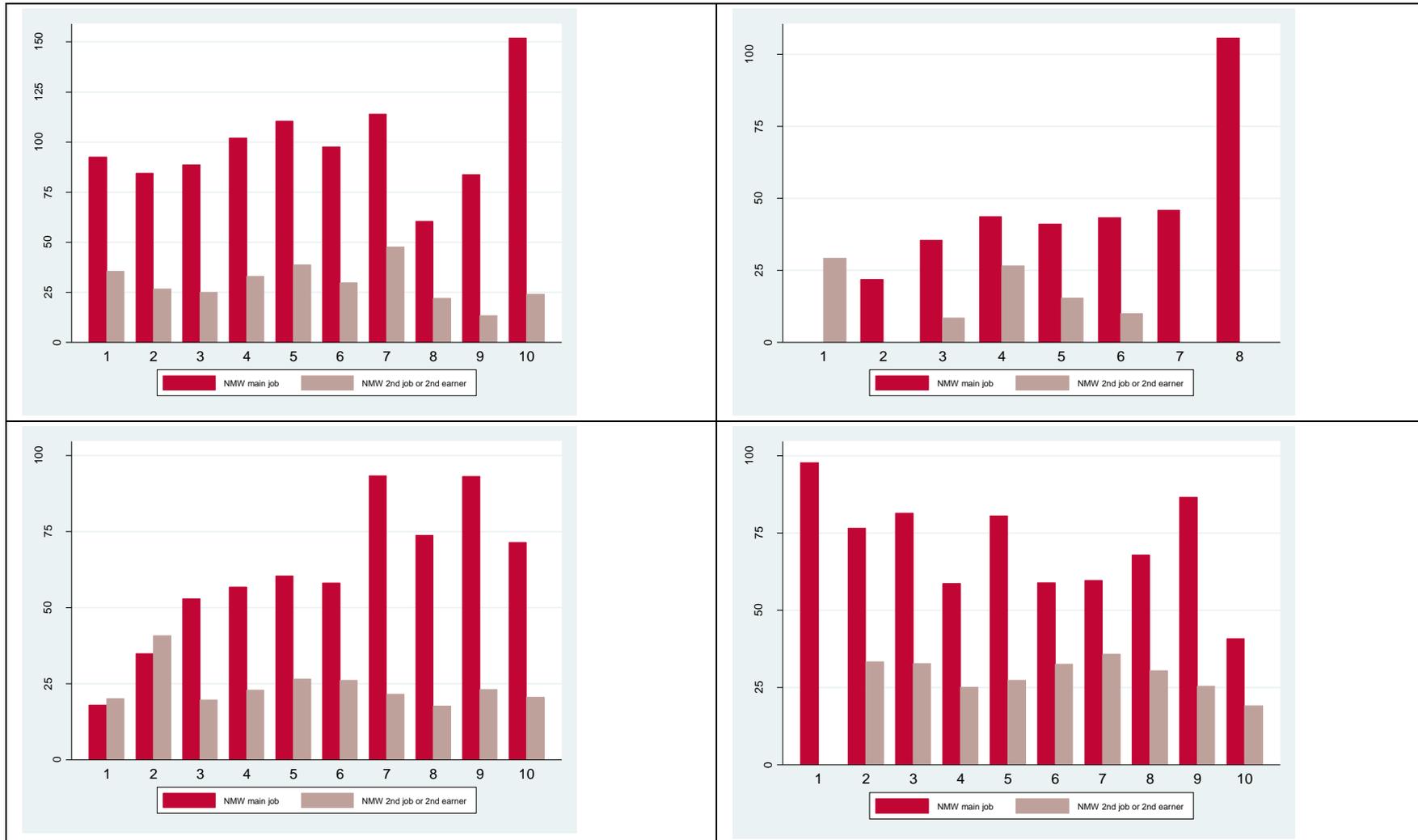
Notes and Sources: as for Table 3.1 and Figure 3.1

Figure 3.12 Total earnings from NMW jobs as proportion of net family income, by NMW status and income decile



Notes and Sources: as for Table 3.1 and Figure 3.1.

Figure 3.13 Total earnings from NMW jobs as proportion of net family income, by NMW status and income decile group (clockwise from top left: single, lone parents, couples without children, couples with children)



Notes and Sources: as for Table 3.1 and Figure 3.1

### 3.4. Impact of Universal Credit on the marginal effective tax rate faced by national minimum wage workers

This section estimates the marginal effective tax rate (METR) faced by NMW workers in 2014 under our baseline system and under UC.<sup>14</sup> The METR is important for NMW workers as it measures not just by how much the tax and benefit system discourages increases in hours worked or efforts to seek a better-paid job, but also because it measures by how much the tax and benefit system reduces the gains from statutory increases in the NMW.

The way that Universal Credit affects METRs in general is discussed in Brewer et al. (2012a&b) and DWP (2012). Overall, the general pattern is for the very highest METRs to be lowered, but for there to be more workers facing high METRs.

Table 3.5, shows various summary statistics of the distribution of METRs before and after UC, and how these vary by employment and detailed NMW status. Table 3.6 repeats this by family type. Overall, they show that:

- In general, Universal Credit reduces the number facing very high marginal effective tax rates (80%+), reduces the number facing marginal effective tax rates of below 60%, but increases the number facing high marginal effective tax rates (60% to 80%). (Because we have excluded consideration of council tax benefit, no marginal rate is higher than 77% under Universal Credit; were CTB to have been considered under its current rules, then some of these rates of 77% would rise to 82%). On average, there is a small fall in the mean METR faced by working-age adults in work.

There is much more change when this is broken down by family type.

- Single adults tend to see METRs rise under UC, mostly as UC will extend means-tested support for more of this group than currently receive tax credits or benefits when in work.
- Lone parents, who are more likely than other family types to be entitled to HB if in work, which can lead to very high METRs, see, on average, large falls in METR under UC. Some of these will be lone parents currently facing multiple withdrawals of benefits and tax credits, who benefit from the single taper under UC, and some will be lone parents currently receiving tax credits but who will not be entitled to any UC.
- Couples with children for whom the NMW is the main source of earnings also see large falls in METRs, on average, under UC. As with lone parents, this is because some currently face very high METRs through receiving HB when in work.
- Couples without children tend to see the highest METRs fall under UC, leading to a small fall overall.

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<sup>14</sup> We define the METR as the proportion of a small rise in gross earnings which is lost to withdrawn benefit or tax credit entitlement and higher tax and NI liability. To calculate, we increase gross earnings by 3% corresponding approximately to an additional hour of full time work per week.

Figure 3.14 shows how the entire distribution of METRs changes under UC, and does this for NMW workers and those earning above the NMW. Figure 3.15 repeats this for those earning NMW in their main job and those earning it in a secondary job. They show that:

- Under the current tax and benefit system, NMW workers are more likely to face especially low and especially high METRs than higher-paid workers.
- Under UC, there will be a new spike in the distribution of METRs at 65%, but (almost) no one will face an METR above 77%. As we say above, excluding consideration of Council Tax Benefit, Universal Credit reduces the number facing very high marginal effective tax rates (80%+) but increases the number facing high marginal effective tax rates (60% to 80%).
- NMW workers who are not the main source of earnings in their family tend to face lower METRs than those who are the main source of earnings in their family. But the impact of UC on incentives appears similar for both groups.

Table 3.5. Distribution of METR under baseline 2014 system

	NMW main job	2 <sup>nd</sup> job or 2 <sup>nd</sup> earner	Above NMW	Total
mean	41.05	34	38.85	38.73
p5	0	0	0	0
p10	0	0	24.13	20
p25	20	29	32	32
p50	32	32	34.28	34.13
p75	69.06	41	43.4	43.48
p90	81.72	73	73	73
p95	92.68	73.91	73.96	74.49

Distribution of METRs under UC

	NMW main job	2 <sup>nd</sup> job or 2 <sup>nd</sup> earner	Above NMW	Total
mean	38.78	32.48	37.66	37.5
p5	0	0	0	0
p10	0	0	24.65	20
p25	32	20	32	32
p50	32	32	33.92	33.69
p75	65	38	43.22	43.48
p90	76.2	65.1	68.15	69.2
p95	76.2	76.2	76.2	76.2

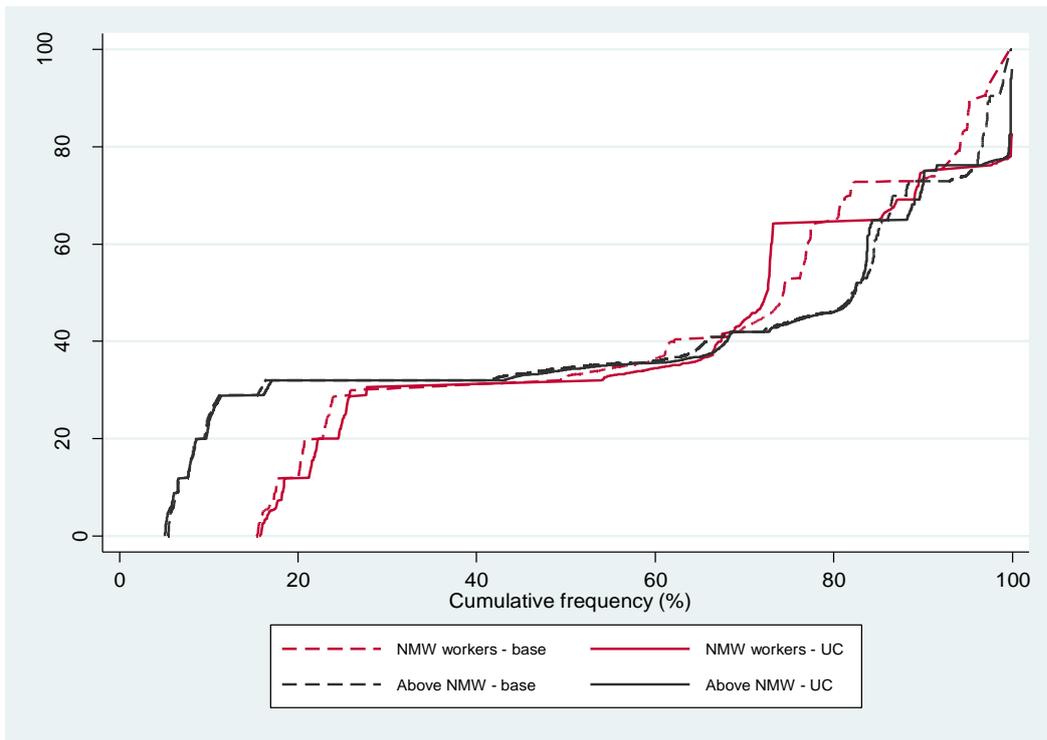
Notes and Sources: as for Table 3.1 and Figure 3.1

Table 3.x – METR before and after UC by employment and NMW status and family type

	Before UC						After UC						
working at NMW													
	single adult (<SPA)	couple without children (both <SPA)	Couple with children (both <SPA)	lone parent (<SPA)	Couple w/o children (one SPA+)	Total		single adult (<SPA)	couple without children (both <SPA)	couple with children (both <SPA)	lone parent (<SPA)	Couple w/o children (one SPA+)	Total
mean	29.47	27.48	22.34	26.12	25.13	25.37		36.66	26.79	21.65	20.13	20.69	25.19
p5	0	0	0	0	0	0		0	0	0	0	0	0
p10	0	0	0	0	0	0		0	0	0	0	0	0
p25	0	24.32	0	0	5.29	0		32	15.54	0	0	0	0
p50	32	32	0	0	24.56	32		32	32	0	0	20	32
p75	33.88	33.93	41	65	34.4	36		65	33.48	35.6	65	32	34.91
p90	65	41	73	81.7	43.16	70		65	36.96	66.67	70.51	37.13	65
p95	73	42.17	73.1	100	73	73.53		69.2	45.6	76.2	76.2	43.14	76.2
	Before UC						After UC						
Working at a salary above NMW													
mean	34.39	33.45	21.66	25.62	23.94	27.73		36.65	33.04	20.9	23.2	21.75	27.52
p5	0	5.49	0	0	0	0		9.2	0	0	0	0	0
p10	12	28.21	0	0	0	0		29	24.97	0	0	0	0
p25	32	32	0	0	0	0		32	32	0	0	0	0
p50	32	32.14	26.45	0	29	32		32	32	16.3	0	24.66	32
p75	35.84	36.63	35.64	65	35.33	36.4		36.95	36.34	35.19	65	33.33	35.84
p90	46.23	44.53	47.79	74.52	44.3	47.29		65	44.45	46.49	76.2	42	47.95
p95	70	46.2	73	90.55	52	73		65	46.14	67.09	77.26	45.64	67.65

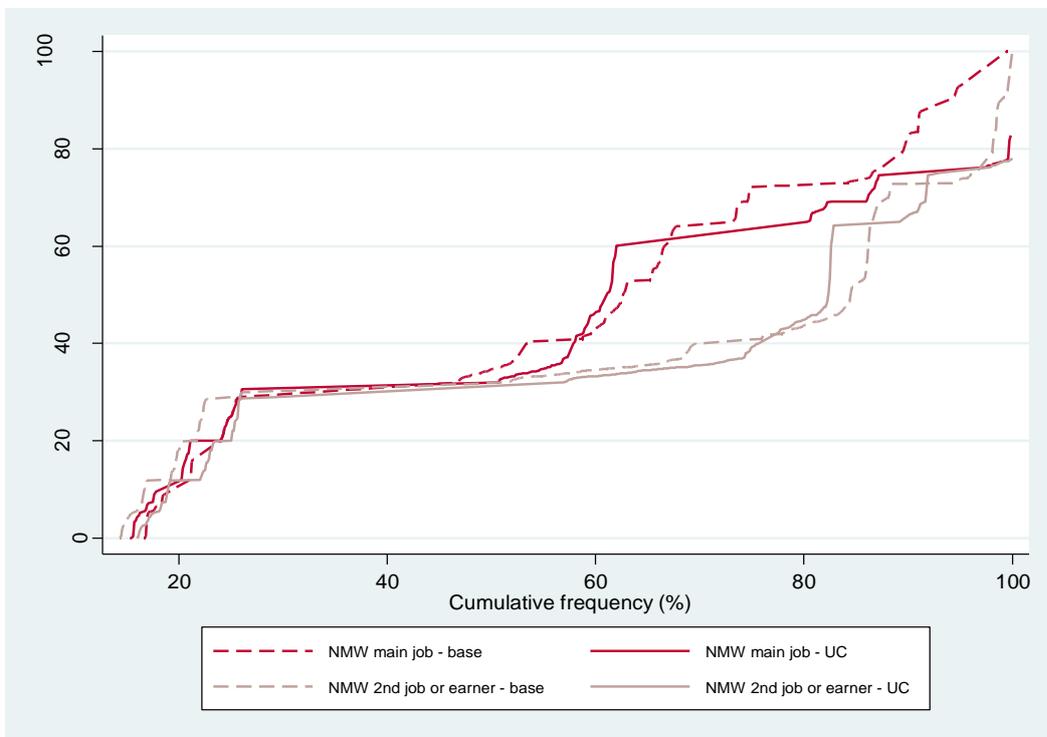
Notes and Sources: as for Table 3.1 and Figure 3.1

Figure 3.14. Cumulative distribution of METRs before and after introduction of UC



Notes and Sources: as for Table 3.1 and Figure 3.1

Figure 3.15. Cumulative distribution of METRs before and after introduction of UC



Notes and Sources: as for Table 3.1 and Figure 3.1

### 3.5. Impact of a rise in the national minimum wage on income of national minimum wage families

The final section of this chapter shows the impact on NMW families of a statutory rise in the NMW, and how this varies by position in the income distribution and type of NMW family. These estimates were calculated by increasing our projected level for the NMW in October 2014 by 10%, and calculating how net incomes change under our UC system.<sup>15</sup>

Table 3.7 shows the average change in net income for different sorts of NMW families, and Figure 3.16 and 3.17 show the same by income decile group, first for all NMW families, and then split by whether or not the NMW is the main source of earnings.

In general, the effect of a rise in the NMW on the income of a NMW family depends on the share of net income accounted for by earnings from the NMW, and the METR faced by the NMW worker in that family. So families that see incomes change by small (large) amounts are either those in which NMW workers are facing high (low) METRs, or those in which other sources of income make earnings from NMW relatively unimportant (important). Amongst those families for whom the NMW is the main source of earnings, families without children gain the most from a rise in the NMW: this presumably reflects that they will tend to face lower METRs than families with children under UC. Across the bulk of the income distribution, a 10% rise in the NMW leads to an increase in net family income amongst NMW families of around 3%; this breaks down to a figure of around 4% for families where the NMW is the main source of earnings, and around 2% for families where the NMW is the secondary source of earnings.

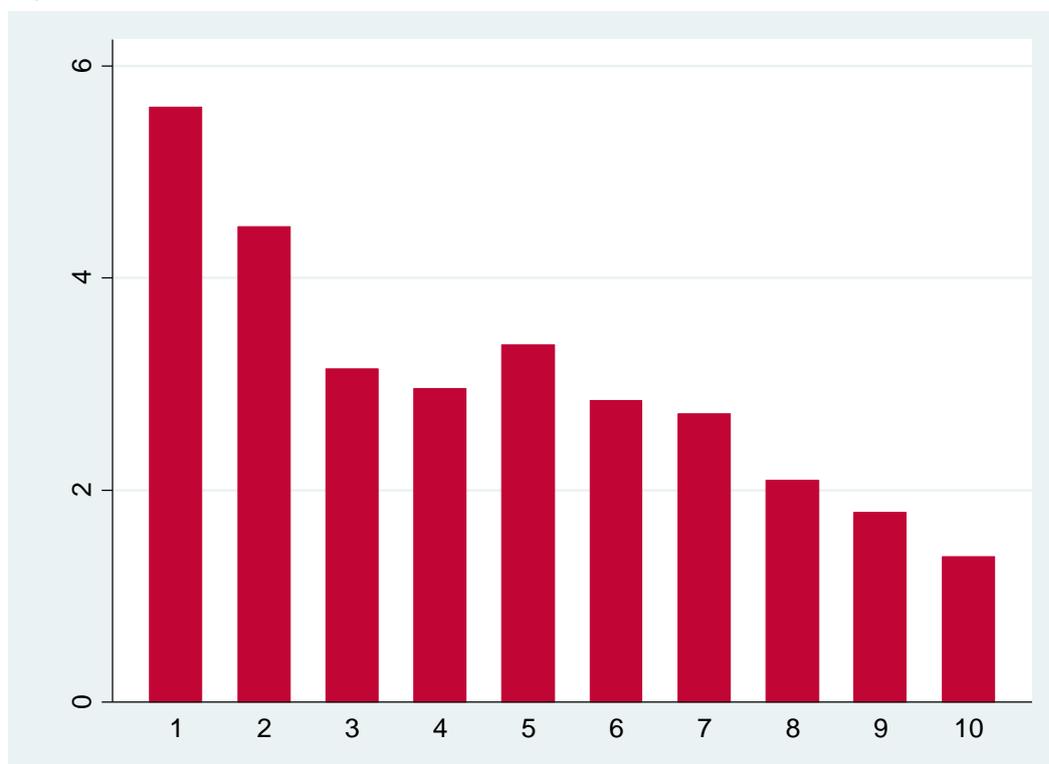
Table 3.7. Average change in net income (£/week) for different NMW families after a hypothetical 10% rise in the NMW, and under UC

	Single	Lone parents	Couples with children	Couples without children	All
<b>NMW main job</b>	13.62	6.17	9.25	15.55	12.26
<b>NMW 2nd job or 2<sup>nd</sup> earner</b>	6.12	2.81	10.96	13.84	11.83

Notes and Sources: as for Table 3.1 and Figure 3.1

<sup>15</sup> Our assumption of full-take-up of benefits and tax credits and UC means that our results are likely to be underestimates of the true impact, as families not receiving the benefits and tax credits to which they are entitled will tend to face lower METRs and thus gain more from a rise in the NMW.

Figure 3.16. Change in net family income when NMW increased by 10%, all NMW families (under UC)



Notes and Sources: as for Table 3.1 and Figure 3.1

Figure 3.17. Change in net family income when NMW increased by 10%, by detailed NMW type (under UC)



Notes and Sources: as for Table 3.1 and Figure 3.1

#### 4. Work incentives of other adults in national minimum wage families

In this section, we estimate what impact UC has on the work incentives facing non-working adults in couples, on the assumption that these individuals also take NMW jobs. We measure these incentives using the participation tax rate (PTR), which measures what fraction of gross earnings is lost to withdrawn benefit or tax credit entitlement and higher tax and NI liability. The focus is on how the incentives change for non-working adults living in couples with NMW workers; we also compare these to non-working adults living in couples with those paid more than the NMW.

Table 4.1 and Figures 4.1 to 4.4 show the full distribution of PTRs for these non-working adults living in couples, separately for different assumptions about how many hours will be worked by the (currently) non-working adults, and whether the working partner is paid the NMW or more. They show that:

- On average, Universal Credit increases the participation tax rate (and therefore reduces the financial pay off from working) of secondary earners (on the assumption that they would earn the NMW), and this is evident for families where the main earner is paid the NMW, as well as those with higher wages.
- This arises mostly because the taper in UC is made at a higher headline rate than under tax credits at present (65% vs 41%). For those working full-time, this higher headline rate is partly offset by the fact that the UC taper is against net income,

rather than gross income (a change which considered alone would strengthen work incentives). But for those working part-time, the fact that the UC taper is against net income, rather than gross income, is less pertinent as their earnings will lie below the income tax personal allowance.

Figure 4.5 to 4.8 show the full distribution of PTRs for non-working adults living in couples with a NMW earner as a partner, separately for different assumptions about how many hours will be worked by the (currently) non-working adults, and by whether the family contains children. They show very clearly that:

- Potential secondary earners in couples without children with NMW earners as partners will see little change in their PTRs, but non-working adults in couples with children with NMW earners as partners will see very large changes, and usually increases, in their PTRs. These rises in PTRs occur because single-earner couples with children tend to gain from the introduction of UC; and as a result of the higher headline withdrawal rate under UC; both factors mean that, compared to the current tax and benefit system, there is more state support to be lost when the potential secondary earner moves into work, and it is lost faster as the earnings of the potential secondary earner rise.<sup>16</sup>

Table 4.1. Distribution of PTRs of non-workers assuming they would earn NMW if in work  
2014 baseline

baseline	mean	p5	p10	p25	p50	p75	p90	p95
	NMW main job families							
10 hours	35.02	0	0	5.13	39.53	56.59	79.14	79.73
20 hours	32.6	0	0	11.13	32.91	50.66	62.76	69.21
30 hours	33.5	0	0	16.11	32.79	50.76	63.49	69.04
40 hours	33.54	0	0	19.71	32.22	49.63	61.27	66.54
	Above NMW							
10 hours	14.87	0	0	0	0	29.88	43.62	65
20 hours	16.57	0	0	0	6.34	25.42	47.28	55.8
30 hours	19.06	0	0	0	12.91	27.86	47.72	53.89
40 hours	20.59	0	0	0	17.31	29.22	44.99	54.82

#### Under UC

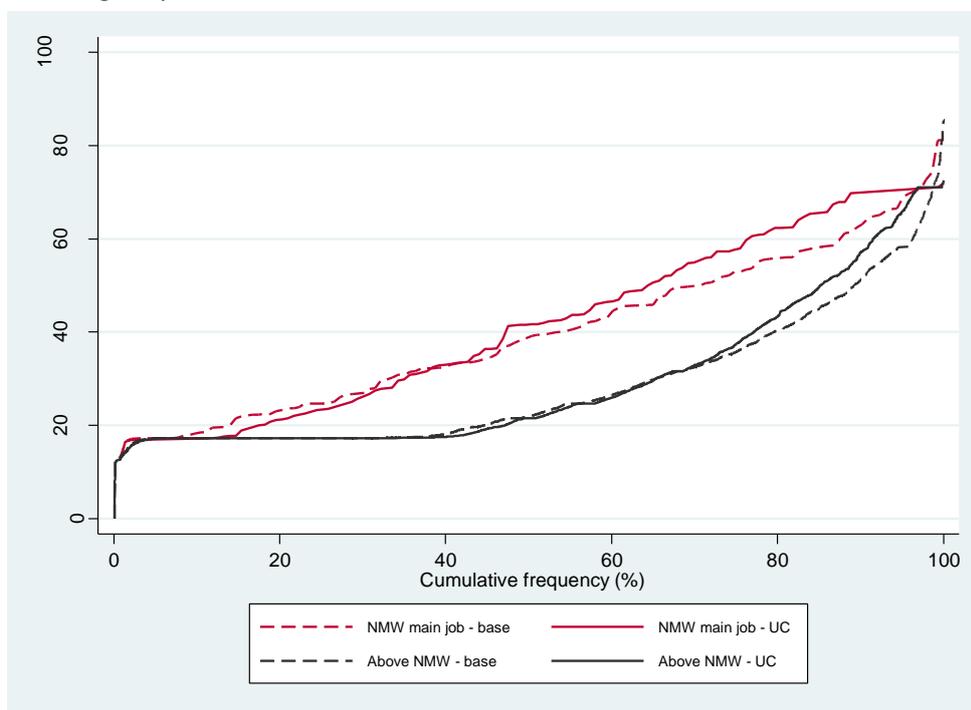
	mean	p5	p10	p25	p50	p75	p90	p95
	NMW main job families							

<sup>16</sup> Although workers will tend to face a lower withdrawal rate under UC than workers facing withdrawal of multiple benefits and tax credits in the current system, such a situation will apply to very few two-earner couples, who tend to have already exhausted entitlement to HB or CTB.

10 hours	35.31	0	0	0	43.32	65	65	65
20 hours	34.93	0	0	6.39	34.95	63.74	67.2	67.2
30 hours	34.83	0	0	12.96	33.21	56.54	69.51	69.51
40 hours	34.6	0	0	17.34	32.53	52.13	67.47	71.05
	Above NMW							
10 hours	17.17	0	0	0	0	34.83	65	65
20 hours	18.24	0	0	0	6.31	27.04	65.5	67.2
30 hours	20.03	0	0	0	12.9	27.59	55.61	67.26
40 hours	21.26	0	0	0	17.3	29.12	50.01	61.62

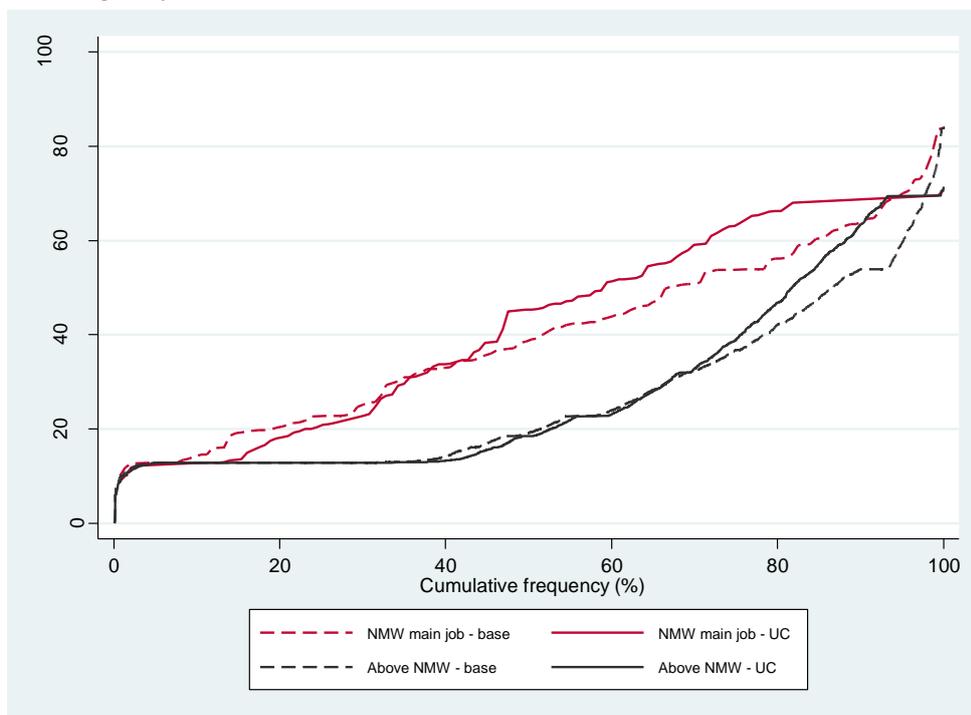
Notes and Sources: as for Table 3.1 and Figure 3.1

Figure 4.1. Cumulative distribution of PTRs of non-working adults in couples before and after UC, assuming they work 40 hours/wk at the NMW



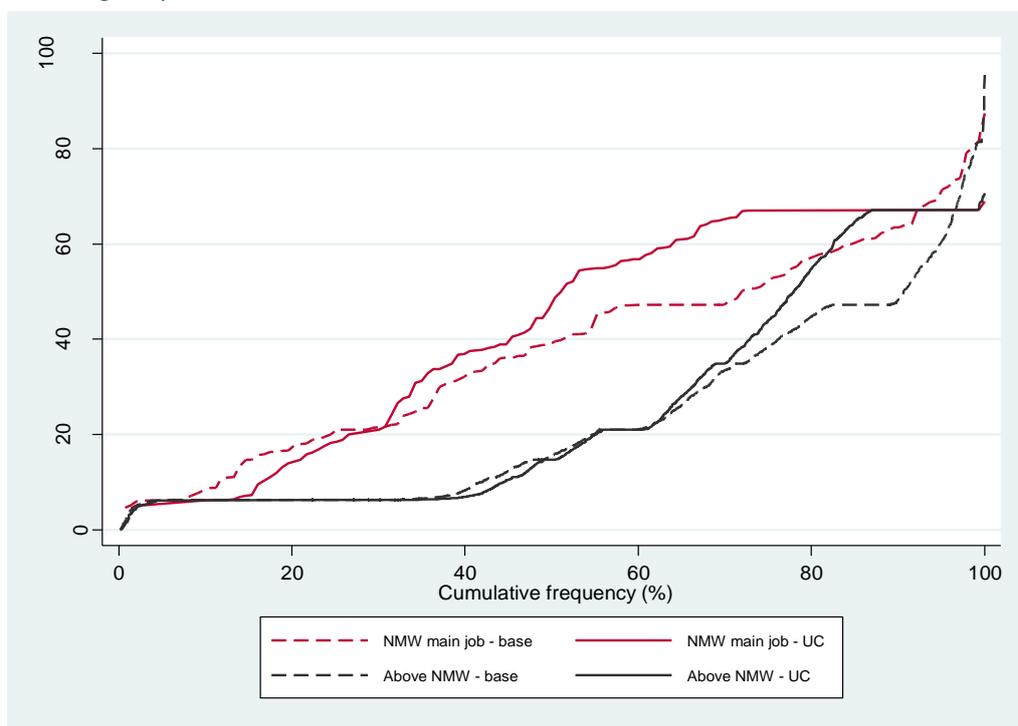
Notes and Sources: as for Table 3.1 and Figure 3.1. Legend refers to wage earned by working partner.

Figure 4.2. Cumulative distribution of PTRs of non-working adults in couples before and after UC, assuming they work 30 hours/wk at the NMW



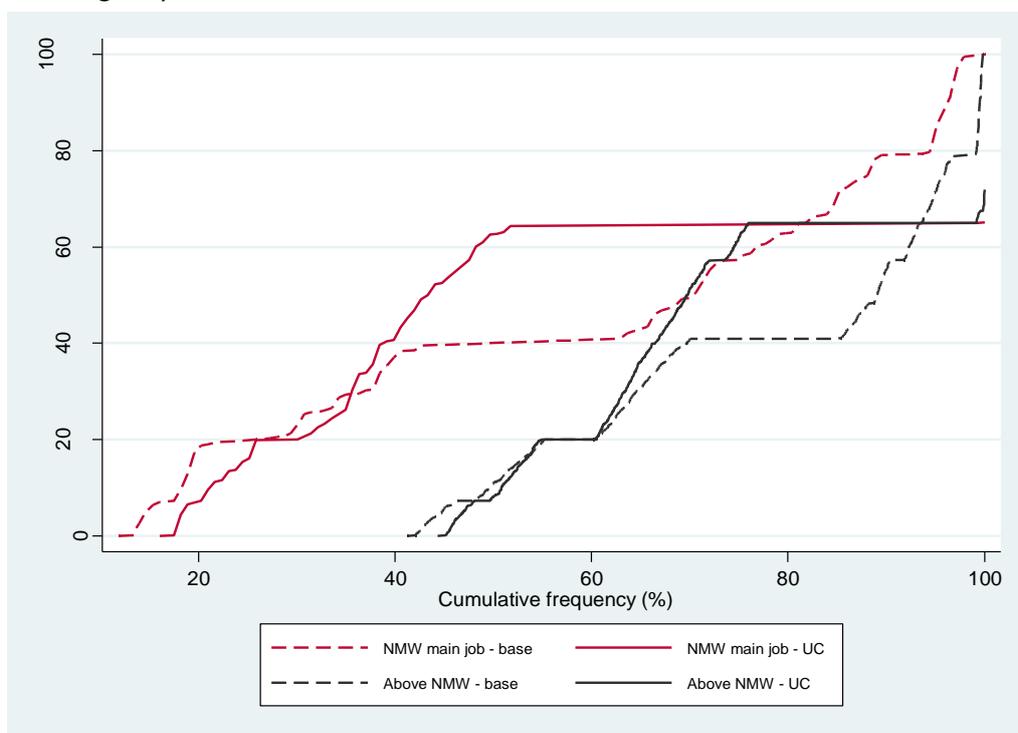
Notes and Sources: as for Table 3.1 and Figure 3.1. Legend refers to wage earned by working partner.

Figure 4.3. Cumulative distribution of PTRs of non-working adults in couples before and after UC, assuming they work 20 hours/wk at the NMW



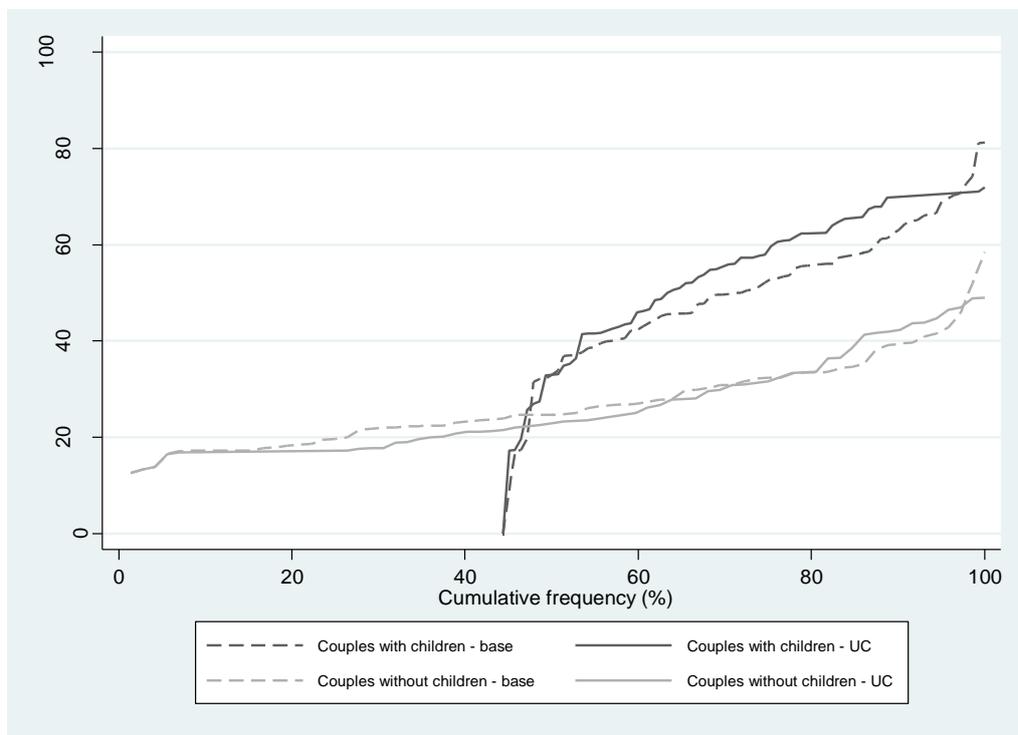
Notes and Sources: as for Table 3.1 and Figure 3.1. Legend refers to wage earned by working partner.

Figure 4.4. Cumulative distribution of PTRs of non-working adults in couples before and after UC, assuming they work 10 hours/wk at the NMW



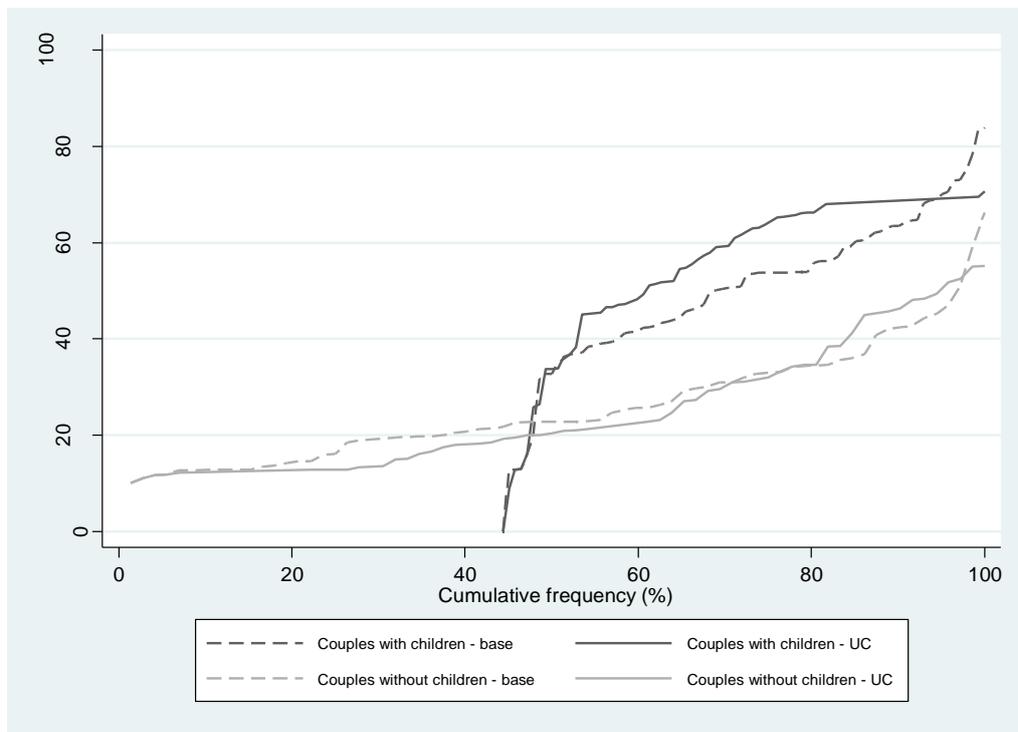
Notes and Sources: as for Table 3.1 and Figure 3.1. Legend refers to wage earned by working partner.

Figure 4.5. Cumulative distribution of PTRs of non-working adults in couples before and after UC, assuming they work 40 hours/wk at the NMW, and partner is paid the NMW



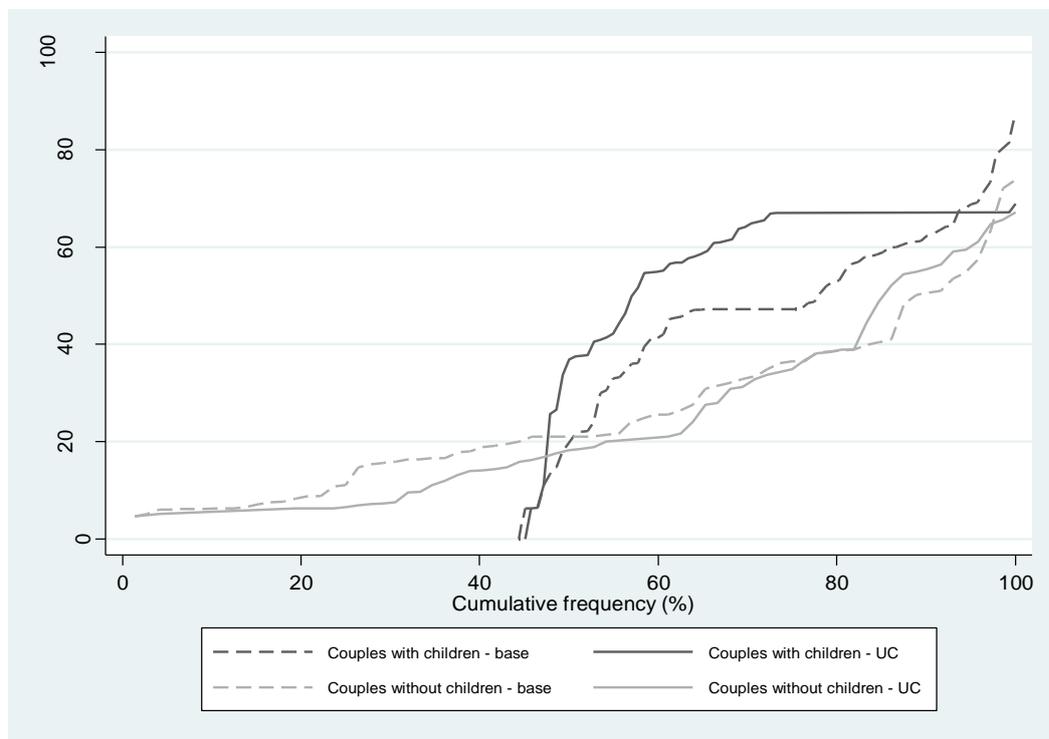
Notes and Sources: as for Table 3.1 and Figure 3.1.

Figure 4.6. Cumulative distribution of PTRs of non-working adults in couples before and after UC, assuming they work 30 hours/wk at the NMW, and partner is paid the NMW



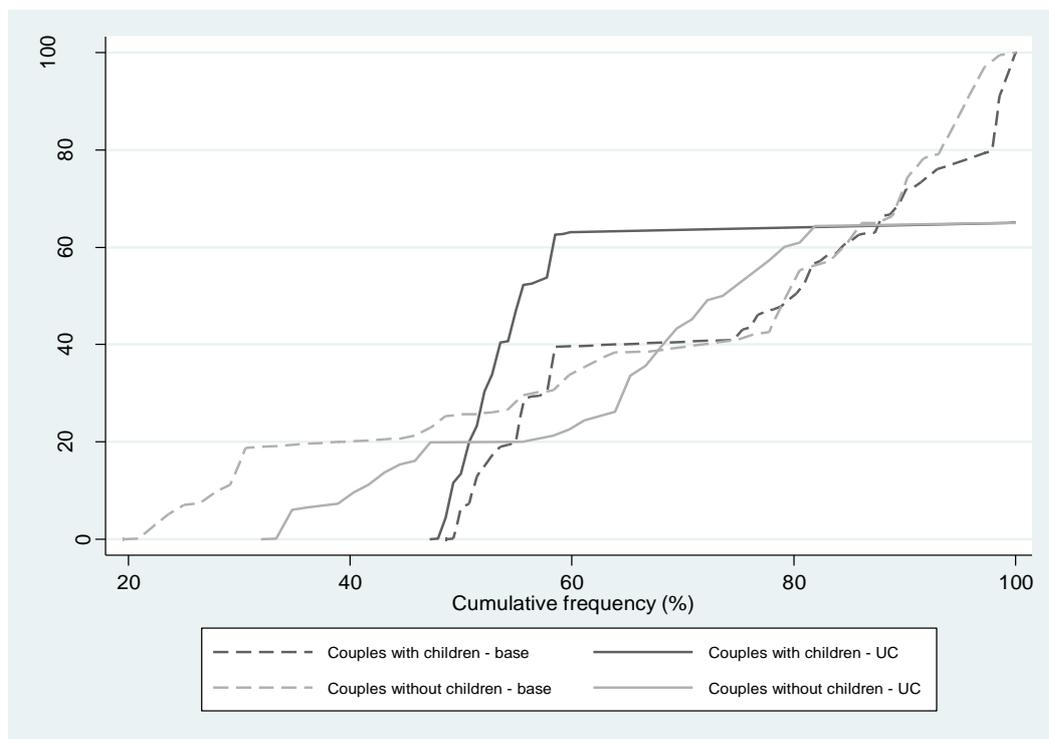
Notes and Sources: as for Table 3.1 and Figure 3.1..

Figure 4.7. Cumulative distribution of PTRs of non-working adults in couples before and after UC, assuming they work 20 hours/wk at the NMW, and partner is paid the NMW



Notes and Sources: as for Table 3.1 and Figure 3.1.

Figure 4.8. Cumulative distribution of PTRs of non-working adults in couples before and after UC, assuming they work 10 hours/wk at the NMW, and partner is paid the NMW



Notes and Sources: as for Table 3.1 and Figure 3.1.

## 5. Conclusions

This paper examined the likely impact of Universal Credit (UC) on the incomes and work incentives of families containing NMW workers (“NMW families”), and so contributes to the literature examining the interaction between the NMW and the tax and benefit system, and that examining the relationship between NMW workers and low-income families or households.

Both families for whom NMW jobs are the main source of earnings and families for whom NMW jobs are a secondary source of earnings are forecast to lose (very) slightly from UC. But families for whom NMW jobs are a secondary source of earnings are forecast to lose more, consistent with the redistributive nature of the pattern of winners and losers. But there is a great deal of variation within these small, “on average”, changes, some of which is related to family type. UC will extend conditionality (in other words, a requirement to take steps to look for better-paid or jobs with longer hours) to some families who are in work, and we estimate around 250,000 families containing NMW workers will be subject to conditionality.

Across all families, Universal Credit reduces the number facing very high (80%+) marginal effective tax rates (METRs) but increases the number facing high METRs (60% to 80%). On average, METRs fall slightly. But there is much more change when broken down by family type: single adults tend to see METRs rise under UC; lone parents see large falls in METR, on average, under UC; couples with children for whom the NMW is the main source of earnings also see large falls in METRs, on average, under UC; couples without children tend to see the highest METRs fall under UC, but experience small falls overall.

These changes in METRs affect how changes in the NMW affect family incomes for NMW families. In general, NMW families which see incomes change by small (large) amounts after a rise in the NMW are either those in which NMW workers are facing high (low) METRs, or those in which other sources of income make earnings from NMW a relatively unimportant (important) income source. Across the bulk of the income distribution, a 10% rise in the NMW leads to an increase in net family income amongst NMW families of around 3%; this is around 4% for families where the NMW is the main source of earnings, and around 2% for families where the NMW is the secondary source of earnings. Families without children gain the most from a rise in the NMW, reflecting that they will tend to face lower METRs than families with children because they are less likely to be in receipt of UC.

On average, Universal Credit increases the participation tax rate (PTR) (and therefore reduces the financial pay off from working) of potential secondary earners (on the assumption that they would earn the NMW), and this is evident for families where the main

earner is paid the NMW, as well as those with higher wages. This arises mostly because the headline withdrawal rate that applies in UC is to be set at a higher headline rate than under tax credits at present (65% vs 41%). For those working full-time or at higher hourly wages, this is partly offset by the fact that the UC taper is against net income, rather than gross income (which would normally strengthen work incentives). But for those working part-time and/or at low wages, the fact that the UC taper is against net income, rather than gross income, is less pertinent as their earnings will lie below the income tax personal allowance. This is especially noticeable for potential secondary earners in couples with children, who see very large increases in their PTRs under UC. These rises in PTRs occur both because single-earner couples with children tend to gain from the introduction of UC, and because of the higher headline withdrawal rate under UC; both factors mean that, compared to the current tax and benefit system, there is more state support to be lost when the potential secondary earner moves into work, and it is lost faster as the earnings of the potential secondary earner rise.

There are several important limitations of this analysis that could be relaxed in further work. First, policy uncertainties meant that the analysis has ignored council tax benefit (and its impending reform), and ignored the phase in and transitional protection that will initially apply to many UC claimants. Second, the analysis has assumed full take-up of all benefits and tax credits, and has been done on a static, no-behavioural change, basis. If Universal Credit does succeed in increasing take-up rates and encourages more people to work, then the impact on incomes will be greater (more positive) than this analysis suggests.

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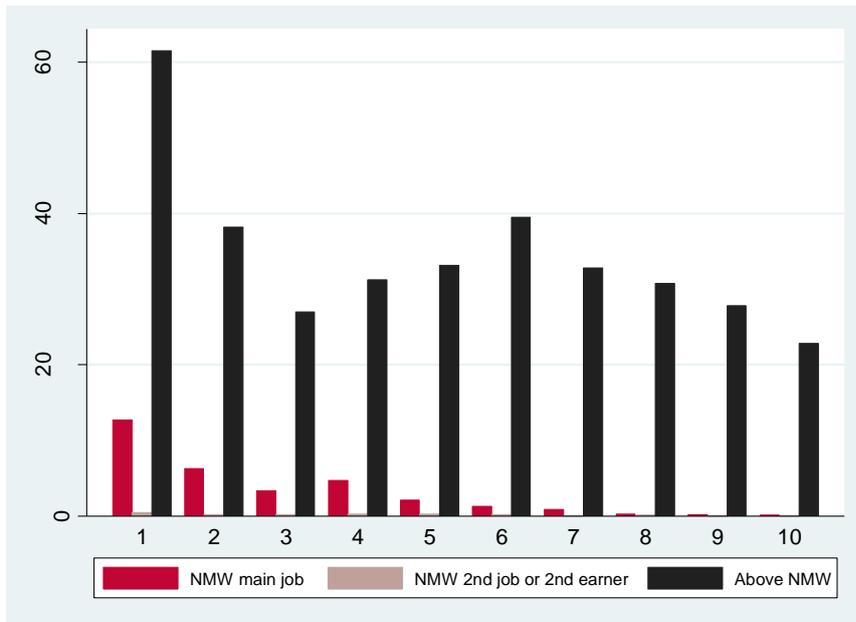
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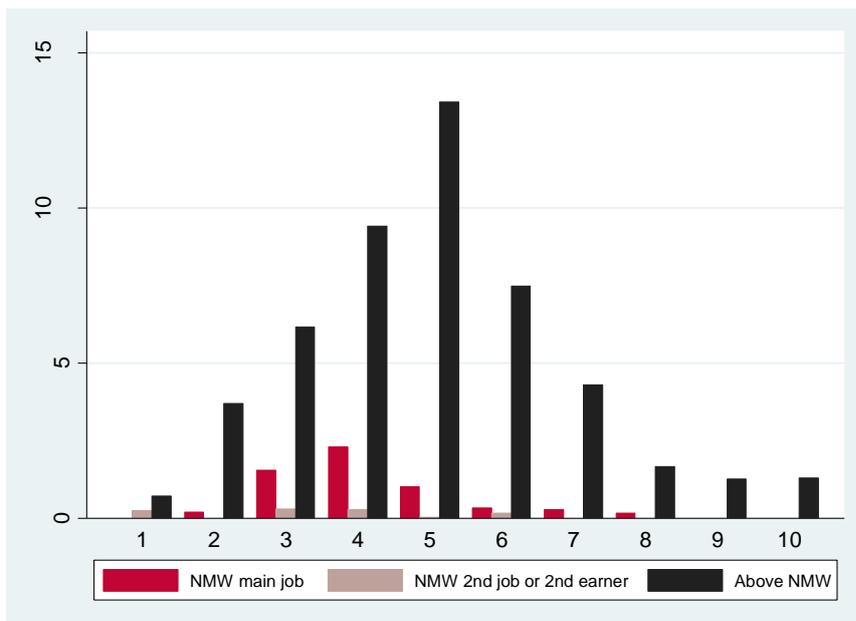
## Appendix 1. Working families distribution across the income distribution, by NMW status

Figure A1.1 The distribution of single adult working families across the income distribution, by NMW status



Notes and Sources: as for Table 3.1 and Figure 3.1. Denominator is all working families within decile, so graph shows that single people paid NMW in their main job make up just over 12% of bottom income decile group.

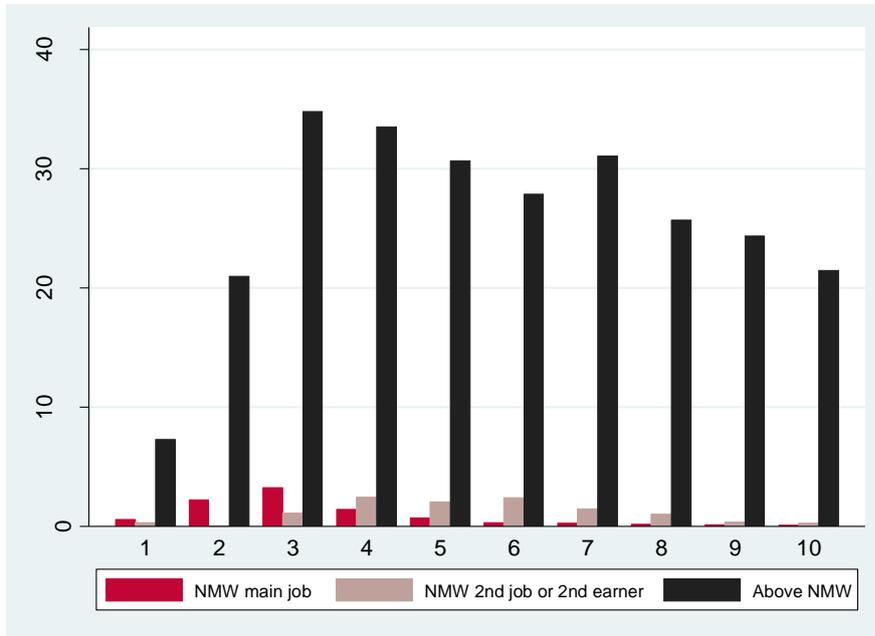
Figure A1.2 The distribution of lone parent working families across the income distribution, by NMW status



Notes and Sources: as for Table 3.1 and Figure 3.1. Denominator is all working families within decile, so lone

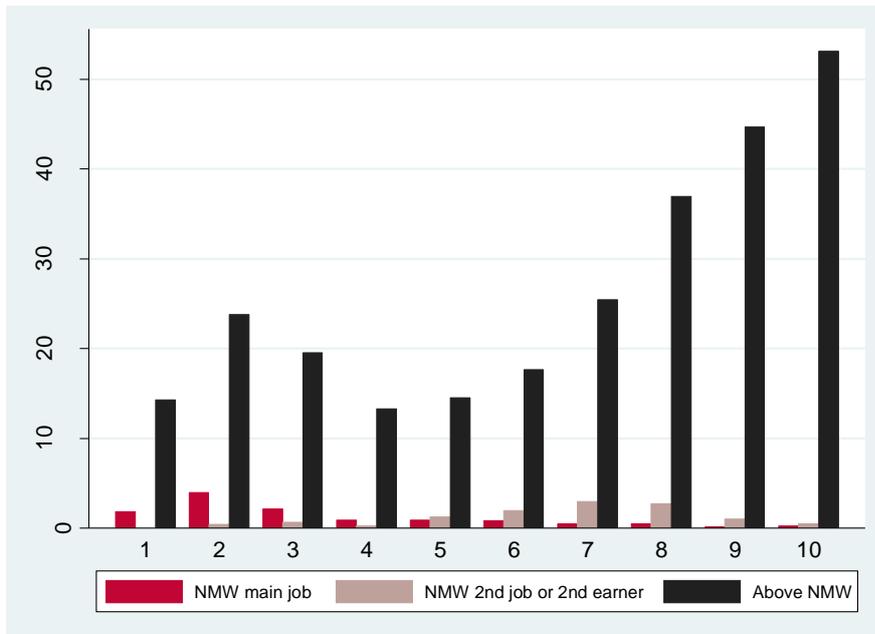
parents paid NMW in their main job make up just over 2% of 3<sup>rd</sup> income decile group.

Figure A1.3. The distribution of couples with children working families across the income distribution, by NMW status



Notes and Sources: as for Table 3.1 and Figure 3.1. Denominator is all working families, so couples with children with the main earners paid at NMW in his main job make up just over 3% of 3<sup>rd</sup> income decile group

Figure A1.4. The distribution of working couples without children across the income distribution, by NMW status



Notes and Sources: as for Table 3.1 and Figure 3.1. Denominator is all working families, so couples without children with the main earner paid at the NMW in his main job make up about 4% of 2<sup>nd</sup> income decile group.

## Appendix 2. Details of “difficult to model” tax and benefit reforms

### Simulating future incomes in EUROMOD

1. Market incomes are updated from 2009/10 up to 2012/13 using indexes that are appropriate for each source of income. Where data are not available for the last months of this period, the projection uses OBR forecast assumptions about the movement in prices (CPI or RPI) or nominal earnings for the income sources that are updated by earnings or all-items price indexes. In the case of elements of housing costs, which are indexed by specific components of RPI for which forecasts are not published, it is assumed that the relevant index moves according to the trend of the previous 12 months (see Sutherland et al (2012) for more detail, and Table A2.3 for the sources of indexes used).

Table A2.1 OBR forecast assumptions (December 2012 Autumn Statement) % change on a year earlier

	2012-13	2013-14	2014-15	2015-16	2016-17
RPI (Sept)	2.6	3.1	2.7	3.1	3.4
CPI (Sept)	2.2	2.6	2.2	2.0	2.0
Wages+salaries	2.6	2.2	3	3.9	4.0

OBR 2012 Economic and Fiscal outlook December 2012 Table 4.1

<http://cdn.budgetresponsibility.independent.gov.uk/December-2012-Economic-and-fiscal-outlook23423423.pdf>

2. Other income components that are not simulated (some contributory and disability benefits) are updated according to the actual increase in a main element of each benefit – all recipients are assumed to receive the same average percentage increase.

3. Some changes (or decisions not to change) taxes and benefits have been announced for one or more years beyond 2012/13. These known future elements of policies are simulated by EUROMOD. Where changes are not yet known it is assumed that thresholds and amounts of payment are indexed according to announced rules or OBR assumptions, as summarised in the tables below. Rounding conventions have not been applied. The figures shown in Table A2.1 are used to uprate the tax-benefit component in the following fiscal year.

Table A2.2 OBR Indexation assumptions

Policy element	Index used	Rounding assumption
Income tax personal allowances	RPI; CPI once personal allowance reaches £10,000 <sup>17</sup>	Increase rounded up to nearest £10 per year
Income tax basic rate limit	RPI; CPI from 2015-16	Increase rounded up to nearest £100 per year
Income tax starting rate limit	RPI; CPI from 2015-16	Increase rounded up to nearest £10 per year
Income tax threshold for additional rate; threshold for withdrawal of personal allowances and threshold for child benefit taxation	Fixed in cash terms	
Income tax higher rate threshold	1% for two years from 2014-15	
NICs Primary threshold/lower profits limit	CPI	Rounded to nearest £1pw/£5pa
NICs Secondary threshold	RPI; CPI from 2015-16	Rounded to nearest £1pw.
NICs Upper Earnings Limit/Upper Profits limit	Aligned with income tax higher rate threshold	
NICs Small earnings exception	CPI	Rounded to the nearest £10pa
NICs Class 2 weekly rate	CPI	Rounded to nearest 5p pw.
Disability benefits, Income-related benefits, Maternity benefits and Statutory Sick Pay	CPI; then 1% for three years from 2013	
Basic State Pension	Higher of earnings, CPI and 2.5%	
Pension Credit Guarantee Credit	Earnings	
Pension Credit Savings Credit	CPI	
Child Tax Credit Family element	Fixed in cash terms	
Child Tax Credit Child element	CPI; 1% from 2014/15 for two years	Rounded to nearest £5pa
Child Tax Credit Disabled Child elements	CPI	Rounded up to nearest £5 pa
Working Tax Credit	CPI; 1% from 2013/14 for three years (excluding disability elements)	Rounded up to nearest £5 pa
Working Tax Credit: max childcare costs	Fixed in cash terms	
Child benefit	CPI; 1% from 2014/15 for two years	Rounded up to nearest 5p pw

Source: 2012 Budget Policy Costings Annex A and HM Treasury Autumn Statement 2012 (December). See [http://cdn.hm-treasury.gov.uk/budget2012\\_policy\\_costings.pdf](http://cdn.hm-treasury.gov.uk/budget2012_policy_costings.pdf) and

<sup>17</sup> Calculated to happen in 2017-18 using the OBR assumptions, so ignored in this analysis

[http://cdn.hm-treasury.gov.uk/autumn\\_statement\\_2012\\_complete.pdf](http://cdn.hm-treasury.gov.uk/autumn_statement_2012_complete.pdf)

4. Market incomes are projected from 2012-13 to 2017-18 using the forecast assumptions shown in Table A2.1. Table A2.3 summarises the index used for each type of income and expenditure used in the policy simulations, distinguishing between the projection from 2009-10 to 2013-14 and that from 2013-14 to 2016-17.

Table A2.3 Indexes used to project market incomes and expenditures

	2009-10 to 2012-13	2012-13 to 2017-18
Earnings, self employment income	Index of average earnings	OBR forecast earnings growth assumption
Income from capital	CPI	OBR forecast CPI assumption
Rent paid and received	Rent element of RPI	OBR forecast RPI assumption
Childcare costs, maintenance paid and received and other private transfers	Index of average earnings	OBR forecast earnings growth assumption
Mortgage interest	Mortgage interest element of RPI	OBR forecast RPI assumption
Other housing costs	Rent element of RPI	OBR forecast RPI assumption
Occupational and personal pension contributions	Index of average earnings	OBR forecast earnings growth assumption
Personal pension income	CPI	OBR forecast CPI assumption
Council tax	Average change in Band D tax by region	OBR forecast RPI assumption

### Modelling LHA and HB

Before the reforms in 2011 to 2012, a claimant's entitlement to LHA was based on a combination of a claimant's actual rent and the LHA rate that applied in their local area (specifically, LHA entitlement =  $\min(\text{LHA rate, actual rent} + \text{£15})$ ). Local LHA rates were set at the median of local rents, separately according to the number of bedrooms, within areas known as Broad Rental Market Areas (these are not the same as local authorities and may overlap). The End User License version of the FRS does not contain LA identifiers (let alone BRMA identifiers), and so, in order to approximate the local LHA rate faced by claimants, we take averages of LHA rates across standard regions. By doing this, we are also able to model the cut in LHA rates from April 2011 that set LHA rates at the 30<sup>th</sup> centile of local rents, rather than the 50<sup>th</sup> centile.

### Increase in the female SPA

From April 2010, the age at which women become entitled to the State Pension (SPA) is rising by one month every two months from its pre-2010 level of 60. The state pension age will then rise from 65 to 66 for both men and women between December 2018 and April 2020. This changes the composition of the sample of people who are of "working-age", which is clearly important when forecasting how UC will affect the future working-age

population. But it also has implications for household incomes, as it affects receipt of several state benefits and liability to national insurance.

In our base data (FRS 2009/10) we observe women entitled to SPA from age 60, while in 2014 (our simulated year) women will be entitled to State Pension only from age 62 (and one month). Therefore women age 60 and 61 observed as receiving the State Pension in our base data will not be entitled to it in our simulated year. These women could either be working, inactive or receiving/entitled to some kind of income replacement benefit.

We allow for some mechanical and some simple behavioral response to the increases in the female SPA for these affected women. First, we remove entitlement to the basic state pension, pension credit, and other benefits payable only to those above the female SPA. Second, we predict entitlement to IB/ESA, which are disability benefits paid only to working-age adults. We do this by using data on women aged 58-59 in our base data to estimate a probit regression of receipt of IB/ESA, using the following as predictors: education, region or residence, council tax band, housing tenure, marital status, whether partner works (if present) and local authority disability status. This regression is then used to generate predicted IB/ESA entitlement probabilities for women age 60 and 61 in our base data. Finally, we allow for a labour supply response to the rise in the female SPA amongst the women directly affected. We do this by using data on women aged 51-65 in our base data to estimate a regression of employment status, using the following as predictors: education, region, housing tenure, council tax band, local authority disability status, entitlement to Disability Living Allowance (DLA), a cubic in age and an indicator variable for being under SPA. For women in couples we include an indicator of the partner's employment status. We use this to predict the probability of being in work for women 60 and 61 in our base data in a world where the SPA has increased to 62 years. Aggregating these predicted probabilities tells us the predicted proportion of those directly affected by the SPA change who will be in work after that change, and we then select sufficient number of women with highest predicted probabilities of being in work when below SPA in order to match the predicted increased employment rate. Finally, for those women aged 60-61 whom we have now simulated as being entitled to ESA/IB or being in work, we impute additional information (each woman simulated as being entitled to IB/ESA is allocated an IB/c-ESA amount, disability status and duration on benefit, and women simulated as being in work are allocated a monthly income and hours of work).<sup>18</sup>

Although relatively complicated, this procedure still embodies the following assumptions:

- People below the original SPA and those above the new SPA are not affected by the rise in SPA: in this sense, there are no anticipation effects or dynamic effects on employment of raising the SPA.

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<sup>18</sup> We do this by matching on the propensity score, where the "treatment" variable identifies people being either below SPA and the propensity score is estimated using a probit regression with the same predictors as the employment equation, other than the cubic in age.

- Other members of the household not directly affected by the SPA increase do not change their labour market behaviour (ie, no change in hours worked or postponed retirement).

Having simulated the additional IB/ESA entitlements and gross earnings, we can run the modified base data through EUROMOD in the normal way.

### **Transition from IB to ESA**

Incapacity benefit (IB) has been unavailable to new claimants since October 2008, with adults who are unable to work through disability or ill-health having to claim employment support allowance (ESA) instead. In simulating the population between 2010-11 and 2014-15, we need to take into account the steady fall in the number receiving IB, and the steady rise in the number receiving ESA.

We do this in a number of steps.

First, we reflect the turnover in the population on disability benefits between 2009-10 (the period of our data) to 2010-11. The DWP tabulation tool (accessed July 2012) tells us that the number of individuals claiming long-term IB fell by 124,000 between 2009 and 2010, and an additional 72,000 claimed ESA. We replicate this by randomly selecting some individuals receiving IB in our base data to no longer receive it, and, from those, randomly select some to receive ESA.

Second, we take account of the fact that, between April 2011 and March 2014, existing claimants of IB (including women age 60-61 “moved” to IB because of the SPA rise (see above)) will be reassessed to determine whether they are entitled to ESA and, if so, which level of the benefit they are entitled to. We assume that the rate of reassessment is constant (i.e. 25% of those on IB in 2010 are reassessed for ESA in each year between 2011 and 2014).

Of those reassessed, we assume that 29% move into the Support Group, 34% to the Work Related Activities Group (WRAG) and 37% are found to be fit for work and lose entitlement to disability benefits (figures taken from [http://research.dwp.gov.uk/asd/asd1/stats\\_summary/stats\\_summary\\_may12.pdf](http://research.dwp.gov.uk/asd/asd1/stats_summary/stats_summary_may12.pdf)).

Third, from April 2012, contributory ESA for those in the WRAG has been limited to a maximum of one year. We simulate this by removing entitlement from some of those we estimate to be entitled to c-ESA.

Table A2.4 below shows the end product of all these adjustments.

Table A2.4. Estimated number of ESA recipients in 2014-5

	number of cases	Grossed up number of cases
Total individual observed with a disability	1,358	1,289,035
ESA claims		
Support Group (SG)	695	664,792
Working Related Activities Group (WRAG)	176	166,689
Total ESA successful claims (SG+WRAG)	871	831,481

Source: Authors' calculation. A further 487 cases (457,554 grossed-up) who in the original FRS are receiving IB are simulated to be Fit for Work under ESA in 2014.