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An ex-ante analysis of the effects of the UK Government's welfare reforms on labour supply in Wales

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Stuart Adam
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Preface

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The analysis in this paper was largely conducted during the summer and autumn of 2012, and the welfare reforms analysed include announcements made up to and including the 2012 Budget. This means that the analysis does not include reforms announced in the 2012 Autumn Statement.

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Executive summary

The UK is part-way through almost unprecedented real-terms reductions in government expenditure as the government attempts to deal with the large hole in the public finances. As part of this, the UK government has announced and is in the process of implementing £18 billion of cuts to welfare spending (that is, spending on benefits and tax credits) by 2014. It has also announced plans to begin the national roll-out of a new Universal Credit from October 2013, which will replace six means-tested benefits with a single integrated benefit. Universal Credit represents the most significant change in the structure of the welfare system since the 1940s and is aimed at reducing administration costs and errors, simplifying claims, encouraging take-up and strengthening the incentive to work for those currently facing the weakest work incentives.

We estimate that the UK coalition government's welfare reforms reduce total benefit and tax credit entitlements in Wales by around £520 million (or £590 million if Universal Credit is excluded). This corresponds to about £6.40 per family per week on average (or £7.26 if Universal Credit is excluded), roughly 1.5% of their net income. Unsurprisingly, the top fifth of the income distribution loses rather less than this, since they were receiving less in benefits and tax credits to start with and therefore bear less of the brunt of cuts. Yet we find that the biggest average losses are experienced not by the very poorest households, but by the lower-middle of the income distribution. This is partly because in-work support (particularly Working Tax Credit) is being cut more sharply than out-of-work support, and partly because Universal Credit is a giveaway primarily to the lowest-income third of families, partly offsetting the losses those families experience from the wider welfare cuts. One-earner couples with children are the biggest losers from the welfare cuts, on average, but they are also the biggest gainers from Universal Credit; overall, therefore, the biggest average losses are experienced by non-working families with children, who lose both from Universal Credit (if they have significant unearned income, such as from savings or spousal maintenance) and from the wider benefit cuts. Pensioners, and families without children in which all adults work, are largely protected from the cuts.

But it is important to look beyond this analysis of winners and losers–how entitlements would change if no one changes their behaviour in response to the reforms. For reforms as radical as these, it is vital to understand how individuals' choices over whether and how much to work are likely to be affected. Yet no such analysis has previously been published. This report attempts to quantify, as far as possible, the likely effects of the UK coalition government's welfare reforms (excluding tax changes) on labour supply in Wales. Because it is such a major reform in its own right, and because it is being phased in only gradually over a period of several years, we separate out Universal Credit from the other reforms and consider the effects of the reform package, both excluding Universal Credit completely and assuming it was fully in place.

The effects of the coalition government's welfare reforms on work incentives

We distinguish between two kinds of work incentive: the incentive to be in paid work at all; and the incentive for those in work to increase their earnings. The financial incentive to be in work at all can be measured using the participation tax rate (PTR), the proportion of total gross earnings lost in the form of tax and withdrawn benefits. The incentive for those in work to increase their earnings can be measured by the effective marginal tax rate (EMTR), the proportion of a small increase in earnings lost in tax and withdrawn benefits. In both cases, higher numbers mean weaker work incentives.

- Across the whole working-age population in Wales, we estimate that the coalition government's welfare reforms reduce the average PTR from 33.1% to 32.7% excluding Universal Credit or 32.3% including Universal Credit. This modest change in the average PTR conceals far greater variation

across the population: almost one in four sees their PTR change by more than 10 percentage points after the introduction of Universal Credit, and one in ten sees a change in their PTR of more than 20 percentage points.

- It is perhaps surprising that the UK government's welfare reforms excluding Universal Credit–which largely consist of severe cuts to means-tested benefits and tax credits–reduce the average PTR by only 0.4 percentage points. The explanation lies in the effect of tax credit reforms on families with children: the coalition's reforms generally reduce the amount of tax credits families can get when in work, while actually increasing tax credits (though not benefits) for non-working families. Thus the reforms actually tend to weaken the incentive for families with children to have someone in work, especially at low earnings. This is only slightly outweighed by a strengthening of incentives for couples to have a second partner in work (because less support for one-earner couples means less to lose by a second partner moving into work), and for single adults without children (for whom tax credits are less important) to work at all.
- Universal Credit has, in some ways, almost the opposite effect. It strengthens incentives for families to have someone in work, mainly because it is more generous to low-earning families (especially couples with children) than the existing system, while having little effect on maximum entitlements for non-working families (unless they have significant unearned income, as discussed above). But since Universal Credit provides greater support for one-earner couples, couples have more to lose by a second partner moving into work so (potential) second earners see a rise in their average PTRs and hence a reduced incentive to be in work.
- Another notable effect of Universal Credit is to reduce the number of people in Wales facing PTRs in excess of 75% to fewer than 10,000, compared with 46,000 under the baseline 2010 benefits system. This is achieved because Universal Credit will not be withdrawn at low levels of income as sharply as existing benefits. While the number of people facing these extremely high PTRs will fall, the number facing moderately high PTRs will rise: over 60,000 more people will face a PTR of between 50% and 75% under Universal Credit. But reducing the numbers facing the very highest PTRs is particularly valuable because the distortion caused by taxes rises more than proportionately to their rate. Taking Universal Credit alongside the rest of the welfare reforms, it is clear that the most dramatic changes are for people with non-working partners and children, who see a substantial fall (6.4 percentage points) in their average PTR. On the other hand, those with a working partner and children face PTRs on average 3.6 percentage points higher after the reforms than before them. Thanks to Universal Credit, the reforms strengthen the incentive for families to have someone in work, but weaken the incentive for couples to have both partners in work.

The reforms also strengthen incentives for those in work to increase their earnings, on average: the average EMTR is reduced by 1.1 percentage points (from 36.9% to 35.8%) by the reforms excluding Universal Credit, and by a further 0.4 percentage points (to 35.5%) once Universal Credit is taken into account. Looking in more detail we find the following:

- The large-scale welfare cuts (excluding Universal Credit) reduce the number of people who are subject to means-testing on top of income tax and National Insurance contributions by around 50,000, since smaller entitlements are exhausted at lower income levels (and eligibility is removed from some groups completely). Average EMTRs therefore fall for most family types and at most earnings levels, although among those still subject to means-testing, EMTRs often increase slightly due to the increase in the tax credit withdrawal rate from 39% to 41%.
- Universal Credit increases EMTRs for a small number with the very lowest level of earnings (below about £7,000 per year), but apart from that it tends to reduce EMTRs at low levels of earnings (with the biggest falls at earnings of around £12,000), since it is at low levels of earnings that people can currently face simultaneous withdrawal of several benefits and tax credits, which Universal Credit eliminates: under Universal Credit, nobody will face an EMTR above 81%. Lone parents benefit

particularly from this aspect of the reform. However, for people who would otherwise face tax credit withdrawal but no other means test, the 65% withdrawal rate of Universal Credit is steeper than they currently face, and those people see an increase in their EMTRs.

- Taking Universal Credit alongside the other welfare reforms, it is lone parents that stand out, with a 12.3 percentage point reduction in their average EMTR. Single people without children and two-earner couples see more moderate falls, while the (relatively few) sole earners in couples see a weakening of their incentives to earn more. Average EMTRs are sharply reduced at earnings of £10,000 to £15,000 –where incentives were weakest to start with, which is a particularly desirable outcome.

The effects so far relate only to financial work incentives. Those are the only ones that we can quantify, and the only ones included in our labour supply analysis below. However, we should also recognise that the government's welfare reforms also involve significant changes to non-financial work incentives.

- While Universal Credit will change the overall entitlements of people in different circumstances, arguably just as important is the way it integrates different strands of support into a single benefit. This offers the prospect of greater simplicity and more transparent work incentives–though perhaps with a less visible and salient incentive to work than Working Tax Credit provides, and with much depending on how successful the practical implementation proves to be. Universal Credit may also extend work search requirements to many more low earners, especially in couples, than are subject to them now. For instance, presently, for a couple claiming jointly, weekly earnings of more than £121.45 are enough to move off income-based Jobseeker's Allowance and therefore no longer face work search requirements. However, under Universal Credit, a couple with combined earnings of up to £433 per week may be required to seek employment with longer hours or a higher wage.
- Universal Credit is not the only benefit reform being introduced that will affect non-financial work incentives. The Work Programme involves a significant reorganisation of welfare-to-work, with payments to providers based entirely on employment outcomes by 2014, and greater flexibility in what services are provided (though the Work Programme is a less radical departure in Wales, where it replaces the Flexible New Deal, than in some other parts of the UK). As of October 2011, lone parents whose youngest child is aged 5 or over have been moved from Income Support to Jobseeker's Allowance, with the additional job-search requirements that involves. And the shift of the stock of claimants of Incapacity Benefit to Employment and Support Allowance, with the associated retesting of medical conditions, is resulting in many people being found fit for work, or being required to prepare for an eventual return to work. Whilst all of these changes may be expected to increase moves from non-employment to employment in principle, in practice it is not clear how large the impact will be.

Likely labour supply responses to the changes in financial work incentives

For those reforms whose impact on financial work incentives we can quantify, we take two approaches to estimating how people's work behaviour might respond to the changes in financial incentives. One is to estimate new labour supply models (the 'estimation and simulation' approach); the other is to assume degrees of labour supply responsiveness for different groups, drawing on a review of existing empirical evidence on labour supply behaviour, and apply these assumptions to the changes in PTRs and EMTRs described above (the 'calibration and simulation' approach).

The calibration and simulation approach can be applied to the entire working-age population of Wales. However, the estimation and simulation approach is only applied to part of the population: it does not cover single people without children (for whom models are difficult to estimate), and among the rest of the population we exclude all adults (and their partners) who are self-employed, disabled, aged 60 or over, aged 21 or under or are students, because it is harder to capture these groups' labour supply behaviour in standard models. And given that the elasticities used in the 'calibration and simulation'

approach are generally based on other standard labour supply models, the calibration approach is also likely to be most reliable for the same subset of the population. Applying both approaches to just that subset of the population – around 75% of lone mothers and 60% of adults in couples, together making up around 720,000 of the 1.8 million working-age adults in Wales – we find as follows:

- The overall impact of the reforms on employment is predicted to be positive, but very small, according to both methods. From a baseline level of employment in the sample of 616,000, we predict that the reforms excluding Universal Credit increase employment by around 2,000 (taking the estimation approach) or 200 (the central estimate from the calibration approach), while the reforms including Universal Credit increase employment by 300 (estimation approach) or 200 (calibration approach). There is variation among different groups of the population, however.
- The reforms excluding Universal Credit are predicted to lead to a small decrease in the number of lone mothers in employment, and small increases in employment among men and women in couples without children, and women in couples with children. The estimation approach suggests a modest (1,300, or 0.8%) increase in employment among men in couples with children, whereas the calibration approach suggests no change in employment among this group.
- The reforms excluding Universal Credit are predicted to lead to a small fall in the number of couples with one earner, and small increase in the number with two earners, especially among couples with children. This reflects the fact that those with non-working partners will face weaker work incentives, whilst those with working partners will face stronger work incentives, following the reforms.
- The reforms including Universal Credit are predicted to lead to a modest increase in employment among lone mothers, a small increase in employment among couples without children, and a small reduction in employment among couples with children. Increased incentives for families to have one person in work, but reduced financial incentives for couples to have both partners in work under Universal Credit, are predicted to reduce slightly the number of workless families and the number of two-earner couples, and increase slightly the number of one-earner couples and working singles.

Broadening out to look at the entire working-age population (using just the calibration and simulation approach), our central set of assumptions implies no change in employment for the reforms excluding Universal Credit, and a small increase in employment (5,000 people) once Universal Credit is in place. The pattern of changes across the population is predicted to be very similar to the smaller sample for which both approaches can be used:

- Excluding Universal Credit, the reforms are predicted to lead to small reductions in employment among lone parents (-400) and those in couples with non-working partners (-1,700), reducing the number of one-earner couples. This is offset by small predicted increases in employment among single adults without children (+600), and those in couples with working partners (+1,500), suggesting an increase in the number of two-earner couples.
- Once Universal Credit is included, the picture changes significantly. Employment is expected to increase among lone parents (+800), single adults without children (+1,800) and couples with non-working partners (+3,900), but is expected to fall among couples with children with working partners (-2,700). This reflects stronger incentives for families to have someone in work, but weaker incentives for couples to have both partners in work.

The calibration and simulation approach also allows us to predict the impact of the reforms on the total number of hours worked and total amount earned in Wales. Our central estimates are as follows:

- Excluding Universal Credit, the reforms are predicted to lead to an increase in the total number of hours worked in Wales of 0.4%, and an increase in aggregate gross earnings of 0.2% (£58 million). Given that employment is not predicted to increase, this implies an increase in average hours and earnings per worker–though we do not distinguish how far this is the result of existing

workers increasing their hours and earnings, and how far the result of some people stopping work and being replaced with an equal number of different people moving into longer hours, higher-paid work.

- The reforms including Universal Credit are predicted to lead to an increase in the total number of hours worked in Wales of 1.0%, and an increase in aggregate earnings of 0.5% (£149 million). However, the changes vary significantly across the population and lone parents are expected to see much bigger increases (7.0% for total hours worked and 5.1% for earnings), as are the relatively small number of women with children whose partner does not work (an increase of 11.2% and 9.7% for hours and earnings respectively).

Our review of the labour supply literature indicated that there is uncertainty about just how responsive people are to financial work incentives, and for this reason we carry out sensitivity analysis where we assume a higher or lower degree of responsiveness than in our central scenario. This shows that:

- The impact on employment of the reforms excluding Universal Credit looks to be close to zero under the low-, central- and high-responsiveness scenarios. Once Universal Credit is added in, the results are somewhat sensitive to the assumptions used: employment is predicted to increase by 1,900 in the low-responsiveness scenario, or by 13,200 in the high-responsiveness scenario. However, in the context of a working-age population of 1,756,000, a difference of just over 11,000 is fairly small.

Thus, whilst there is some uncertainty about the precise impact on labour supply of the changes in financial work incentives following the welfare reforms including Universal Credit, all the scenarios examined suggest that the overall impact will be positive but relatively small.

Labour market impacts in the wider economic environment

The predicted labour supply impacts described above simply 'add up' the predicted individual responses across the Welsh population. But there are a number of reasons why in practice – and particularly in the short term – the effects of the welfare reforms may not correspond to a simple aggregation of predicted individual labour supply responses.

- The models of labour supply we use implicitly assume that the labour market is flexible enough so that everyone who wishes to work at the going wage rate is able to (i.e. labour demand equals labour supply), and that the wage rate employers are willing to offer does not fall as the pool of potential workers increases (i.e. labour demand is perfectly elastic). This may be a reasonable approximation in the long run as markets move towards equilibrium and employers are able to invest in additional capacity to increase the productivity of additional workers. But in the short run, particularly if there is fairly high unemployment as is the case now, these assumptions may be inappropriate.
- The empirical evidence suggests that when there is significant unemployment and demand for labour is weak, the impacts on employment and hours of work of policies to increase labour supply are less strong than standard labour supply models imply: people are simply not offered the option of doing the (extra) work they seek. This implies that the weaker the Welsh labour market is, the less the extent to which the predicted increases in *desired* labour supply would translate into increases in employment, at least in the short run. Analysis that allows for wages to fall in response to increases in labour supply also suggests a more muted positive short-term hours/employment effect of welfare reform than when wages are assumed to remain unaffected.
- Low labour demand also means the possibility of negative spillover effects from the reforms on the employment and wages of other people: with more people looking for (extra) work, and businesses not yet expanding to absorb them (as we would expect in the long run), existing workers and other jobseekers may find themselves 'crowded out' by those wishing to work longer hours or enter

employment, or may see their wages fall if employers cut wages in response to the larger pool of potential workers.

- The empirical evidence on whether past welfare reforms had negative spillover effects is mixed; some US studies find significant effects, but studies of UK reforms generally find few spillovers. However, these earlier reforms took place against the backdrop of a significantly stronger economy and labour market, where fewer negative spillovers would be expected than in a weaker labour market.
- Any negative spillover effects that do occur are likely to be concentrated among groups of workers who are close substitutes for those encouraged to enter the labour market or increase their hours by the welfare reforms. In this instance, the increased incentive for many families to have someone in low-paid work means that such effects are likely to be most concentrated among existing low-wage/low-income employees and other jobseekers looking for low-wage work, especially those among these groups who do not see their work incentives improve (or even see them weaken, such as some second earners in couples). However, there is also a possibility of positive spillover effects on other groups if they have skills that are complementary to those encouraged to increase their labour supply by the reforms (to take a simple example, if there are more would-be waiters then chefs might benefit as well).
- Not only might short-run labour demand conditions influence what effect changing individuals' desired labour supply has on actual employment and earnings; it is also likely that the cut in welfare expenditure will itself affect short-run demand conditions in the economy and therefore what work is available (as well as affecting individuals' desired labour supply, the main focus of this report). Less money in people's pockets means that they buy less goods and services; the firms producing those then want to employ fewer people, leaving those people with less money to spend, and so on. The Office for Budget Responsibility (OBR) estimates that, across the UK, cutting welfare spending by 1% of GDP (roughly the size of these welfare cuts) reduces GDP by about 0.6% in the short-run – and there is evidence that the negative impact on output could be larger than this at the moment, given that the economy is operating below full capacity and unemployment is reasonably high. Of course, any fiscal tightening would reduce aggregate demand in a similar way (though the extent depends on the nature of the tightening), and the Chancellor might argue that without a fiscal tightening UK interest rates (notably including the cost of government borrowing) would rise, imposing costs of its own.

Conclusions

The UK coalition government's welfare reforms strengthen financial work incentives a little, on average, and correspondingly the effect of the reforms on employment, hours of work and earnings in Wales looks likely to be positive but small. These small overall changes conceal significant variation across the population, notably important differences between the effects on first and second earners in couples. However, there remains significant uncertainty, not least around the impact that changes in 'non-financial' work incentives (such as the simplification associated with Universal Credit and the extension of work-search requirements for receiving benefits to more people) may have on labour supply. Furthermore, at least in the short run, it is unclear whether those wishing to enter work or increase their hours will be able to, given that fairly high levels of unemployment are expected to persist for the coming years. A conclusion that emphasises uncertainty is rarely welcome. But it is a reminder that, while careful theoretical and empirical analysis can yield important insights, the effects of large and complex reforms, involving numerous changes to both financial and non-financial work incentives, and taking place in a particularly uncertain economic climate, are inherently difficult to predict.

1. Introduction

The UK is part-way through significant real-terms reductions in government expenditure as it attempts to deal with the large hole in its public finances. As part of this, the UK government has announced and is in the process of implementing £18 billion of cuts to welfare spending (that is spending on benefits and tax credits) by 2014. This includes cuts in the generosity of housing benefit, council tax benefit, disability benefits, the child and working tax credits, and child benefit, as well as a shift from using the retail prices index (RPI) and the Rossi index[1] to the generally lower consumer price index (CPI) when uprating benefits to account for inflation from one year to the next. The UK government has also announced plans to introduce Universal Credit from October 2013, which will replace six means-tested benefits with a single integrated benefit. This represents the most significant structural reform of the welfare system since the 1940s and is aimed at reducing administration costs and errors, simplifying claims, encouraging take-up and increasing the incentive to work for those currently facing the weakest incentives.

IFS researchers have previously examined the impact of the changes to the welfare system on incomes and financial work incentives. In particular, a series of papers has examined how the impacts of the UK coalition government's tax and welfare reforms taken together vary across the income distribution, by sex, by detailed family type and across the UK (Browne (2010, 2011a, 2011b, 2012)). A preliminary analysis of the impact of Universal Credit – utilising details known at the time of writing – on incomes and work incentives has also been published (Brewer, Browne and Jin (2011)). An important feature of the work to date is that it has examined the impact of reforms on incomes and work incentives holding behaviour, and in particular labour supply, fixed.

As part of the first stage of its assessment of the impact of the welfare reforms in Wales, the Welsh government has made extensive use of this earlier work. The purpose of this report (which forms the evidence base for stage 2 of the assessment) is to take the analysis one step further and examine the potential impact of the reforms on the labour supply behaviour of people in Wales. It also updates the analysis of incomes and financial work incentives to provide more detail for Wales and to focus particularly on the reforms to the welfare system (as opposed to the combined impact of welfare and tax changes as previously carried out).

The rest of this report proceeds as follows. In Chapter 2 we describe the welfare reforms being undertaken between 2010 and 2014, focusing on the types of individuals and families most affected by particular reforms, and the impact of reforms on both financial and non-financial work incentives. Chapter 3 quantifies the impact of these reforms on financial work incentives and family net incomes across the population in Wales using the IFS's tax and benefit micro-simulation model, TAXBEN. This is done separately excluding and including Universal Credit, allowing us to assess the impact of this reform on its own, and because Universal Credit will in practice be only part rolled-out by 2014.

In Chapter 4 we discuss the findings of the literature examining the responsiveness of labour supply to financial work incentives, focusing on the magnitudes of responses in terms of hours and employment decisions, and how this varies across the population. The chapter also includes a discussion of the literature on the impact of taxes and welfare on income and wages, and on behaviour in the long run, such as education choices, fertility decisions and labour supply over the life-cycle.

Chapter 5 presents the results of simulations of the impact of the welfare reforms on labour supply in Wales that utilise models for lone mothers and couples with and without children that are estimated using data from the UK's Family Resources Survey (FRS). This approach, which we term the 'estimation and simulation' approach, is designed to capture the impact of parts of the welfare reforms that simpler

[1] Rossi is a price index that is similar to the RPI but excludes housing costs.

techniques struggle to capture (such as the shift from discrete jumps in welfare entitlement at 16 and 30 hours of work per week under Working Tax Credit (WTC) to a smoother link between hours and entitlement under Universal Credit). However, the estimated models exclude significant numbers of people, and hence, in Chapter 6, an alternative 'calibration and simulation' approach is used to simulate the impact of reforms for the entire working-age population in Wales. This involves making assumptions about how responsive different groups of people's hours of work and employment are to changes in financial work incentives, drawing on the evidence discussed in the literature of Chapter 4. A key part of this work is testing the sensitivity of results to the degree of responsiveness assumed.

In a simple sense, the individual labour supply decisions underlying the simulations of Chapter 5 and 6 can be aggregated to represent the whole of Wales. However, in Chapter 7 we discuss qualitatively how the broader economy may affect the impact of the welfare reforms, and be affected by the welfare reforms. This includes the potential for spillover effects on other groups of workers not directly affected by the welfare reforms, the 'multiplier' effects, as changes in purchasing power affect the level of aggregate demand in the economy, and the scope for the impact of the reforms to differ in the context of a labour market with low demand for workers, which is likely to be especially relevant given that unemployment is expected to remain elevated over the coming few years. Chapter 8 concludes.

The analysis in this paper was largely conducted during the summer and autumn of 2012, and the welfare reforms analysed include announcements made up to and including the 2012 Budget. This means our analysis does not include some significant reforms that were announced in the 2012 Autumn Statement: the decision to increase the rates of most existing working-age benefits and tax credit by 1% – that is, significantly below expected inflation – in the Aprils of 2013, 2014 and 2015; and the announcement of certain parameters of Universal Credit, which will make it significantly less generous than had previously been planned.

2. Work incentives and the coalition government's welfare reforms

2.1 The scope of our analysis

This report is an analysis of the benefit reforms implemented, or due to be implemented, by the UK's coalition government from when it was elected in June 2010 up to and including April 2014.[2] Three aspects of that focus should be made explicit.

First, our attention is restricted to benefit reforms: we do not examine reforms to the tax system, such as the significant increases in the VAT rate and in the income tax personal allowance that have been introduced. Nor do we examine reforms to public services. To some extent these distinctions are arbitrary. Financial work incentives – the relationship between work and financial reward – are affected in much the same way by benefits as by taxes, and ideally the two should be analysed together. The distinction between them can sometimes be rather artificial, as was highlighted by the rather sterile debate under the previous Labour government as to whether tax credits should be considered as tax reductions or as benefits (we include them in our analysis in this report). Similarly, benefits and public services are often close substitutes to the point of being barely distinguishable: state-provided or state-subsidised childcare makes going to work more affordable for parents in much the same way as a tax credit that covers most of the cost. Nevertheless, for practical purposes we must find some way to limit our remit and so in this report we focus our attention solely on reforms to benefits and tax credits. Where it is relevant for our empirical analysis, we treat the tax system that is currently due to be in place in 2014–15 as if it were in place for the entire period of our analysis.

Second, we look at reforms implemented (or due to be implemented) after the UK's coalition government took office. That is not the same as reforms *announced* by the coalition: the present government has chosen to go ahead with certain changes announced by its Labour predecessor (such as limiting Local Housing Allowance to actual rent paid, and allowing the generosity of Winter Fuel Payments to fall when a temporary increase expired) and cancelled others (such as the introduction of a 'toddler tax credit'). It is a moot point who should be given the credit or blame for policies announced by one government and implemented (or abandoned) by its successor, and our choice was somewhat arbitrary. Fortunately, the reforms that fall into this category are small relative to those announced by the coalition government itself, which removes some of the sensitivity of this choice.

Third, we examine reforms due to be implemented up to and including April 2014. Some of the reforms introduced by the present UK government affect the way that benefit and tax credit rates are increased year on year, and so have an increasing effect over time. The longer the time horizon chosen, the more these reforms dominate the picture. We therefore have to decide, in effect, how many years' worth of a new indexation policy to count within our analysis. Again, there is no good answer to this, and going up to the end of the present government's term of office seemed as natural a choice as any.

Looking at reforms up to April 2014 includes almost all the major reforms currently in the pipeline. But perhaps the biggest reform of all – Universal Credit – will still be only partly in place. A combination of a long roll-out period and significant transitional provisions means that it will be a long time before Universal Credit is operating in a 'steady state'. That is one reason why, throughout this report, we

[2] As noted in the Preface and Introduction, however, we do not include reforms announced in the 2012 Autumn Statement, which came too late to be incorporated in our analysis.

analyse the reforms both including and excluding Universal Credit. The other reason is simply that Universal Credit is such a major reform that it merits isolating for separate analysis.

We outline how Universal Credit will work and how it will affect people in Section 2.5. But before that, we examine the rest of the reforms that are the subject of this report. Reforms that affect financial work incentives are our main focus in this report, and the exclusive focus of the empirical analysis in Chapters 3 to 6. Following discussion of those, in Section 2.4 we turn to consider changes to non-financial work incentives, such as work search conditions attached to benefits. The full list of reforms we consider is enumerated in Table 2.1.

2.2 Characterising financial work incentives

Financial work incentives depend on the relationship between hours of work and net income (that is, income after taxes and benefits). This will vary between people according to the wage rate they can command and the taxes and benefits payable from/to them at different levels of earnings.

Figure 2.1 shows the relationship between hours of work and net income – the 'budget constraint' – for one example low-wage lone parent and the role of different benefits and tax credits in creating it. Of course, one striking feature is the sheer number of different benefits involved, and the corresponding complexity is one reason for the introduction of Universal Credit in an attempt to simplify the system. Taking the budget constraint as a whole, a flatter top line implies weaker work incentives – little extra income from working more hours. Over a substantial range at low hours, the budget constraint is completely flat as Income Support or income-based Jobseeker's Allowance (JSA), which top up claimants' income to a minimum level, is reduced pound-for-pound as private income rises until that minimum level is reached. WTC provides a strong incentive for this lone parent to work 16 hours or more per week; but once over the 16-hour threshold the lone parent faces little gain from earning more as Housing Benefit, Council Tax Benefit and tax credits are reduced as earnings rises.

Figure 2.1 illustrates the situation for just one – not especially typical – example individual. With vast variation in personal circumstances and enormous complexity in the way that the overlapping network of different benefits responds to those circumstances, budget constraints vary enormously across the population. To understand fully the financial work incentives facing any given individual, one would ideally look at their full budget constraint. But to make analysis of the whole population tractable, we must introduce some summary measures.

In thinking about how reforms affect work incentives, we distinguish between two aspects: the incentive to be in work at all (as opposed to not working) and the incentive for those in work to increase their earnings – whether by working more hours, seeking promotion or moving to a better-paid job.

We measure the incentive to work at all by the participation tax rate (PTR), the proportion of total earnings taken in tax and withdrawn benefits, calculated as:

$$\text{PTR} = 1 - \frac{\text{Net income in work} - \text{Net income out of work}}{\text{Gross earnings}}.$$

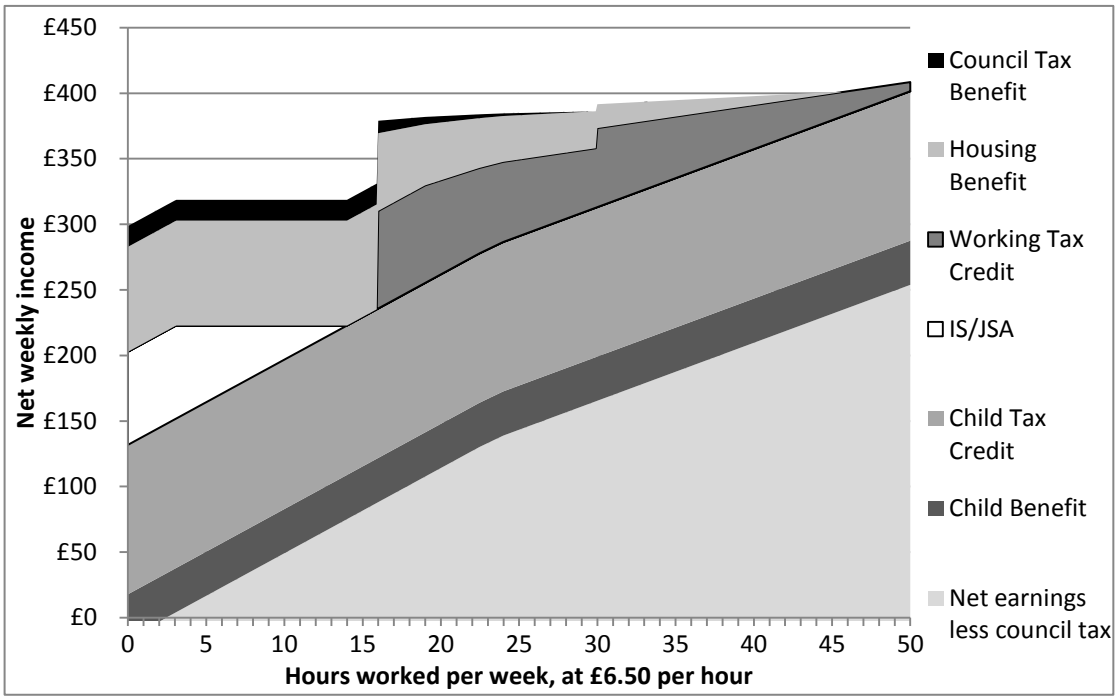
Note that this is not the only measure of work incentives available: another popular measure is the replacement rate – net out-of-work income as a fraction of net in-work income. Adam, Brewer and Shephard (2006) discuss the different properties of the two measures, but for simplicity we concentrate just on the PTR in this report.

We measure the incentive for those in work to increase their earnings by the effective marginal tax rate (EMTR), the proportion of a small increase in earnings taken in tax and withdrawn benefits.

In both cases, higher numbers imply weaker work incentives. Zero would mean that there was no financial gain from working (or from increasing earnings); 100% would mean that the person got to keep all of their gross earnings (or extra earnings).

When looking at work incentives for members of couples, in this report we focus on the relationship between an individual's working behaviour and their family's net income. That implicitly assumes that couples fully pool their income between them – not a wholly realistic assumption, but alternative extreme scenarios seem even less plausible and modelling truly realistic household bargaining far too difficult.

Figure 2.1 Composition of an example budget constraint in 2012–13



Notes: Example is for a lone parent, with two children aged between 1 and 4, earning £6.50 per hour, with no other private income, no childcare costs and no disabled family members, paying £80 per week in rent to live in a council tax Band B property in a local authority setting council tax rates at the national average. 'Net earnings less council tax' is earnings after deducting income tax, employee NICs and council tax. Figure does not show negative amounts for 'net earnings less council tax' on the left-hand side where council tax exceeds net earnings: with zero earnings, 'net earnings less council tax' is –£15.77, with Child Benefit making up the difference from what is shown.
Source: Authors' calculations using TAXBEN.

Table 2.1 Welfare reforms implemented (or due to be implemented) since April 2010

	Reform	Announced	Effective	Revenue effect in 2014–15 (£m)[c]
1	Expiry of temporary increase in Winter Fuel Payments so rate falls back from £250 to £200 (from £400 to £300 for those aged 80 or over)	2010 March Budget	Winter 2011–12	+700
2	Reduce hours of work required for WTC from 30 to 16 for those aged 60 or over or with a partner aged 60 or over	2010 March Budget	April 2011	-20
3	Change Local Housing Allowance so that cannot claim more than the amount of rent actually paid (previously, could keep up to £15 per week if rent paid was less than the LHA rate)	2009 Budget/ 2010 March Budget	April 2011	+170
4	Switch to uprating most benefits by CPI (instead of RPI or Rossi)	2010 June Budget	April 2011	+7,555[a]
5	'Triple lock' for basic State Pension (highest of CPI, average earnings or 2.5%) from April 2012, after increase in line with RPI in April 2011 (higher than triple lock would have been that year)	2010 Spending Review	April 2011/ April 2012	-1,530[a]
6	Increase Pension Credit Guarantee Credit by same cash amount as State Pension in April 2011 and April 2012	2010 June Budget/ 2011 Autumn Statement	April 2011/ April 2012	-840
7	Cash freeze in the Pension Credit Savings Credit for 4 years from April 2011, with a reduction in April 2012	2010 Spending Review/ 2011 Autumn Statement	April 2011/ April 2012	+600
8	Cash freeze in the basic and 30-hour elements of WTC for 3 years from April 2011, and in the couple and lone parent element in April 2012	2010 Spending Review/ 2011 Autumn Statement	April 2011/ April 2012	+1,305
9	Increase the hours requirements for WTC from 16 to 24 for couples with children	2010 Spending Review	April 2012	+540
10	Abolition of the 50+ return-to-work element of WTC[b]	2010 June Budget	April 2012	+35
11	Reduce the proportion of eligible childcare costs covered by tax credits from 80% to 70%	2010 Spending Review	April 2011	+390
12	Withdraw the family element of Child Tax Credit immediately after withdrawing other elements of tax credits (previously withdrawn only once income exceeded £50,000)	2010 June Budget	April 2011/ April 2012	+455
13	Increase the rate at which tax credits are withdrawn from 39% to 41%	2010 June Budget	April 2011	+755
14	Increase the child element of Child Tax Credit by £180 above inflation	2010 June Budget/ 2010 Spending Review	April 2011	-1,610
15	Remove the baby element of Child Tax Credit	2010 June Budget	April 2011	+275
16	Freeze Child Benefit in cash terms for 3 years	2010 June Budget	April 2011	+1,285
17	Taper Child Benefit away from families containing someone earning more than £50,000	2010 Spending Review/ 2012 Budget	January 2013	+1,740

18	Restrict Sure Start Maternity Grant to the first birth	2010 June Budget	April 2011	+75
19	Set Local Housing Allowance rates at 30th instead of 50th percentile of local rents	2010 March Budget/ 2010 June Budget	April 2011	+525
20	Increase Housing Benefit deductions for resident non-dependants in April 2011 and uprate them with CPI thereafter	2010 June Budget	April 2011	+210[a]
21	Cap total rent claimable for a given family composition under Local Housing Allowance (irrespective of local rents) and abolish rates above the 4-bedroom rate	2010 June Budget	April 2011	+165
22	Increase Local Housing Allowance rates in line with CPI rather than actual rents	2010 June Budget	April 2013	+265[a]
23	Cut Local Housing Allowance (to the 'shared room rate') for single adults aged 25–34 without children	2010 Spending Review	January 2012	+215
24	Cut Housing Benefit for people under-occupying socially rented properties[b]	2010 June Budget	April 2013	+490
25	Time-limit contributory Employment and Support Allowance to 1 year except for the most severely disabled	2010 Spending Review	April 2012	+1,230
26	Introduce a benefit cap, £500 per week in 2013–14 (£350 for single adults), for working-age adults, excluding recipients of WTC or Disability Living Allowance and the most severely disabled recipients of Employment and Support Allowance	2010 Spending Review	April 2013	+330
27	Changes to the treatment of changes in circumstances within-year for tax credits[b]	2010 June Budget	April 2011/ April 2012/ April 2013	+1,410
28	Replace Council Tax Benefit with local council tax rebate schemes and reduce the funding provided for it. The scheme operating across Wales is assumed to work like the current CTB system but with a reduction in the maximum proportion of council tax one can claim for from 100% to 91%	2010 Spending Review	April 2013	+485
29	Introduce the Work Programme to replace previous welfare-to-work schemes (the Flexible New Deal in Wales)[b]	2010 Spending Review	June 2011	n/a[d]
30	Extend Lone Parent Obligations, requiring lone parents with children aged 5 to 9 to claim Jobseeker's Allowance rather than Income Support[b]	December 2007 Command Paper/2010 June Budget	October 2010/May 2012	—[e]
31	Move existing claimants of incapacity benefits onto Employment and Support Allowance, reassessing their health condition in the process[b]	2008 Budget	October 2010	—[f]
32	Replace Disability Living Allowance with Personal Independence Payment, reassessing claimants' health condition in the process[b]	2010 June Budget	April 2013	+1,055

34	Introduce Universal Credit to replace 6 existing means-tested benefits and tax credits	2010 Spending Review	October 2013	-140[g]

[a] These numbers will rise year-on-year because these reforms change the speed at which benefit rates increase over time.

[b] Not modelled in our empirical analysis.

[c] Revenue effects across the UK. Note: The revenue effects of some reforms depend on whether others have happened; the costings here are taken from Budget documents, which assume that those arbitrarily listed higher up in the Budget costings table (or in a previous Budget) are already in place and those listed lower down (or in a subsequent Budget) are not.

[d] Funded within the Department for Work and Pensions' overall Department Expenditure Limit as announced in the 2010 Spending Review.

[e] We have been unable to find a revenue estimate for the impact of extending conditionality to lone parents whose youngest child is aged 7 to 9. The yield of extending conditionality to those whose youngest child is aged 5 or 6 is £290 million.

[f] We have been unable to find a revenue estimate for this.

[g] Note that this is the expected cost in 2014–15, when the phase-in of Universal Credit is only just beginning. The cost in 2017–18 is expected to be £2,230 million.

Source: Various Budgets.

2.3 Characterising the effects of individual reforms

The reforms listed in Table 2.1 can be divided into four main groups: changes in the generosity of 'safety-net' benefits; cuts to in-work support; means-testing more aggressively; and changes to non-means-tested benefits. We now consider each of those in turn, and then discuss those reforms that do not fall neatly into one of those categories.

Changes in the generosity of safety-net benefits

The majority of the reforms listed in Table 2.1 involve changing the maximum amount of means-tested support that can be received by those with no other income. This includes many of the cuts:

- All the cuts to Housing Benefit and Council Tax Benefit (reforms 3, 19, 20 21, 22, 23, 24 and 28)
- Removing the baby element of Child Tax Credit (reform 15)
- Restricting Sure Start Maternity Grant to the first birth (reform 18)
- Introducing a benefit cap (reform 27)

Reducing the generosity of safety-net benefits is regressive, imposing losses on those with no other income. But it straightforwardly strengthens the work incentives of those affected. A reduction in out-of-work income clearly strengthens the incentive to be in work at all: it makes stopping work less attractive for those currently in work, gives those out of work more of a push to get a job. And if benefits are less generous, the range of income over which they are withdrawn is shorter, so fewer people already in work will still be entitled to these benefits and face the disincentive of having them withdrawn as their income rises.

In some cases the government has increased the generosity of safety-net benefits:

- The increase in the child element of Child Tax Credit (reform 14)
- Increases in the Pension Credit Guarantee (reform 6)

Such increases have the opposite effect, weakening work incentives for those affected.

For changes in the generosity of safety-net benefits, the size of the revenue effects shown in Table 2.1 are a reasonable (albeit not precise) guide to the extent to which they weaken work incentives. Individually, the most significant are in fact the two give-aways, though the cuts to Housing Benefit and Council Tax Benefit are also significant, particularly when taken as a group. But the various changes apply to people in quite different circumstances: people with children (other than babies) will tend to see their work incentives weakened by the increase in Child Tax Credit; people renting properties in the private sector will often see their work incentives weakened by the cuts to Local Housing Allowance. Some of the reforms, such as the introduction of a benefit cap, can have a big impact on the work incentives of those who are affected, but affect relatively few people and therefore appear relatively small overall.

Cuts to in-work support

WTC is broadly progressive, providing support to low-income working families – although the very poorest families are of course those who are not in work at all. The coalition has announced real-terms cuts to the maximum value of WTC:

- Cash freezes in the value of the basic and 30-hour elements for 3 years and the additional elements for lone parents and couples for one year (reform 8)

- Increasing the weekly hours that couples with children must work to qualify for WTC, from 16 to 24 (reform 9)
- Reducing the childcare support provided through WTC (reform 11)
- Abolishing the bonus that those aged 50 or over receive for up to a year if they move from benefits into work (reform 10).

These cuts to WTC reduce the incentive for someone in a family to be in low-paid work. However, with less generous in-work support for low-earning families, those already receiving WTC before the reforms have less to lose from increasing their earnings above the point where entitlement to WTC stops. Thus, while these reforms weaken the incentive for families to have someone in work at all, they strengthen the incentive for those in work to increase their earnings.

Because WTC is means-tested on couples' combined income, it is crucial to realise that these reforms generally entail a weakening of incentives for someone in the couple to be in work, and a strengthening of incentives for the couple to increase their earnings. One way in which a couple can increase their earnings is, of course, for both partners to work instead of one. Thus, for couples, cuts to WTC weaken the incentive for the first partner to be in work, but strengthen the incentive for the second partner to be in work. Being a one-earner couple is being made less attractive, both relative to being a no-earner couple and relative to being a two-earner couple.

This is not true, however, of the reduction in the childcare element of WTC. To qualify for childcare support, both members of the couple must be in paid work; so reducing it has no effect on the incentive for the first partner to be in work (since the presence of a non-working partner disqualifies them from the childcare support anyway), but weakens the incentive for a second earner to be in work (since working entitles them to less childcare support than before the reforms).

BOX 2.1: The Savings Credit element of Pension Credit

Perhaps surprisingly, cutting the Savings Credit element of Pension Credit (reform 7) affects work incentives in a similar way to cutting WTC. Those who are not working and have little or no private income receive only Pension Credit Guarantee Credit (changes to which are discussed separately above): they are not entitled to Savings Credit. There is less incentive for them to be in work and earn enough to entitle them to Savings Credit if the Savings Credit is smaller. But for those in work and receiving Savings Credit, a smaller Savings Credit means there is less to lose by increasing their earnings further – including, for couples, by having a second partner in work.

The effect on work incentives of cutting Pension Credit Savings Credit differs from that of cutting WTC in two ways, both stemming from the fact that entitlement to the Savings Credit is phased in as income rises above a threshold rather than being triggered by an hours threshold. First, because Savings Credit is phased in gradually, an increase in the threshold not only reduces the overall generosity of the Savings Credit (with the effects discussed above); it also creates a small range of income between the old and new thresholds where a small rise in income is less worthwhile because it is not rewarded with additional Savings Credit. People earning in this range now face an EMTR of 100% – they lose Pension Credit Guarantee Credit pound-for-pound as their earnings rise – rather than 40% if losing a pound of Guarantee Credit were offset by gaining 60p of Savings Credit. And second, because there is no hours of work requirement for receiving Pension Credit Savings Credit, those with enough income from other sources (such as a private pension) to entitles them to Savings Credit – like those with income from a working partner – find that a less generous Savings Credit gives them less to lose from being in work.

Means-testing more aggressively

The reforms discussed so far involve changing the maximum amount of means-tested benefits and tax credits that can be received. But the government's welfare reforms also involve means-testing tax credits more aggressively (reforms 12 and 13) and means-testing Child Benefit for the first time (reform 17).

These reforms do not affect the amount of support that families can receive if they do not work; the reduction in generosity comes entirely at the expense of those in work. They thus reduce the incentive for families to have someone in work, and specifically to have earnings above the threshold at which support begins to be withdrawn (currently £6,420 in the case of tax credits and £50,000 for Child Benefit) and below the point at which it would have been completely withdrawn in the absence of reforms (which varies by hours of work and number of children in the case of tax credits; there is no such point in the case of Child Benefit as it is currently paid regardless of income level).

For couples, all that is relevant in the case of Child Benefit is the income of the higher earner: the reform weakens the incentive for the higher earner to stay in (or move into) work if their earnings would be more than £50,000 (unless both partners earn more than £60,000). In the case of tax credits, the effect for couples will often be similar to that of cutting WTC: while the incentive to have a first earner in work is weakened, the reduced support for one-earner couples can mean that there is less to be lost by – and thus a stronger incentive for – a second earner being in work. However, that is not always the case: if the couple's combined earnings would still leave them entitled to tax credits in the absence of the reforms (perfectly possible given that entitlement extended up to family income of more than £58,000), it is possible that the reforms can reduce the couple's entitlement by more if both partners work than if only one does, in which case the incentive to have a second partner in work is also weaker.

Turning to incentives for those in work to increase their earnings, the means-testing of Child Benefit clearly reduces the incentive for those in work (just the higher earner in the case of couples) to increase their earnings through the £50,000 to £60,000 range, over which the benefit will be withdrawn.

Again, the effect of sharper means-testing of tax credits on the incentive for those in work to increase their earnings is more complicated. Those who face losing 41p rather than 39p of tax credits for each extra pound earned (reform 13) clearly face a weaker incentive to increase their earnings; but this more rapid withdrawal means that the entitlement runs out at a lower income level, and those who are no longer entitled no longer face losing any tax credits as their earnings increase. The disincentive is stronger but applies to fewer people. Meanwhile, the change to the means-testing of the family element of Child Tax Credit (reform 12) includes both a more extreme version of the same phenomenon (the family element is now withdrawn at the same 41% rate as the rest of tax credits, rather than the previous 6.7%), but also starting to withdraw it from a lower income level (immediately after the child element, rather than the previous £50,000). This latter change means that the prospect of losing tax credits as income rises affects a different part of the income distribution, which is more densely populated and where people may be more or less responsive to such incentives.

Changes in the generosity of non-means-tested benefits

The government has introduced a more generous rule for determining annual increases in the basic State Pension (reform 5). The previous Labour government had planned to move from uprating it in line with RPI inflation (or the higher of RPI inflation and 2.5%, as it had been since 2002) to uprating it in line with average earnings growth; the coalition government has instead moved to uprating it in line with whichever is highest out of average earnings growth, CPI inflation or 2.5%. In April 2011, when (unusually) RPI inflation would have been higher than any of these other measures, the government increased the basic State Pension in line with RPI inflation instead, so that the 'triple lock' only became effective from April 2012. Over time, this new indexation rule will add more and more to the value of the

State Pension relative to what it would otherwise have been. In the opposite direction, the coalition allowed the previous Labour government's temporary increase in the Winter Fuel Payment to expire (reform 1).

Changes in the generosity of non-means-tested benefits have little effect on work incentives, since these benefits are paid irrespective of income and work status. The only channel by which they can have an effect is the 'income effect': while higher non-means-tested benefits have no effect on the *reward* from working, the extra income can mean that recipients have less *need* to work.[3]

Arguably, a freeze in Child Benefit (reform 16) should not be counted as non-means-tested, since (as discussed above) it is now to be withdrawn from high-income families. However, in practice the vast majority of families with children do not have anyone earning above £50,000, so for the most part freezing Child Benefit still acts like cutting a non-means-tested benefit in terms of how it affects financial work incentives.

Other reforms affecting financial work incentives

By far the biggest cut to welfare introduced by the coalition government is the switch to uprating most working-age benefit rates annually in line with the CPI measure of inflation, rather than the RPI and Rossi measures used previously.[4] Since CPI inflation is usually lower than the measures it was replacing, this change leads to steadily falling benefit rates relative to what they would otherwise have been. Four years of this lower indexation starting from April 2011 was already expected to be saving the Exchequer £7.6 billion a year by 2014–15, a figure that will keep rising thereafter.[5]

Since the move to CPI uprating affects rates of both in-work and out-of-work benefits, its effects combine the features of both. Broadly speaking, it is fair to say that since the benefits system as a whole weakens work incentives, across-the-board reductions in its scale tend to strengthen work incentives. More detailed analysis tends to bear out this simple picture. Incentives for those in work to increase their earnings are weakened (or at most unchanged) in almost all cases: with less generous benefits, means-testing extends less far up the income distribution, so fewer people face losing support if they increase their earnings. As for the incentive to be in work at all, for those whose in-work income would put them beyond the range of means-testing, the change to indexation acts like a simple change in the generosity of the safety-net benefits: with lower out-of-work support available, they have a stronger incentive to stay in (or move into) work.

However, there are some nuances in terms of the incentive to be in work at all for people who are entitled to WTC (or who would be if they worked). Of the previously used measures, Rossi inflation tends to be lower than RPI; and since Rossi was used to uprate the principal out-of-work benefits while RPI was used to uprate WTC (amongst other things), in some cases the switch to CPI reduces out-of-work benefits less than in-work benefits. And even if RPI and Rossi inflation were the same, uprating in line with the lower CPI could reduce in-work income by more than out-of-work income (increasing PTRs) in cases where maximum WTC entitlement exceeds maximum Income Support/income-based Jobseeker's Allowance entitlement – the most common cases being among lone parents and those eligible for the childcare element of WTC.

[3] In the jargon we introduce in Section 4.1, these reforms have no substitution effect but may have an income effect. Note that these reforms do not affect participation tax rates (the main measure of the incentive to be in work that we use in this report) at all, but do affect replacement rates (the alternative measure mentioned above).

[4] Rossi had been used to uprate Income Support, Employment and Support Allowance and Jobseeker's Allowance (and consequently the threshold for withdrawing Housing Benefit and Council Tax Benefit, which were set at that same level), while the RPI was used to uprate most other benefits and tax credits.

[5] Note that this revenue effect also includes the effect of a shift to CPI-uprating of public service pensions, which we do not discuss further in this report.

Two other reforms affecting financial work incentives deserve a mention.

Since Employment and Support Allowance is only available to people who are out of work, any reduction in its generosity, such as time-limiting contributory ESA (reform 25), makes out-of-work support less generous while leaving in-work support unchanged, and so strengthens (potential) claimants' incentive to be in work. However, this applies only to (potential) claimants themselves: the reform affects their partners' work incentives differently. Those whose entitlement to contributory Employment and Support Allowance (ESA) is withdrawn may still qualify for income-related ESA – but only if their family income is sufficiently low. The partners of ESA claimants whose contributory entitlement has now been limited to a year therefore face weaker incentives to be in work, or to increase their earnings, as doing so can reduce or eliminate the couple's entitlement to income-related ESA.

Finally, there have been reforms to the way that tax credits treat changes in circumstances in-year (reform 27). Before the reforms, rises in income of up to £25,000 were not taken into account in calculating tax credits until the following year (a measure introduced in response to the problems with overpayments that bedevilled tax credits after they were reformed in 2003). Reforms announced in the June 2010 Budget reduce this disregard from £25,000 to £5,000. That clearly weakens work incentives, since earning more is now met more quickly with a reduction in means-tested support. On the other hand, at the same time the government announced the introduction of a disregard for falls in income of up to £2,500, which no longer trigger a rise in tax credits until the following year – strengthening work incentives by making reductions in earnings more painful. Along with changes to the backdating of tax credit claims, these disregard changes are expected to raise £1.4 billion for the Exchequer, and they are comfortably the most significant of the three reforms in Table 2.1 that we do not model in our quantitative analysis of later chapters (the others being the abolition of the 50+ credit in WTC and the cut in Housing Benefit for those 'under-occupying' social housing).

2.4 Non-financial work incentives

The government has made a number of changes to the benefits system that do not directly affect the relationship between hours of work and net income, but which might nevertheless have an effect on people's work behaviour. Difficulties in quantifying those effects means that we do not examine them in subsequent chapters of this report, but here we describe the main changes (other than those associated with Universal Credit, which we discuss in the next section) and consider what effects they might have. The bottom line is that while one would expect them to have a positive impact on the likelihood of people entering work, the magnitude of this effect is unclear: it could be quite substantial (for instance, exceeding the impact of the changes in financial work incentives), or it could be negligible.

The Work Programme

The introduction of the Work Programme in 2011, which replaced the Flexible New Deal in parts of the country and a plethora of welfare-to-work schemes (such as various New Deal programmes and Employment Zones) elsewhere, is one of the major planks of the coalition government's welfare-to-work strategy. Support in finding work for the long-term unemployed is now delivered by a mix of private, voluntary and public-sector organisations, which are given significant autonomy in what type of support they deliver and how they manage their caseload, subject to satisfying what they promised in their bids, and a complaints procedure. Great Britain is divided into 18 areas, each with 2 or 3 providers, which in turn have around 1,000 subcontractors who provide particular services, such as training or work placements. Payments to providers of between £400 and £600 per person on the programme in 2011 are being phased out over 3 years, with payments instead primarily based on getting people into sustainable work (i.e. payment by results). A job outcome fee is paid to providers for every person they get in to work for at least 3 or 6 months (the length of employment required depends upon how far the person was

initially from the labour market), with additional 'sustainment' payments payable every 4 weeks subsequently, for between 1 and 2 years (again depending on distance of the person from the labour market). This is designed to provide an incentive to programme providers to perform well, and the amounts paid are designed to reflect the expected differences in the amount of effort providers will have to make in getting different groups of participants in to work. The success of different operators will be monitored and those performing best in an area will see a 5 percentage point shift in caseload to them, whilst those performing poorly risk losing their contracts.

Whilst this represents a major change compared to the former New Deals and Employment Zones, it represents less of a change for those areas where the Flexible New Deal has been rolled out in 2009, including all of Wales. In particular, under the Flexible New Deal, provision and management of support for the long-term unemployed was also contracted out to private and voluntary sector organisations, which then had a degree of flexibility in what services to provide, and which were paid partly based on employment outcomes. However, the caseload-based payment represented 40% of total possible payments (versus a planned 0% under the Work Programme by 2014), with an additional 40% available after 3 months of sustained employment, and the final 20% following 6 months of sustained employment. In contrast, under the Work Programme, providers can obtain less than half of the maximum payment by 6 months of sustained employment; the maximum payments are not attained until at least 15 months, and up to 30 months, of sustained employment. In principle, the Work Programme should therefore make providers more focused on long-term employment than the Flexible New Deal it replaces. Under the Flexible New Deal, the payment for job outcomes is the same for all clients, whereas under the Work Programme there are higher payments for those clients deemed to require more support in getting in to work. Whether the relativities for different types of client are correct is not yet clear, but in principle, this should reduce the incentives providers previously faced to target support at 'easy' cases and ignore hard-to-help cases (Mulheirn and Menne (2008)).

Taking part in the Work Programme is compulsory after 9 months of claiming JSA for those aged 18–24, and 12 months for those aged 25 or over. Under the Flexible New Deal, which was rolled out across Wales in 2009, people moved on to schemes provided after 12 months on JSA.[6] At first glance, this suggests that under the Work Programme more intense support for finding work starts earlier for those aged 18–24 and at the same time for those aged 25 or over. However, the discretion given to providers under the Work Programme makes it difficult to draw firm conclusions about whether the new scheme does more or less to encourage work than the scheme it replaces for JSA claimants.

Some JSA recipients with 'serious disadvantages' can voluntarily join the Work Programme after 3 months, and others are mandated to after 3 months. Recipients of Income Support, Incapacity Benefit and Employment and Support Allowance (ESA) can volunteer to join at any time, and ESA recipients deemed 'close to being fit for work' are mandated to join. It is worthwhile noting that these groups could also voluntarily join the Flexible New Deal programme.

The payments provided to suppliers for getting those on ESA who are required to take part in the Work Programme into sustained work are higher than for getting JSA recipients into sustained work, but payments for other ESA recipients and Income Support and Incapacity Benefit claimants are lower. This is despite the fact that these groups are likely have additional barriers to work compared to JSA recipients, and might therefore be expected to require additional resources to get into work. The Department for Work and Pensions (DWP) states that payments are lower because programme participation by these groups is voluntary, and those who volunteer are in fact likely to move into work and require less support. Whether this is borne out in practice is not yet clear.

[6] This compares to 6 months for those aged 18–24 under the previous New Deal for Young People, 18 months for those aged 25–49 under the New Deal 25+ and voluntarily from 6 months for those aged 50+. These schemes ceased in Wales in 2009 but continued in parts of the UK up until the introduction of the Work Programme in 2011.

To summarise, whether the attempts to improve incentives for providers to deliver and the additional freedom to innovate leads to increases in sustained employment and progression in work is an empirical question. Preliminary results from the evaluation of the Work Programme are expected to be published on 27 November 2012, after this report has been finalised. DWP expects that 36% of those referred to the Work Programme will be placed into jobs for which providers get paid (i.e. lasting at least 3 months or at least 6 months, depending on the type of claimant) of which 28% would have found work without the programme, and 8% find work because of the programme. For JSA recipients, the forecast by DWP for the same figures are 40% obtaining a job of at least 3 or 6 months, of which 32% would have found a job in any case, and 8% are helped into work by the programme. The National Audit Office (2012) has conducted a review of this forecast suggesting that this is over-optimistic, and instead forecasts 26% of JSA recipients will find work when on the Work Programme, compared to an estimated 25% under the Flexible New Deal. If this forecast is correct, this means the scheme does little to increase entry in to work compared with previous schemes. The National Audit Office also warns that 'providers may not break even' and that minimum performance targets may be breached.

Evidence on the efficacy of such programmes from elsewhere is fairly limited. However, the Freud Review (Freud (2007)), which recommended a shift to this model of payment, cites evidence that the system has performed well in Australia. In particular, he finds that payment-by-results together with provider-flexibility in what support to offer led to significant innovation and better outcomes. For instance, some providers used 'group therapy' to help improve motivation, whilst others provided support in addressing debts, as this was found to be a barrier for some leaving the safety net of benefits.

Lone Parent Obligations

The work-related requirements within the benefit system for lone parents have gradually increased over the years since the introduction of Work Focused Interviews in 2001 (Finn and Gloster (2010)). As part of this, starting in November 2008, Lone Parent Obligations (LPOs) have shifted most non-disabled lone parents with older children from Income Support to JSA. They are then expected to look for work in return, and are provided with help and support to do so. Lone parents with a health condition or disability are sometimes able to stay on Income Support, or may be required to claim ESA instead. Prior to October 2010, the LPO scheme applied to lone parents whose youngest child was aged 10 or over. This age was reduced to 7 in October 2010 (a plan the coalition government inherited from Labour) before being reduced again to 5 from October 2011.

With a few exceptions, lone parents in receipt of Income Support have to take part in Work Focused Interviews, and most have to complete an action plan agreed with a personal advisor that sets short-term and long-term goals to prepare themselves for work. However, the job-search requirements of JSA are significantly greater, although additional support is provided to help find work. Recipients of JSA are required to be available for, and actively seeking, employment and must also sign a Jobseeker's Agreement, which states what they have agreed to do to find work. In order to check they are meeting these conditions, and in order to offer help and advice in finding work, JSA claimants are also required to visit Jobcentre Plus at least every 2 weeks, and are subject to being called into Jobcentre Plus at any time. Those who remain unemployed for a more than a short while must take part in more in-depth interviews with Jobcentre Plus staff, and may be referred to particular employers, or required to broaden the range of jobs they are searching for. After 12 months, claimants are required to take part in compulsory employment schemes such as the Work Programme, which was discussed above. Those not complying with conditions can then be subject to having their JSA stopped.

Finn and Gloster (2010) carried out a review of the available evidence on the impacts of programmes in other countries that have increased work-related requirements for lone parents, and/or have provided additional support to lone parents to help them enter employment, drawing particularly on evidence

from the United States. They found evidence from the US literature for a strong positive impact on employment, and a significant reduction in welfare caseloads, following reforms in 1996 that increased work-related requirements, toughened sanctions against those not meeting the requirements, and generally made long-term dependence on out-of-work welfare benefits less of an option. They concluded that available evidence suggests that around one-quarter of the 11.5 percentage point increase in the US's lone parent employment rate between 1995 and 2000 was due to increasing requirements for lone parents to seek work. However, it is worthwhile noting that the US reforms took place against a backdrop of a strong economy and labour market, with rising employment more generally; the impacts of such reforms in a weaker economy, as currently in Wales and the rest of the UK, may not be as strong (see Section 7.2 of this report).

The US evidence also suggests that more employable lone parents will find work more quickly following their shift to JSA, leaving a population of benefit recipients who have greater barriers to employment, and who might need additional support to enter work. Such lone parents are more likely to have large families, live in social housing, have low education and suffer from mental or physical health problems. In the UK context, the fact that many lone parents with health problems will be able to move to ESA or continue to claim Income Support might mean this group does not face sanctions and disengagement from the welfare and employment support system to the same extent as in the reforms in the US.

The evidence also suggests significant variation in outcomes due to differences in approaches by the front-line staff who are implementing the reforms. This may be because of differences in ability to communicate requirements to lone parents, to assist with job-search or to impose any sanctions that are mandated. There is likely to be a degree of discretion involved in determining whether people are searching hard enough for work, with evidence from the Netherlands and Sweden showing significant variation in how front-line staff interpreted and applied requirements and determined exemptions.

The impact of Lone Parent Obligations is therefore likely to vary across lone parents, and across the country according to the state of the labour market, and the skills and judgements of local front-line staff.. A qualitative survey of lone parents (Lane et al. (2011)) suggests that the shift from Income Support to JSA gave lone parents a 'push' towards work, in part because of the job search and work requirements of JSA, and in part because of the stigma and hassle associated with claiming the benefit. Lone parents already closer to the labour market report that their attitudes to seeking work are unaffected by the Lone Parent Obligations, with those further from the labour market reporting rather mixed feelings. The evaluation of the reform is on-going and quantitative findings on the impact on employment and benefit exit are not yet available, but early results will be published in spring 2013.

Changing medical tests for disability benefits

Changes to the medical tests that those wishing to claim disability benefits face will also affect work incentives, by reducing income, and by leading to a shift to benefits with increased job-search requirements and more active support for help in finding work.

One major change implemented since the 2010 General Election is the shift in the stock of existing claimants of incapacity benefits (Incapacity Benefit, Income Support received on grounds of disability and Severe Disablement Allowance) to ESA. This requires reassessment of their disability using a tougher medical test, after which claimants are divided into three categories: those deemed fit for work, who are moved on to JSA and the Work Programme; those who are too ill or disabled to work presently but who are expected to take steps for an eventual return to work who are placed in the 'Work Related Activity Group' (WRAG) element of ESA; and those who are deemed never to be able to work, who are given unconditional support via ESA.

Figures published on 6 November 2012[7] show that, of the 139,200 in receipt of incapacity benefits who were reassessed between December 2011 and February 2012, 36% were found fit for work. This means just over one-third of former recipients of incapacity benefits would be expected to search for work immediately, or lose access to benefits, and may be placed on the Work Programme. This group would therefore face significantly stronger work-related conditions, which may be expected to increase flows back into employment. 39% were moved on to the WRAG element of ESA, meaning that they must attend work-focused interviews, and may have to undertake work-related activities such as training or planning how to manage their conditions to allow work. Once they are deemed 'close to work' they would then enter the Work Programme (and, as discussed above, providers would receive higher rates of payment for placing these in work). Finally, 25% were moved on to the support element of ESA, which does not envisage a return to work.

It should be noted that from 2009, many recipients of incapacity benefits have had to take part in the 'Pathways to Work' programme, which mandates a series of work-focused interviews for those who are deemed to be unable to work presently, but capable of work in future if provided support. Those participating in Pathways to Work were also able to choose to take part in other work-related activities such as training, condition management and mentoring (termed 'Choices'). Evaluation suggests that the Pathways to Work programme speeded up exit from incapacity benefits among those who would have exited within around 12 months without the programme. Evidence on sustaining employment is mixed with the phase 1 pilots showing a significant (6 percentage point) increase in employment rates up to 18 months after entering the programme (Adam et al. (2008)), and phase 2 pilots showing an insignificant effect on employment. Because of the optional nature of the 'Choices' elements, it has not been possible to evaluate the impact of these programmes.

Taken together, the shift from the former incapacity benefits to ESA means that around 75% of those reassessed are expected to begin looking for work or to take part in schemes to prepare for future work. In contrast, administrative data from the pilot studies suggest around 25% of the flow on to incapacity benefits took part in Pathways to Work in the pilot areas (the evaluations do not report figures for the proportion of the stock involved). The biggest change is for the large fraction of claimants reassessed as fit for work, and therefore subject to much more stringent work-search requirements and more active support for finding work; previously, these people may have been allowed to remain on incapacity benefits, and if deemed to be able to find work without support, would not have been subject to the Pathways to Work scheme. It is not possible to quantify the impact of this change on transitions to employment, but it would be expected to be a positive effect. Those placed in the WRAG of ESA may also have to take part in mandatory work-preparation activities, which were voluntary under the 'Choices' programme. Again, it is not possible to quantify the impact on employment, but one might expect a small positive impact.

Those claiming Disability Living Allowance (DLA) will also be subject to medical reassessment from April 2013 under a tougher medical test, which the government has said is expected to result in 20% of existing claimants losing entitlement to the benefit. Those claimants also in receipt of Income Support, JSA and Housing Benefit may also lose the 'disability premiums' they receive as part of those benefits. This means the change is likely to lead to a bigger reduction in out-of-work income for those reassessed than in-work income, meaning this change in conditionality is likely to increase work incentives. However, the impact cannot easily be quantified.

[7] Employment and Support Allowance – Incapacity Benefits Reassessments: Outcomes of Work Capability Assessments, Great Britain, Department for Work and Pensions (http://research.dwp.gov.uk/asd/workingage/esa_ibr/esa_ibr_nov12.pdf).

Other changes to conditionality and work incentives

There are other small changes to conditionality that may affect the rate at which people leave benefits for employment. For instance, DWP now allows JSA recipients who have been in receipt of it for more than 6 months to do up to 8 weeks of training without losing the benefit. On the one hand, partaking in training may make people less able to take up work during the period of training. However, it may also improve employability and motivation, aiding the return to employment. In addition, the New Enterprise Allowance is available to JSA recipients aged 18 or over who want to start their own business from the first day of their claim as of October 2012 (previously, it was available to those who had been on JSA for over 6 months). This provides business mentoring and support in developing a business plan and starting trading, after which they are able to claim £65 a week in financial support for 13 weeks (an amount similar to JSA) and £33 a week for a further 13 weeks. Loans of up to £1,000 are also made available. It is not clear the extent to which such small amounts can incentivise a move into self-employment and the programme has not yet been evaluated. However, Adams and Oldfield (2012) suggest that many unemployed people, and especially the long-term unemployed, are risk averse. Hence 'for some [potential] businesses a small lump sum in addition to regular payments could provide an important boost'.

2.5 Universal Credit

The introduction of Universal Credit is perhaps the most radical restructuring of the benefits system since the 1940s. Universal Credit is a new benefit, which will replace six of the seven main existing means-tested benefits and tax credits for those of working age: Income Support, income-based Jobseeker's Allowance, income-related Employment and Support Allowance, Housing Benefit, Child Tax Credit and Working Tax Credit. The seventh existing means-tested benefit for those of working age, Council Tax Benefit, is not being brought within Universal Credit, though it is itself being reformed (reform 28 in Table 2.1). And benefits for those above the qualifying age for Pension Credit (the female State Pension age, which is in the process of rising from 60 to 65 between 2010 and 2018) will remain separate from Universal Credit – although couples where one partner is above and one below the Pension Credit age, who can currently claim Pension Credit, will in future have to claim the (usually less generous) Universal Credit instead.[8]

Following 6-month pilots in parts of North-West England, Universal Credit will be phased in nationally over a 4-year period starting in October 2013. New claims for the existing benefits listed above will stop in October 2013, and new claims for tax credits will stop in April 2014; new claims will be for Universal Credit instead. Those who are already claiming the existing benefits and tax credits will be moved onto Universal Credit gradually between April 2014 and the end of 2017, though if they are currently receiving more than they would normally be entitled to under Universal Credit, they will continue to receive the higher amount: no existing claimants will see a cash reduction in the amount of benefit received. So although Universal Credit will start to affect people from October 2013, the combination of a long phase-in period and transitional protection for existing claimants means that it will be a long time before Universal Credit rates apply to everyone. Because of this, in later sections we model the two extreme scenarios: one that ignores Universal Credit completely, and one that treats it as being fully implemented immediately with no transitional protection. Reality will lie somewhere in between these for several years.

[8] Although Universal Credit will not apply to pensioners, once Housing Benefit for those of working age has been subsumed into Universal Credit the government also intends to replace Housing Benefit for pensioners with a housing costs component in Pension Credit, thus achieving a degree of integration for pensioners too.

How Universal Credit will work

While the main features of Universal Credit are now clear, some of the details have yet to be finalised at the time of writing. Amongst other outstanding issues, the government has announced a cap on the total cost of Universal Credit which may mean that it has to be less generous, or else rolled out more slowly, than might have been thought. The description here reflects the best information currently available; but it is subject to change.

For those without disabilities, maximum entitlement to Universal Credit will be the same as under the current system, consisting of the following:

- A standard allowance, the basic amount for all claimants (equal to the personal allowance in Income Support and income-based Jobseeker's Allowance)
- A child element (equal to Child Tax Credit rates) and a childcare element (equal to the childcare element of Working Tax Credit)
- A housing element (equal to maximum Housing Benefit for those in rented accommodation – Local Housing Allowance for private renters – and to the Support for Mortgage Interest component of Income Support and income-based Jobseeker's Allowance for owner-occupiers).

There will also be a disability element, which will be simpler than the current system of Employment and Support Allowance and disability premiums in other means-tested benefits: the 'enhanced' and 'severe' disability premiums that currently exist in most means-tested benefits will have no equivalent in Universal Credit, and instead the premium that is currently paid to the 'support group' (those with the most severe disabilities) in Employment and Support Allowance will be increased. This will create winners and losers among those with disabilities (subject to the transitional protection discussed above), but the government's intention is that the change will be revenue-neutral overall.

However, while maximum support will be little changed from the current system, the way in which it is means-tested will be very different. Currently, each benefit has its own earnings disregards and withdrawal rate; savings and other unearned income are treated differently for benefits and for tax credits; and Income Support, Jobseeker's Allowance and Employment and Support Allowance are available only to those doing (virtually) no work, with a separate Working Tax Credit for those in work. Universal Credit will be much simpler, with a single set of disregards, a single overall withdrawal rate, a uniform treatment of savings and unearned income, and no separation between in-work and out-of-work benefits.

Each family will have a certain level of earnings disregarded before Universal Credit starts to be withdrawn. The level of earnings disregards will vary by family type, and will be lower for those receiving the housing element than for others. The level of disregards has not yet been finalised; in this report we assume the following levels, in line with those assumed in the government's impact assessment:

Table 2.2 Annual earnings disregards in Universal Credit

Claimant type	Not receiving housing element	Receiving housing element
Single	£700	£700
Lone parent	£9,000	£2,780 + £260 for each of the second and third children
Couple without children	£3,000	£1,920
Couple with children	£7,250	£2,440 + £260 for each of the second and third children
Disabled person (or couple in which either partner is disabled)[9]	£7,000	£2,080

The earnings disregards play a crucial role in Universal Credit. With maximum entitlements set equal to those under the existing system and a single withdrawal rate, earnings disregards are the only way for the government to vary in-work incomes across different family types. Without hours rules and separate in-work and out-of-work benefits, high disregards in effect take the place of Working Tax Credit in extending support to many low-income working families.

Each pound of after-tax earnings above the disregard will reduce Universal Credit entitlement by 65p. This is the same rate as Housing Benefit is currently withdrawn; steeper than the rate at which tax credits are withdrawn;[10] and of course less sharp than the 100% withdrawal rate applied to Income Support, income-based Jobseeker's Allowance and income-related Employment and Support Allowance.

Unearned income will be treated very differently from earned income. Most unearned income other than interest income (which has a special treatment, see below) will not be subject to a disregard at all, and will reduce entitlement to Universal Credit pound-for-pound. This is mostly identical to the current treatment of such income under the means-tested welfare benefits, but it is a stricter means-test than under tax credits, where unearned income is currently subject to, at most, a 41% taper. As a result, current claimants of tax credits who rely on unearned income (e.g. out-of-work lone parents receiving large amounts of maintenance payments for themselves) can potentially lose considerably from the Universal Credit reform.

Income from savings and investments will not be counted directly for the Universal Credit means test. Instead, the assets themselves will reduce entitlement. Savings of less than £6,000 will be ignored, but savings above that will be deemed to yield an income of £1 a week for every £250 of savings (e.g. savings of £7,000 will lead to an imputed income of £4 per week). If savings exceed £16,000, then a family will lose all entitlement to Universal Credit. This treatment of investment income is also identical to the way that means-tested benefits (IS, income-based JSA and ESA, HB and CTB) currently operate, but it is much harsher than the current treatment of such income in tax credits, where investment income below £300

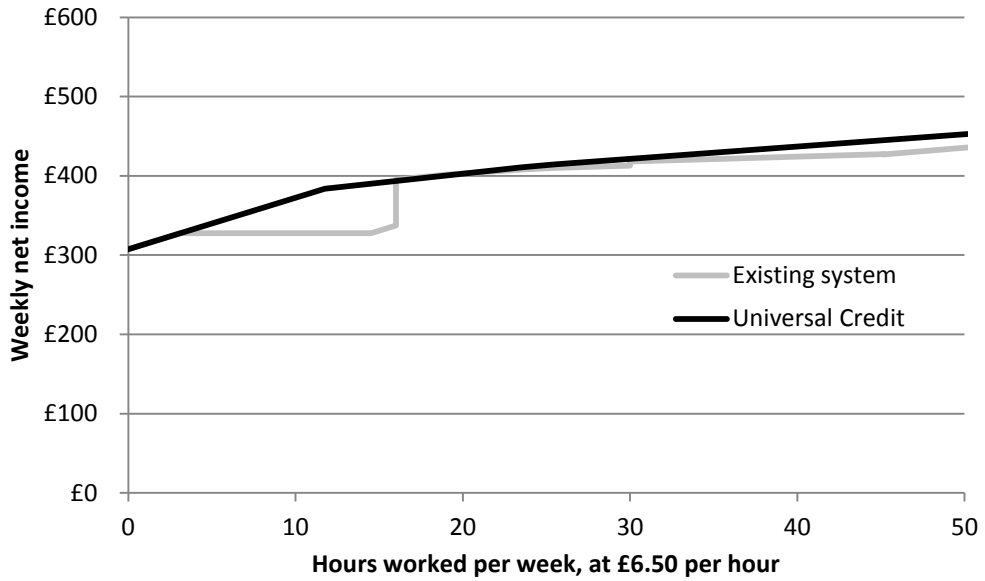
[9] Applies if higher than the disregard the claimant would otherwise receive.

[10] Note, however, that the difference between the tax credit and Universal Credit withdrawal rates is not as big as the headline numbers–41% and 65%–might suggest, because tax credits are withdrawn against pre-tax income while Universal Credit will be withdrawn against post-tax income. Those paying income tax and employee National Insurance contributions, and receiving no other benefits, face an overall effective marginal tax rate of 73% if they face withdrawal of tax credits (20p income tax + 12p employee NICs + 41p tax credits = 73p lost from each pound earned), compared with 76.2% under Universal Credit (having paid 20p income tax and 12p NICs, their Universal Credit is reduced by 65% of the 68p that is left, i.e. 44.2p, making a total of 20p + 12p + 44.2p = 76.2p lost from each pound earned).

per year is ignored altogether, and investment income above £300 per year, as well as all other unearned income, is subject to, at most, a 41% taper.

Unearned income aside, Universal Credit broadly involves means-testing less aggressively than the benefits it is replacing, and in terms of work incentives it pushes somewhat in the opposite direction from the reforms to means-test more aggressively discussed above. Figure 2.2 shows a budget constraint for an example lone parent (similar to that shown at the start of the chapter) before and after the introduction of Universal Credit.

Figure 2.2 Budget constraint for a lone parent with two children before and after the introduction of Universal Credit



Notes: Assumes lone parent with two children who can choose how many hours to work at a given wage rate, £6.50 per hour, and has rent of £80 per week, no disability and no other income. Ignores council tax and associated rebates.

Again, the budget constraint in Figure 2.2 is just for one example individual, and the effect on budget constraints varies substantially across people in different circumstances (see Brewer, Browne and Jin (2011) for some more examples). But the figure illustrates a number of the key effects of Universal Credit. The key changes Universal Credit makes to this budget constraint are as follows:

- Under the current system, out-of-work benefits are withdrawn on a pound-for-pound basis when income increases above a small disregard. Under Universal Credit, the disregard will be much larger, strengthening the incentive for this lone parent to undertake only a few hours of paid work each week, and above the disregard Universal Credit is withdrawn at a slower rate than out-of-work benefits.
- The lone parent becomes eligible for Working Tax Credit when they work 16 or more hours per week and receives an extra payment if they work 30 or more hours per week, leading to jumps in the budget constraint at these points. There will be no equivalent payment under Universal Credit, leading to a much smoother budget constraint.
- EMTRs above the threshold at which Universal Credit starts to be withdrawn are lower than under the current system, but still relatively high. When the lone parent works more than 16 hours per week and increases their earnings under the current system, they lose more than 90p of each additional pound earned through a combination of income tax, National Insurance contributions and withdrawal of tax credits and housing benefit. The EMTR falls under Universal

Credit to 76.2%:[11] the integrated benefit scheme means that only one benefit is withdrawn, removing the very high EMTRs that can exist under the current system when benefits are withdrawn simultaneously.

Figure 2.2 ignores council tax and associated rebates. Although Universal Credit by itself leads to a reduction in the highest overall EMTRs, the fact that council tax rebates will remain separate from Universal Credit still leads to the possibility that two strands of support will be withdrawn simultaneously, creating EMTRs that are nearly as high as under the current system. How the new council tax rebate scheme in Wales will interact with Universal Credit will have significant implications for work incentives. In this report we assume that the council tax rebate scheme in Wales will count Universal Credit as income for the purposes of the means-test (with an additional allowance equal to the rent component of Universal Credit to ensure that income from Universal Credit alone is not enough to reduce rebate entitlement).[12] Counting Universal Credit as income for the means-test implies that the maximum EMTR an individual could face would be 80.96% (if they were subject to withdrawal of both Universal Credit and council tax rebate at the same time as paying income tax and National Insurance contributions on their earnings). That is higher than the maximum 76.2% EMTR if council tax rebate were not being withdrawn in parallel to Universal Credit, but lower than the 89.8% that could be created if Universal Credit did not count in the means-test for council tax rebate, let alone the still higher EMTRs that can arise under the current system.

Simplicity, transparency and salience

Important as changes to financial work incentives are, they are less important if people do not understand those incentives in the first place. One consequence of the plethora of programmes that currently exist is that people often do not know what they are entitled to, let alone what they would be entitled to if their circumstances were different. Many out-of-work families are unaware that they could continue to claim Housing Benefit and/or Council Tax Benefit if they moved into low-paid work.[13] People might therefore be discouraged from working by a perception of lost entitlements that exceeds the reality. And since many of those in work never find out that they can claim Housing Benefit and Council Tax Benefit, the support reaches only a limited proportion of the intended recipients: only around half of working families that are entitled to Housing Benefit claim it, compared with over 90% of non-working families.[14] Similar problems arise because people do not realise that Working Tax Credit can be claimed by those without children. Under Universal Credit, it will be clear that the same benefit will be providing support for low-income families (albeit not at the same level) throughout their working-age lives regardless of their particular circumstances or changes therein. Since a single programme covers a wide variety of circumstances, people could be secure in the knowledge that their entitlement would continue even if their circumstances changed. And since so many will be entitled to the same benefit, people may be more likely to know they are entitled and there may be less stigma attached to claiming. People will be aware of a simple equation: the first slice of earnings they get to keep; after that they lose 65p in the pound.

On the other hand, as complicated as the current system is, there is an argument for saying that Working Tax Credit does at least provide a clear signal that, if you work the requisite hours, support is available.

[11] This EMTR is higher than the 65% Universal Credit taper rate because of income tax and NICs. This is because the lone parent is a basic-rate taxpayer (meaning she pays an additional 20p in income tax for each additional pound earned) and pays employee NICs (meaning she pays an additional 12p in employee NICs for each additional pound earned). The income assessment for Universal Credit is based on income after income tax and National Insurance, meaning that the amount of Universal Credit received falls by 65% of the remaining 68p, which is 44.2p. Thus the overall EMTR is 20p plus 12p plus 44.2p, which equals 76.2p.

[12] Specifically, we assume the Welsh government implements option 2 in Chapter 7 of the recent report by Adam and Browne (2012).

[13] Turley and Thomas, 2006.

[14] Department for Work and Pensions, 2010a.

Universal Credit may lack that kind of salient and easily-understood focal point: whatever the true effect on net incomes, higher disregards and a moderate withdrawal rate may be obscure, and may be seen somewhat differently: limiting the losses from going into work rather than providing an explicit reward to doing so. Furthermore, if it is the case that people, on average, overestimate the return to work (rather than underestimate it), a simpler, more transparent system might actually weaken *perceived* work incentives. Changes in perception may, therefore, not be unambiguously positive.

There is no way to quantify the impact that changed perceptions of the gain-to-work from a simpler, more transparent system might have. Other programmes that have aimed to make the financial gain-to-work more easily understood by benefit claimants, such as the 'Better Off in Work Calculations' introduced in the early 2000s, produced not especially striking results (Knight and Kasparova (2006)). For instance, whilst the likelihood of entering work was higher for lone mothers who received information on the financial gains to work, this was a selected sample and the effect is unlikely to be causal (those receiving the information would have been more likely than others to enter work anyway). Those who were informed they would get a larger gain-to-work were more likely to enter work than those who were informed they would receive a small gain (at least among short-term benefit claimants who were close to the labour market), but it is unclear whether this was due to the provision of information or whether it would have been the case anyway.

Universal Credit may help to achieve simplification in a more practical sense as well, reducing hassle for claimants and administrative problems for government. At the moment people have to make multiple applications for benefits, providing much the same information to different branches of government. Most benefits are the responsibility of DWP, but tax credits and Child Benefit are run by HM Revenue and Customs (HMRC), while Housing Benefit and Council Tax Benefit are administered by local authorities. And when families' circumstances change (starting work or recovering from illness, for example), not only do they often have to apply for support under a different scheme, but there is often a delay between the moment at which payment of one benefit ceases and the moment at which payment of another starts. This can lead to hardship for families at a time of transition and upheaval, and the potential for problems can contribute to putting people off moving into work. In principle, Universal Credit should improve the efficiency with which the benefit system operates – though in practice much depends on whether the UK government can make a success of administering the 'Real-Time Information' system of getting income information from employers, with which Universal Credit has become intimately linked.

The impact of changes in conditionality under Universal Credit

As well as significantly changing benefit withdrawal rates and income disregards, Universal Credit involves a significant change in the job-search conditions for those in receipt of means-tested benefits. Presently, those in receipt of JSA are subject to work-search conditions (described above when discussing LPOs and the Work Programme) if they are working less than 16 hours per week. Working 16 or more hours makes one ineligible for JSA, and potentially eligible for Working Tax Credit, for which there are no work-search conditions requiring one to look for jobs with more hours or higher pay.

Under Universal Credit, an hours limit for work-search requirements is to be replaced by an earnings threshold that is significantly tougher. The rules stipulate that single people may be expected to look for higher-paid employment (whether through more hours or a higher wage) if they earn less than 35 times the minimum wage per week (currently £217),[15] whilst couples may be required to earn double that (£433) between them. The self-employed will automatically be assumed to be meeting these conditions (and will be paid a commensurate amount of Universal Credit). For couples, the work-search requirements may apply to any partner not working full time, although those caring for a child aged 5–12

[15] Based on the National Minimum Wage as at December 2012.

will only be required to seek increases in their wage or hours through work that takes place during school hours (the same applies to lone parents). It is worth noting that these earnings thresholds are maximums, and that DWP will have flexibility in determining the earnings threshold above which people no longer face the full 'intensive' conditionality regime. The government is somewhat concerned about the potential resource cost to DWP of extending the conditionality in full to a much larger group of people, and the latest information is that, initially, full conditionality will apply to 'groups roughly equivalent to those subject to the current Jobseeker's Allowance conditionality regime' (Department for Work and Pensions (2012)). But at the time of writing it remains somewhat unclear exactly which claimants will face exactly what level of conditionality initially and how this will change over time.

In principle, moving from an hours-based rule to an earnings-based rule changes the incentives that claimants face: rather than seeking to increase their hours, which may be difficult given other commitments, claimants can instead seek to increase their earnings. However, JSA recipients lose their entitlement if they earn more than a certain amount, and in practice this amount is often exceeded with less than 16 hours of work. For a single person claiming income-based JSA (or anyone claiming contribution-based JSA), once they earn £76 a week they are no longer entitled to JSA or subject to its conditions. Hence, working just 8 hours at £10 per hour would be enough no longer to have to search for higher-paid jobs, whilst perhaps still being entitled to other benefits (such as Housing Benefit and Council Tax Benefit). For a couple jointly claiming income-based JSA, earnings of more than £121.45 exhaust entitlement, which means working 13 hours at £10 an hour is enough to avoid additional work-search requirements.

The big change is therefore an increase in the earnings threshold below which one may have to continue to seek higher-paid work. For a single person without children, for instance, this increases from £76 per week to £217 per week. And for couples without children, this increases from £121.45 to £433 per week. This means, for instance, that the non-working partner in a couple where the other partner works 35 hours at £10 per hour may be subject to work-search requirements under Universal Credit, and might need to find work that paid at least 13 times the minimum wage to satisfy the conditions for receiving Universal Credit.

If conditionality is imposed up to maximum earnings thresholds, and assuming full take-up of Universal Credit among those entitled to it, we estimate that around 170,000 individuals in Wales would face work-related conditionality. This compares to around 120,000 prior to the introduction of Universal Credit (again based on full take-up).[16] It is therefore fair to say that the reforms could, in principle, extend work-search requirements to many more low earners. This is driven by increasing work-search requirements for couples, the number of whom facing search requirements would increase from 25,000 to 75,000 (there is little change in the number of single people facing work-search requirements). But because DWP will initially apply full conditionality to a smaller group, its initial impact is likely to be much more limited (and if the groups to which full conditionality is applied to are not expanded beyond current ones, the impact will remain limited).

The impact of the expansion of work-search requirements is difficult to assess, in part, because DWP has yet to fully specify what type of actions Universal Credit recipients will have to take in order to satisfy the requirements. Department for Work and Pensions (2011) states that regulations will require job search to be 'effective' and will require evidence of active search, applications for jobs, the creation and updating of online profiles and CVs, registration with an employment agency, and the seeking of references from former employers. As with those not working, working claimants subject to work-related conditions will be expected to take any work 'regardless of type and salary', provided it pays more than their existing

[16] Figures calculated using the IFS tax-benefit micro-simulation model, TAXBEN, and the Family Resources Survey 2007-08, 2008-09 and 2009-10. Figures exclude the self-employed who will be assumed to be earning an amount equivalent to 35 times the minimum wage under the UC regime.

employment, and is within 90 minutes of their home. Those subject to work-search requirements will be expected to 'spend as much time as possible' looking for work. For those not working, 'regulations will specify that claimants must, as a minimum, be engaged in work search for at least the number of hours expected of them to be available for work'. However, how long those already in work are expected to search has not yet been specified, nor has the extent of support that will be provided to these people in finding work (such as via work-focused interviews, mentoring or other welfare-to-work schemes).

Whilst one may expect increased job-search requirements to increase the likelihood of moving in to work and increasing one's earnings, this is not necessarily the case. For instance, Petrongolo (2009) finds that increases in job-search requirements when JSA was introduced in 1996 actually reduced the likelihood of unemployed people moving in to work for a period of up to 4 years. She suggests that this might have been because the additional conditionality means those unable to find work leave JSA and 'become detached from the labour market ... no longer perceiving themselves as workers as they were no longer covered by labor force welfare'. Klepinger et al. (2002) studied the impact of job-search requirement using an experiment in Maryland in the US and found that requiring additional job search and evidence of that search reduced the average length of unemployment insurance claim by 1 week from 12 to 11 weeks, but no significant impact was found on employment or earnings outcomes. For lone parents, though, as discussed above, the review by Finn and Gloster (2010), finds evidence of sustained positive impacts on employment of additional work-related requirements (although these reforms involved more than simply requiring job search). However the applicability of these findings to a benefit system with significantly greater work-search requirements for other benefits (e.g. ESA), and to those already in work and required to increase their earnings, is not clear. This means that whilst reasoning would suggest a positive effect of additional work-search requirements on earnings progression, existing evidence tells us little about whether we should expect this to be borne out in practice. In other words, the impact on employment, hours of work and earnings of the tougher conditionality under Universal Credit could be fairly large (larger than the impact of changes in financial incentives, for instance) or fairly small: previous reforms give little idea on what to expect.

2.6 Conclusion

The coalition government has introduced a large number of welfare reforms, saving the Exchequer a great deal of money in the process. They affect financial work incentives in a variety of different ways, and many of them deserve detailed individual analysis in their own right. However, what is surely most interesting and important from a policy point of view is what effect the overall package of reforms has across the population. Quantifying that is the subject of the next chapter.

3. Quantifying the effect of the whole reform package on financial work incentives in Wales

Examining how individual reforms affect example people is informative. But there is a limit to what can be achieved by looking at individual examples when circumstances vary so widely it is hard to be sure how representative a particular person is. And when, on top of that, we wish to assess the combined effect of a large number of reforms that interact with household characteristics in complicated ways, a micro-simulation model of the tax and benefit system is indispensable. This chapter and Chapters 5 and 6 make heavy use of the IFS's tax and benefit micro-simulation model, TAXBEN, which can be used to calculate how actual and alternative tax and benefit systems would affect the incomes of a representative sample of the population of Wales – and how those same tax and benefit systems would affect their incomes if they stopped working, increased their earnings, etc. For this report we run TAXBEN on data from the Family Resources Survey, increasing the sample size by pooling 3 years of data (from 2007–08 to 2009–10, with financial variables all uprated to simulate the 2012–13 population). The total sample size is 4,221 individuals in Wales, 2,782 of whom are in work; grossing weights provided with the data enable us to scale up the results to match the full population of Wales.

We analyse the effects of the welfare reform package by calculating each individual's family income and work incentives under three different tax and benefit systems:

- a baseline system with the benefits system as it was in April 2010, shortly before the present government took office;
- a system as it is due to look in April 2014, with all the welfare reforms listed in Table 2.1 (except the three specifically mentioned in the table), but without Universal Credit in place;
- a system as at April 2014, again with all the welfare reforms in place, but this time with Universal Credit modelled as being fully implemented with no transitional protections.

To allow us to look at benefit reforms separately from tax changes, the tax system is held constant in its expected 2014–15 form across all three systems. All the systems are expressed in 2012–13 prices, so only the real-terms benefit reforms are relevant. We assume full take-up of benefit and tax credit entitlements: while that is clearly an unrealistic assumption, modelling non-take-up satisfactorily is hard and it is difficult to know what people's take-up behaviour would be if changes in their work patterns gave them different entitlements.

The principal focus of this chapter is micro-simulation estimates of how the UK government's welfare reforms affect work incentives across the population in Wales. But before turning to that, it is useful background to look at the distribution of gains and losses from the reforms.

3.1 The distributional impact of the reforms

In Stage 1 of its research programme analysing the impact of the UK government's welfare reforms,[17] the Welsh government summarised previous work by IFS researchers, which quantified the distributional impact of tax and benefit reforms implemented (or due to be implemented) by the coalition government. As part of Stage 2 of the research programme, the analysis here updates that work to include reforms

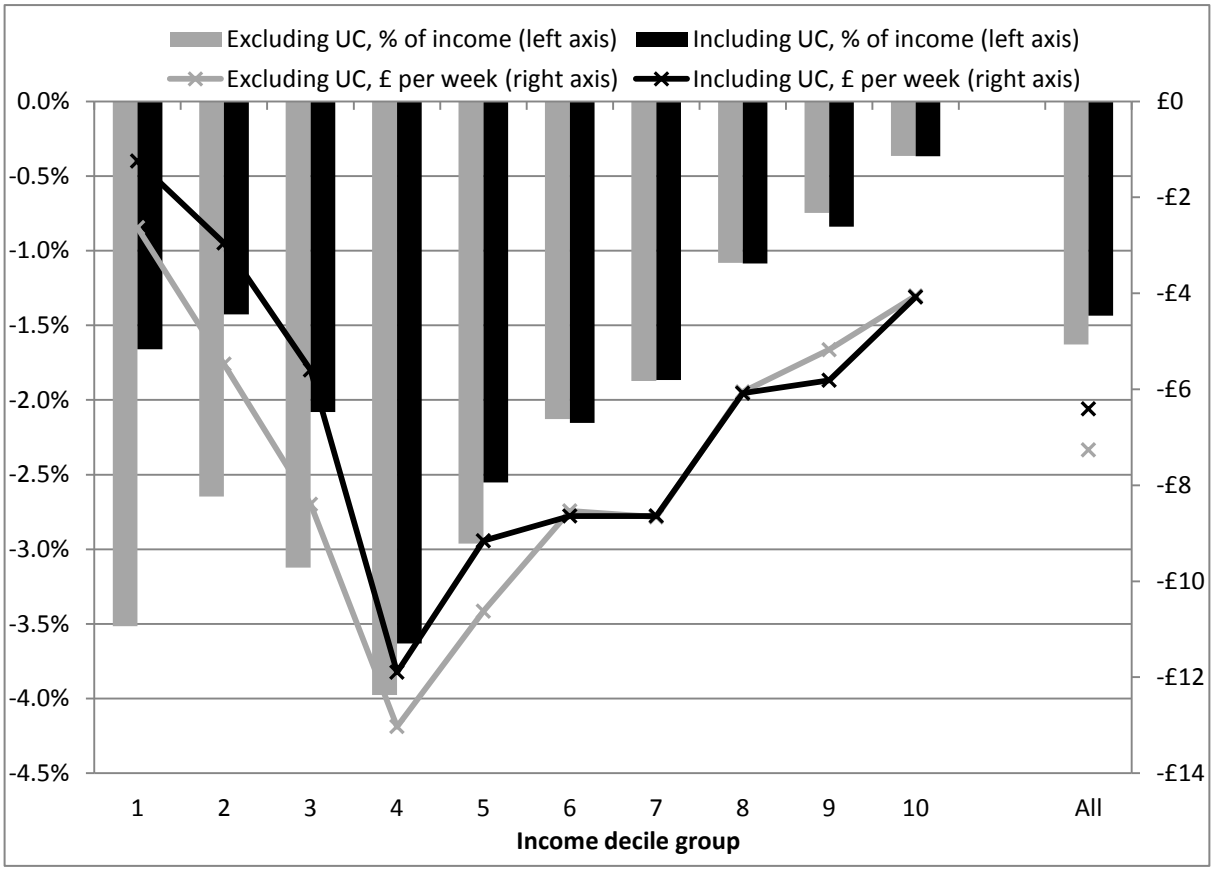
[17] Welsh Government (2012).

announced up to and including the 2012 Budget, and isolates the impact of the benefit changes (rather than looking at tax and benefit reforms together).

We estimate that the UK coalition government's welfare reforms reduce total benefit and tax credit entitlements in Wales by around £520 million (or £590 million if Universal Credit is excluded). This corresponds to about £6.40 per family per week on average (or £7.26 if Universal Credit is excluded), roughly 1.5% of their net income.

Figure 3.1 shows how these losses vary across the income distribution. The coalition's welfare reforms excluding Universal Credit take money predominantly from the bottom half of the income distribution. Since the bulk of the reforms represent cuts to means-tested benefits, it is hardly surprising that those higher up the income distribution (who are entitled to less benefits, if any) lose less than the bottom half, although better-off households do lose out from some cuts to 'middle-class welfare' such as the freeze in Child Benefit, the withdrawal of Child Benefit from incomes of £50,000 upwards and the withdrawal of the family element of Child Tax Credit at lower income than before. But within the lower-income half the picture is not clearly regressive: the biggest losers in both cash and percentage terms are the low-to-middle income families of decile 4, partly because in-work support (particularly Working Tax Credit) is being cut more sharply than out-of-work support.

Figure 3.1 Losses across the income distribution in Wales from the reforms



Notes: Income decile groups are derived by dividing all families in Wales into 10 equal-sized groups according to income adjusted for household size using the McClements equivalence scale.

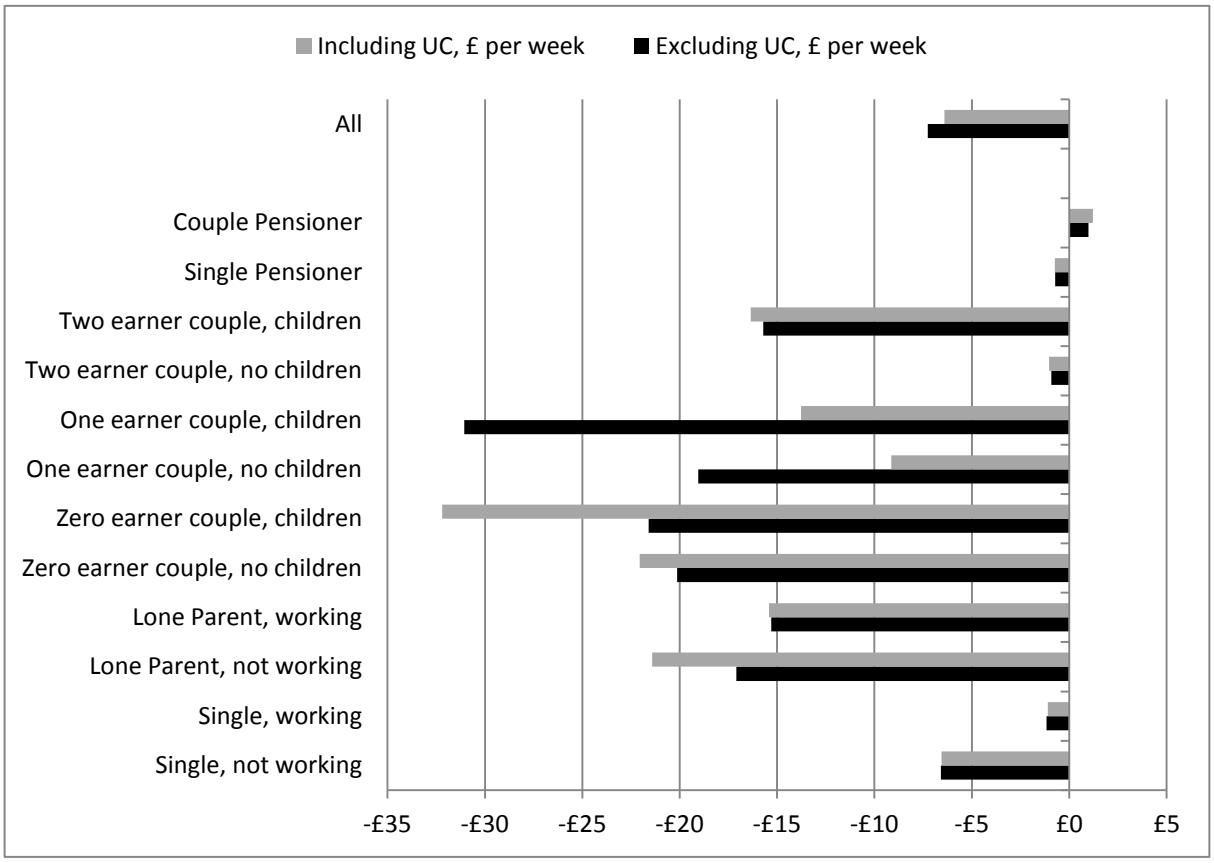
Source: Authors' calculations using TAXBEN run on uprated data from the 2007–08 to 2009–10 Family Resources Survey.

Universal Credit is a small net giveaway, reducing families' losses from the overall package on average. The gainers are predominantly those on lower incomes, so that the overall package once Universal Credit is included looks much less regressive, with the lowest-income fifth losing barely more than the

population as a whole as a percentage of income and losing substantially less than the average in cash terms.

Figures 3.2 and 3.3 show losses by family type, in cash terms and as a percentage of income respectively. In cash terms the reforms excluding Universal Credit hit those with children more than those without children, and hit one-earner couples more than single people or two-earner couples. One-earner couples with children therefore lose the most, while single adults and two-earner couples without children are largely unaffected on average; lone parents, one-earner couples without children and two-earner couples with children are somewhere in between.

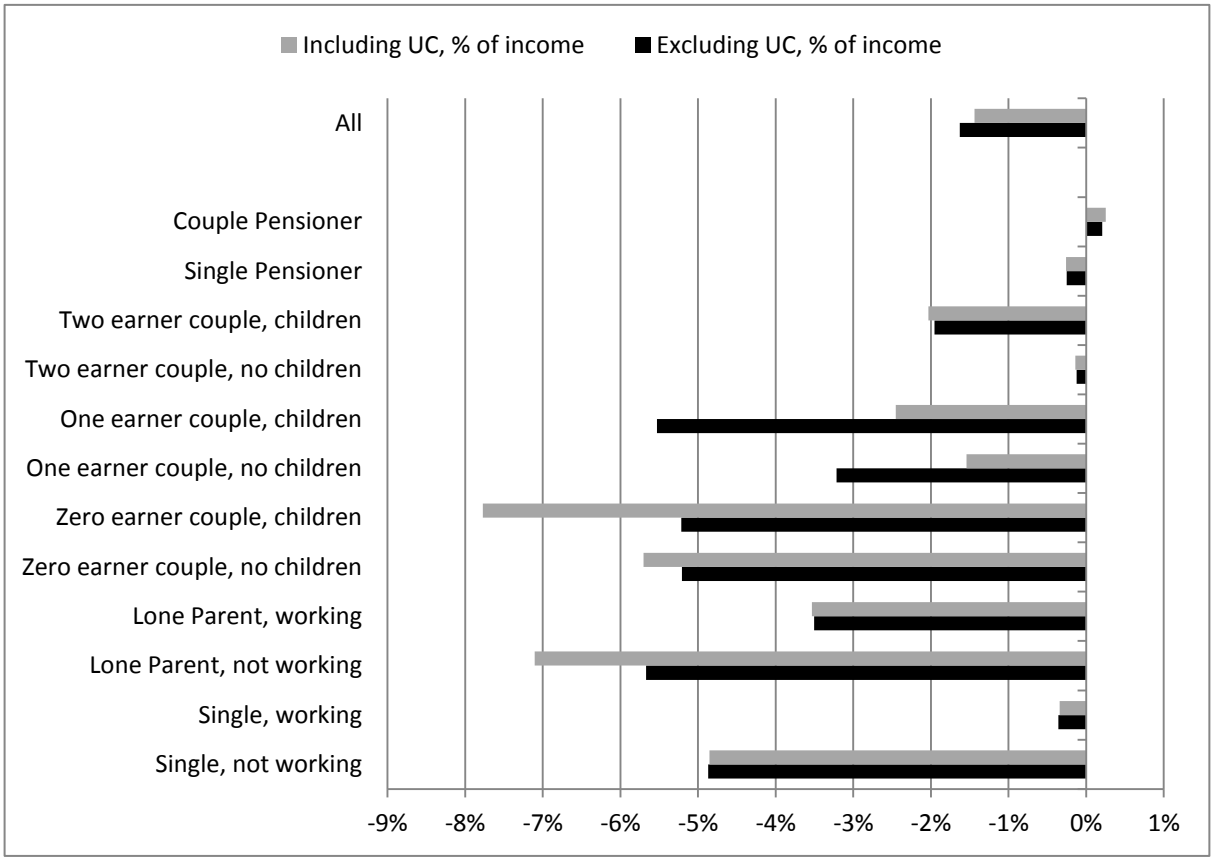
Figure 3.2 Cash gains and losses from the reforms for different family types in Wales



Notes: Income decile groups are derived by dividing all families in Wales into 10 equal-sized groups according to income adjusted for household size using the McClements equivalence scale.
Source: Authors' calculations using TAXBEN run on uprated data from the 2007–08 to 2009–10 Family Resources Survey.

Universal Credit reduces the losses of one-earner couples substantially – especially for those with children – as a result of its less aggressive means-test relative to the current system. Despite the broadly progressive nature of Universal Credit, it significantly increases average losses for non-working families with children. That is because, while out-of-work income is unchanged for most, those with substantial savings or receiving unearned income such as maintenance see those resources penalised more heavily in the calculation of Universal Credit entitlement than they are for Child Tax Credit at the moment. Pensioners, and families without children in which all adults work, are largely unaffected by both the welfare cuts and the introduction of Universal Credit.

Figure 3.3 Percentage gains and losses from the reforms for different family types in Wales



Notes: Income decile groups are derived by dividing all families in Wales into 10 equal-sized groups according to income adjusted for household size using the McClements equivalence scale.
Source: Authors' calculations using TAXBEN run on uprated data from the 2007–08 to 2009–10 Family Resources Survey.

3.2 Estimating work incentives across the population in Wales

Our analysis of work incentives covers all individuals in Wales aged between 19 and State Pension age (SPA). We remove those over the SPA because their work incentives raise different issues around the relationship between stopping work and starting to claim private and state pensions, which are best quantified in different ways.

For each individual in the sample and each of the three tax and benefit systems, we begin by calculating their family's tax and benefit position given their actual behaviour. For working individuals, we then calculate what their family's tax and benefit position would be if that individual did not work (to estimate their participation tax rate) and what their family's tax and benefit position would be if that individual increased their earnings slightly.

For non-workers, we estimate what their position would be if they did work in order to calculate their PTR (see Annex A for details). We do not analyse EMTRs for non-workers since the consequences of earning an extra pound seem a rather less relevant question for non-workers.

We therefore calculate PTRs across the whole working-age population, and EMTRs for those who are actually in work.

To calculate PTRs and EMTRs for individuals in couples, we look at how the couple's net income changes when the individual in question stops work or changes their earnings slightly, holding the other partner's employment and earnings fixed.

The measures of PTRs and EMTRs used here incorporate income tax, employee NICs and all the main social security benefits and tax credits. They do not incorporate employer NICs, indirect taxes (VAT and excise duties) or capital taxes (corporation tax, inheritance tax, stamp duties, capital gains tax, or income tax on savings income). While most of these other taxes can certainly affect work incentives – creating a wedge between what an employer is willing to pay to hire someone and what a worker's earnings enable him to buy after tax – they are not affected by the welfare reforms we are looking at, and while excluding them makes the effective tax rates on earnings look lower than they really are, it should not affect the comparison between alternative benefit systems that are the subject of this report.

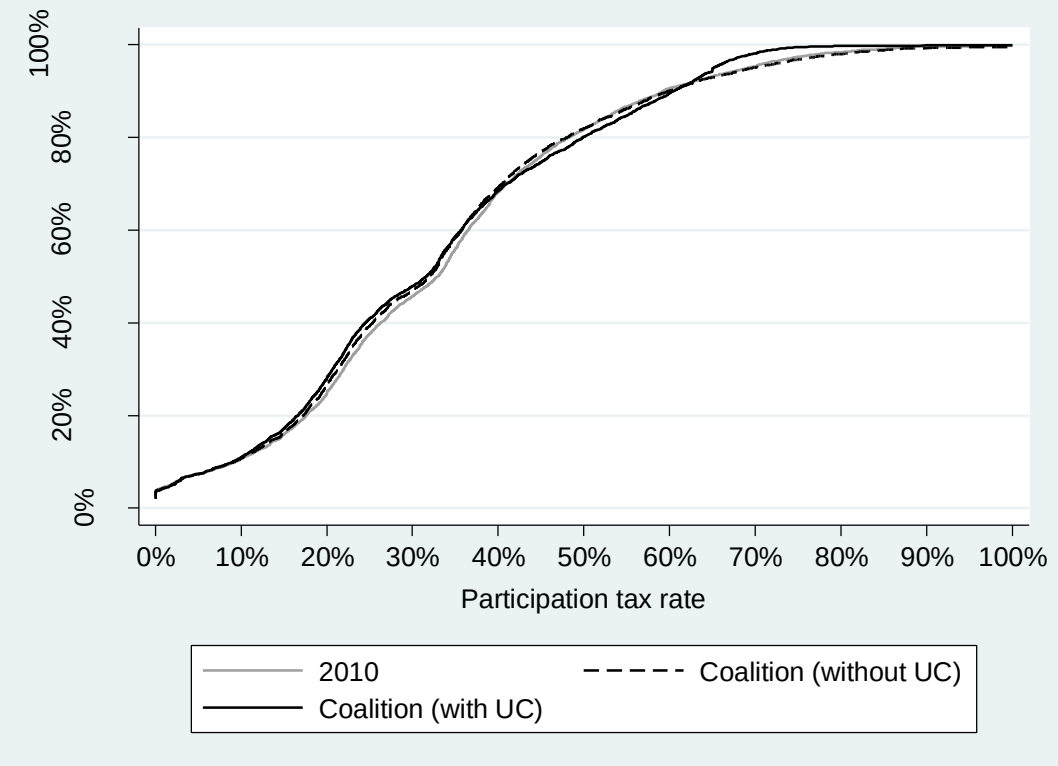
3.3 Incentives to be in work at all

Across the whole working-age population in Wales, we estimate that the coalition government's welfare reforms reduce the average PTR from 33.1% to 32.7% excluding Universal Credit or 32.3% including Universal Credit. Although small-sounding changes in PTRs can translate into significant economic effects, this is nevertheless a small reduction. However, this modest change in the overall average PTR conceals far greater variation across the population: 36% of working-age adults in Wales see their PTR change by more than 5 percentage points as a result of the reforms, 23% see a change of more than 10 percentage points, and one in ten sees a change of more than 20 percentage points. In what follows we describe the pattern of changes.

Figure 3.4 shows the distribution of PTRs in Wales before and after the reforms. Reading across, we can see that, for example, around 80% of working-age adults have a PTR below 50%, meaning that they get to keep more than half of what they earn (or would earn if they worked). The lines on the chart are fairly close together: the government's welfare reforms do not change the picture dramatically. However, one important point to note is that Universal Credit goes much of the way towards eliminating the very weakest incentives to work found in the current system: the number of people in Wales facing PTRs in excess of 75% falls from about 46,000 under the baseline system to fewer than 10,000. The corollary of that is that more people will face moderately weak incentives than do now: the number of people facing PTRs between 50% and 75% increases from 277,000 to about 340,000, so overall around 26,000 more people face a PTR above 50%. But reducing the numbers facing the very highest PTRs is particularly valuable because the distortion caused by taxes rises more than proportionately to their rate: put simply, it is generally better to have two people facing tax rates of 50% than one person on 60% and one on 40%. One of the principal advantages of Universal Credit is that it replaces a host of overlapping means-tests with a single integrated one (albeit with council tax support kept separate), moving from PTRs that vary widely according to precise family circumstances to PTRs that are more uniform. As a result, the overall dispersion of PTRs is lower – very much a desirable outcome.[18]

[18] The standard deviation of the PTRs falls from 20.3% (or 20.8% after the reforms other than Universal Credit) to 19.2%.

Figure 3.4 The distribution of PTRs in Wales



Note: Benefit and tax credit reforms only, as described in Section 1: tax system held constant in its expected 2014–15 form. Sample includes all individuals in Wales aged between 19 and the SPA.
Source: Authors' calculations using the IFS's tax and benefit micro-simulation model, TAXBEN, run on uprated data from the Family Resources Survey 2007–08 to 2009–10.

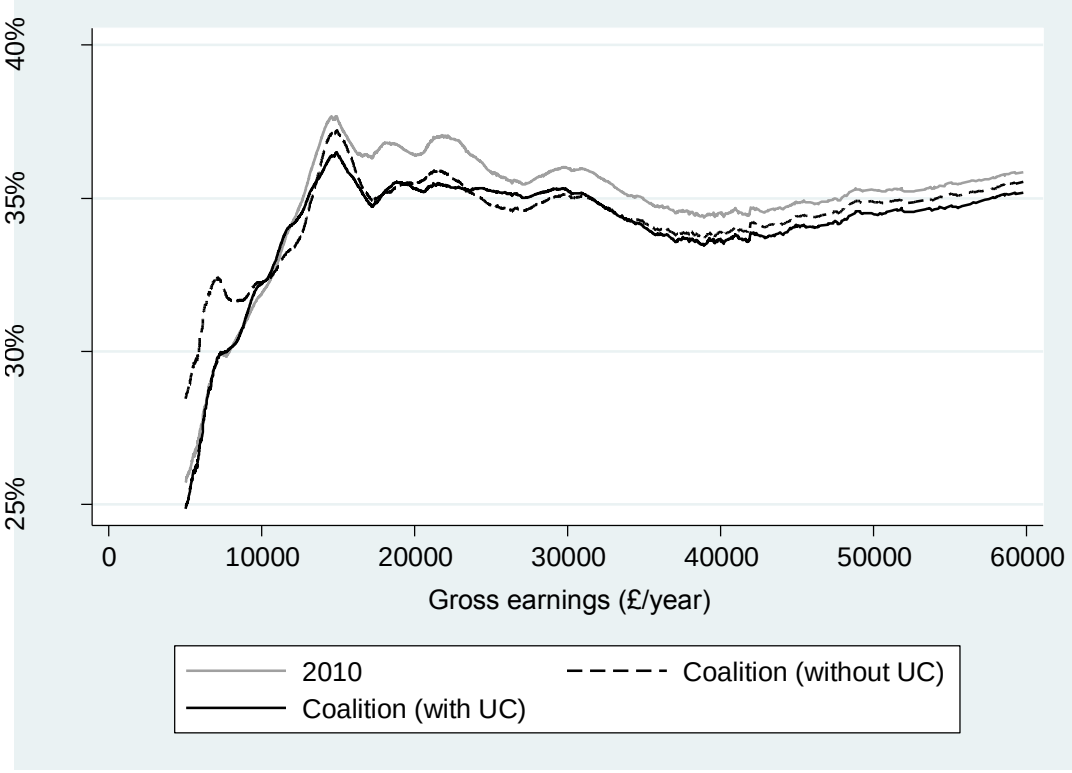
Figure 3.5 shows the effect of the reforms on average PTRs across the earnings distribution, while Table 3.1 shows how the average PTRs of different groups are affected.

Excluding Universal Credit, the reforms significantly increase average PTRs at the lowest levels of earnings (below around £11,000 a year) and reduce them at higher levels of earnings than that, especially above around £17,000.

PTRs increase, on average, for lone parents and (especially) for the first earner in couples with children, and it is these two groups that account for the overall fall in average PTRs at low earnings. The rise in their average PTRs is driven by tax credit reforms: the increase in the child element of Child Tax Credit (increasing out-of-work income) and the more aggressive means-testing of tax credits (reducing in-work income) increase PTRs for these groups right across the earnings distribution; at low levels of earnings, this is compounded by cuts to Working Tax Credit.[19]

[19] Particularly important for those with children and non-working partners is the increase from 16 to 24 in the hours they are required to work to qualify for WTC. This massively reduces their incentive to work in those low-wage, part-time jobs.

Figure 3.5 Average PTRs across the earnings (and potential earnings) distribution in Wales



Note: Benefit and tax credit reforms only, as described in Section 1: tax system held constant in its expected 2014–15 form. Sample includes all individuals in Wales aged between 19 and the SPA.
Source: Authors' calculations using the IFS's tax and benefit micro-simulation model, TAXBEN, run on uprated data from the Family Resources Survey 2007–08 to 2009–10.

But across most of the earnings distribution, and for most of the groups shown in Table 3.1, average PTRs fall. Single people without children and people with working partners account for three-quarters of the adult population in Wales, and these groups see their average PTRs fall at all levels of earnings. Single adults without children see their out-of-work income (unaffected by Child Tax Credit rises, of course) fall as a result of the switch to less generous CPI uprating of benefits and the specific cuts to Housing Benefit and Council Tax Benefit, while if they do work, the fact that they have both higher average earnings and lower maximum benefit entitlements than lone parents means that their earnings are more likely to put them beyond the scope of means-tested support (and so unaffected by WTC cuts).[20] For those with working partners it is even more likely that being in work would put the couple's combined income beyond the scope of means-testing, so the principal effect of all the welfare cuts is to reduce the amount of support available with one partner in work that is lost if the second partner works as well.

To summarise: the government's welfare reforms other than Universal Credit tend to weaken the incentive for families with children to have someone in work, especially at low earnings; but they strengthen the incentives for couples to have a second partner in work, and for single adults without children to work at all. Looking at the other groups in Table 3.1, those aged 55 and above are less likely to have dependent children and likely to have higher earnings than younger people, and so are more likely to see their PTRs fall; while ethnic minorities and those in social rented housing are more likely to have

[20] Recall also that the shift to CPI indexation reduces in-work support more than out-of-work support for many lone parents, but not for single adults without children as their Income Support rate is the same as lone parents' but their WTC rate is lower.

dependent children, are more likely to be the sole breadwinner in a couple, and in the case of social renters have significantly lower average earnings than the rest of the population, and so correspondingly see their average PTRs rise.

Table 3.1 Average PTR in Wales by group

	April 2010	Change in average PTR (percentage points) from:			Number (thousands)
		Reforms excluding UC	UC	Reforms including UC	
Single, no children	37.2%	-1.0	-0.8	-1.8	452
Lone parent	32.0%	2.2	-2.0	0.1	104
Partner not working, no children	38.8%	0.1	-3.9	-3.9	205
Partner not working, children	49.6%	9.5	-16.0	-6.4	123
Partner working, no children	22.4%	-2.1	1.1	-1.0	460
Partner working, children	33.0%	-1.5	5.2	3.6	413
Without children	31.4%	-1.3	-0.6	-1.9	1,117
With children	36.0%	1.2	-0.1	1.1	640
Aged 19–24	29.1%	-0.1	-0.5	-0.6	245
Aged 25–54	33.6%	-0.1	0.0	-0.1	1,122
Aged 55–SPA	34.1%	-1.2	-1.5	-2.7	390
White	33.1%	-0.4	-0.4	-0.8	1,681
Non-white	31.8%	0.4	-0.1	0.3	77
Receiving a disability benefit	44.4%	-3.4	0.1	-3.3	196
Partner receiving a disability benefit	42.2%	5.8	-9.6	-3.9	120
No adult in the family receiving a disability benefit	31.1%	-0.4	0.2	-0.2	1,482
Owner-occupier	29.7%	-0.7	-0.4	-1.2	1,296
Private renter	29.1%	-1.2	0.7	-0.5	216
Social renter	47.6%	2.3	-5.5	-3.2	229
Working	30.8%	-0.2	-0.1	-0.3	1,198
Non-working	37.9%	-0.6	-1.1	-1.8	559
All	32.7%	-0.4	-0.4	-0.8	1,757

Note: Benefit and tax credit reforms only, as described in Section 1: tax system held constant in its expected 2014–15 form. Sample includes all individuals in Wales aged between 19 and the SPA.

Source: Authors' calculations using the IFS's tax and benefit micro-simulation model, TAXBEN, run on uprated data from the Family Resources Survey 2007–08 to 2009–10.

Universal Credit substantially reduces average PTRs at low levels of earnings (below about £10,000) and slightly reduces them at high level of earnings (above about £40,000), with little discernible change on average in between (see Figure 3.5).

The fall in PTRs at high earnings is driven entirely by people with non-working partners and children, and arises not because they receive more in-work support – those high levels of earnings put them beyond the reach of Universal Credit and the benefits it is replacing – but because Universal Credit treats financial assets less generously in the means-test than Child Tax Credit, so those families with children that have significant financial assets (a significant fraction of the high earners) see a reduction in the support they would receive if no-one in the family worked. The reduction in PTRs for high earners is a consequence of the reduction in support for non-working couples with children that we saw in Figures 3.2 and 3.3.

The fall in PTRs at low earnings that Universal Credit brings about has a more obvious cause: the less aggressive means-testing of Universal Credit compared with the benefits it replaces. With higher earnings disregards, and a single 65% withdrawal rate, low earners get to keep more of what they earn, while usually seeing little or no change in their out-of-work income. As we saw in Figures 3.2 and 3.3, the increase in the generosity of in-work support is most pronounced for one-earner couples – and especially one-earner couples with children – and so it is people with non-working partners that see the most marked declines in their average PTRs. Taking together this large decline in PTRs at low earnings with the much smaller decline at high earnings discussed above, those with non-working partners and children see their average PTR fall by a staggering 16 percentage points as a result of Universal Credit.

Crucially, the effect of less aggressive means-testing on reducing PTRs is restricted to the first earner in a family. The flip-side of more generous support for the first earner in a family is that couples have more to lose from a second earner being in work as well. Those with working partners are thus the only family type in the top panel of Table 3.1 to see their average PTRs rise: by 1.1 percentage points for those without children and 5.2 percentage points for those with children (again reflecting the greater generosity of Universal Credit to one-earner couples with children than those without children) – and remember that far more people have working partners than non-working partners.

Turning to the other breakdowns in Table 3.1, Universal Credit causes marked reduction in PTRs among social renters and those not currently working – groups that tend to have lower earnings (if they did work) and are less likely to have working partners than the rest of the population, so they are affected mainly by the stronger incentive to have a first earner in the family.

Very few of those aged between 55 and SPA have dependent children, and they are far more likely to have non-working partners than younger people are (not least because their partner may have retired), so they tend to fall into groups that see reduced PTRs in any case. But one particular reason that Universal Credit strengthens the incentive for those aged 55 or over to be in work is the fact that, for those with partners over the female SPA, both partners rather than one will need to have passed that age for the couple to qualify for the generous out-of-work support provided by Pension Credit once Universal Credit has been introduced.

Taking Universal Credit alongside the rest of the welfare reforms modelled here, average PTRs are little changed at low levels of earnings (with falls from Universal Credit offsetting rises from tax credit reforms) but fall at earnings above about £12,000 (primarily because of the welfare cuts). It is clear that the most dramatic changes are for people with non-working partners and children: big increases in their PTRs (especially at low earnings) caused by tax credit reforms are offset by an even bigger reduction in their PTRs from Universal Credit, leaving them as the group with the biggest overall reduction (6.4 percentage points) in their average PTR. These changes in the generosity of treatment of first earners in couples with children have the reverse impact on incentives for families to have a second adult in work, with the result that those with working partners and children face PTRs on average 3.6 percentage points higher after the reforms than before them. Lone parents see small falls in their average PTRs from

Universal Credit and small rises from the other reforms, leaving them little changed on average at all levels of earnings. All groups without children see falls in their average PTRs.

Those aged 55 or over see bigger reductions in their PTRs from both Universal Credit and the other welfare reforms than younger people. That is important because, as we will see in the next chapter, the employment decisions of people around retirement age respond much more to financial incentives than those of younger people.

Non-workers, who currently face weaker average incentives to be in work than existing workers, see their PTRs reduced by more than existing workers, on average: the characteristics of non-workers, and what we estimate they would earn if they did work, are such that the government's welfare reforms strengthen the incentive for those out of work to get a job much more than they strengthen the incentive for those in work to stay there.

3.4 Incentives for those in work to increase their earnings

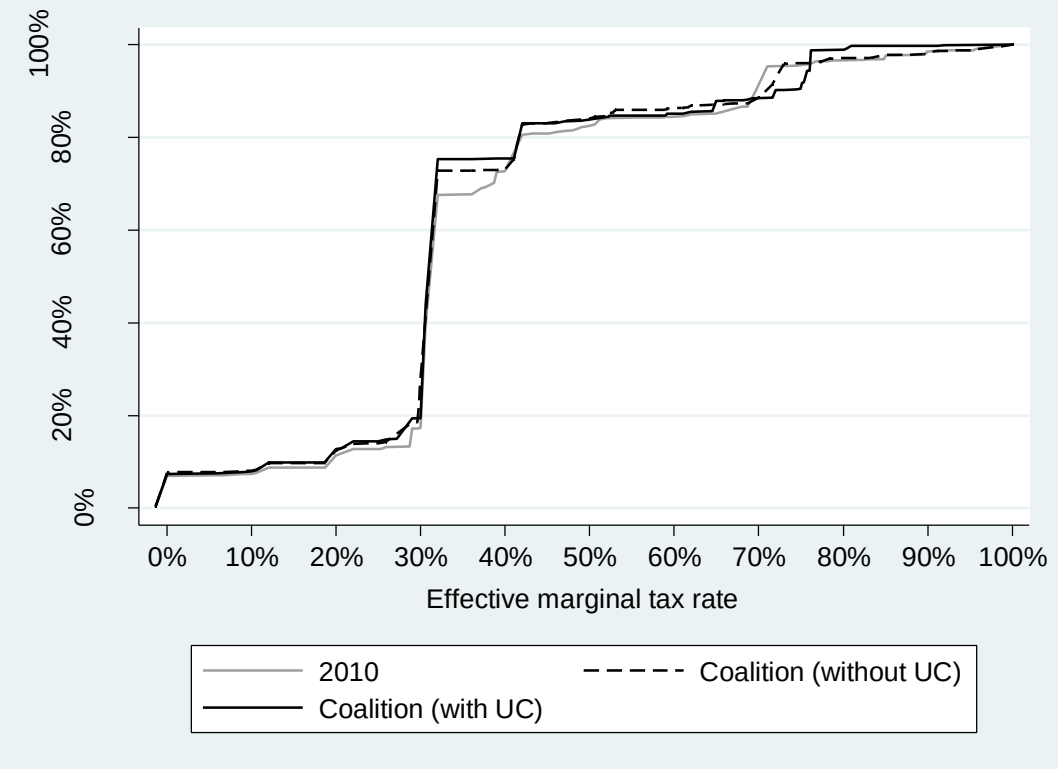
We have seen that the coalition government's welfare reforms strengthen incentives to be in work, on average. We also find that the reforms strengthen incentives for those in work to increase their earnings: the average EMTR is reduced by 1.1 percentage points (from 36.9% to 35.8%) by the reforms excluding Universal Credit; and by a further 0.4 percentage points (to 35.5%) once Universal Credit is taken into account.

Figure 3.6 shows the distribution of EMTRs among workers in Wales. Before the reforms, just over 600,000 people in Wales – half of the working population – faced an EMTR of exactly 32% from income tax and NICs (or 30.6% if contracted out of the State Second Pension). The large-scale welfare cuts (excluding Universal Credit) significantly reduce the number of people who are subject to means-testing on top of that, so the number of people with EMTRs of 32% or 30.6% increases further to 650,000. Correspondingly, for the most part there are fewer people facing EMTRs in excess of any given level above 32% (the line in the Figure shifts upwards). However, the increase in the tax credit withdrawal rate from 39% to 41% means that a sizeable group of people currently facing an EMTR of 71% (39% tax credit withdrawal combined with 32% income tax and NICs) see their EMTR increase to 73% (visible in the figure as a shift to the right between the grey line and the dashed black line in the vertical stretch just above 70%).[21] The higher withdrawal rate also acts to reduce the number of people in that position, though that is offset by the fact that the family element of Child Tax Credit is now being withdrawn at that same 41% rate rather than the 6.7% rate applied before the reforms.

Figure 3.6 also shows that Universal Credit reduces the very highest EMTRs, in the same way as we saw in Figure 2.4 that it reduces the very highest PTRs. Under Universal Credit nobody will face the EMTRs of 85% or more currently created by simultaneous withdrawal of a combination of tax credits, Housing Benefit and Council Tax Benefit on top of income tax and National Insurance contributions – let alone the 100% EMTRs currently faced by those facing withdrawal of Income Support, income-based JSA or income-related ESA. However, for those currently facing withdrawal of tax credits but not Housing Benefit, the Universal Credit withdrawal rate is sharper than what they currently face; thus many of the group discussed above who currently face a 71% EMTR (or 73% after the other reforms) will instead face an EMTR of 76.2% under Universal Credit.

[21] For those contracted out of the State Second Pension, the combined EMTR rises from 69.6% to 71.6%.

Figure 3.6 The distribution of EMTRs among workers in Wales



Note: Benefit and tax credit reforms only, as described in Section 1: tax system held constant in its expected 2014–15 form. Sample includes all individuals in Wales aged between 19 and the SPA.
Source: Authors' calculations using the IFS's tax and benefit micro-simulation model, TAXBEN, run on uprated data from the Family Resources Survey 2007–08 to 2009–10.

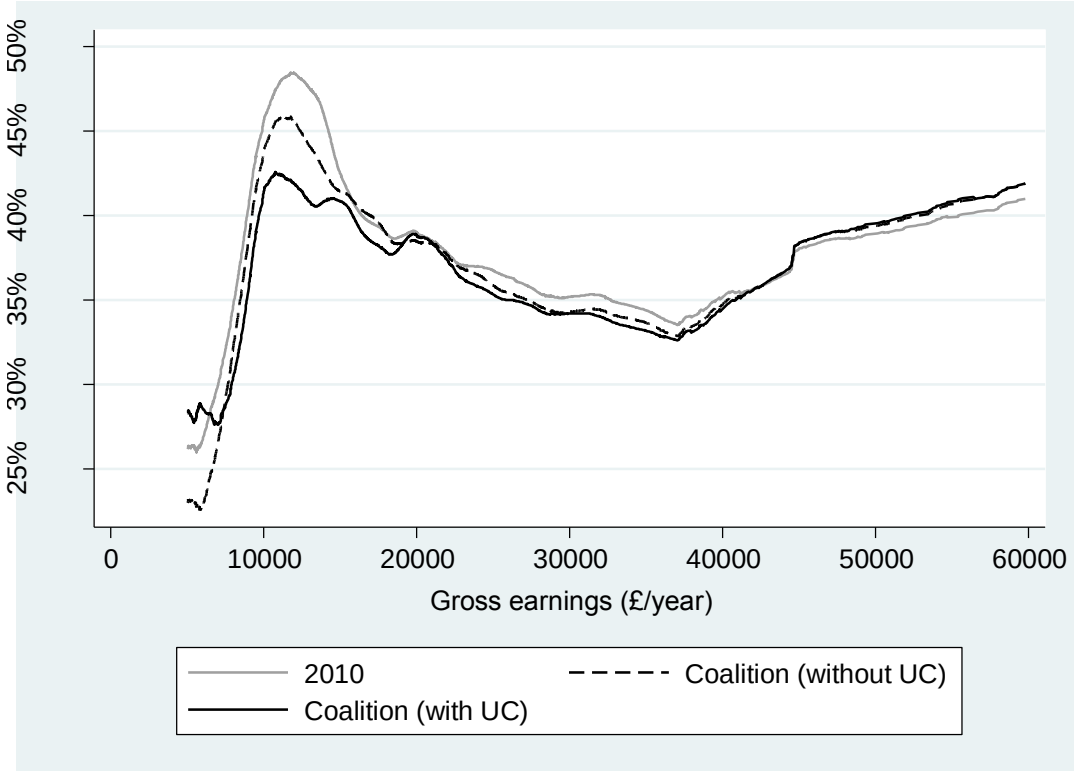
Figure 3.7 shows the effect of the reforms on average EMTRs across the earnings distribution, while Table 3.2 shows how the average EMTRs of different groups are affected.

Above earnings of £50,000, average EMTRs increase. This is purely the consequence of the withdrawal of Child Benefit between incomes of £50,000 and £60,000 per year, which increases the EMTRs of parents with earnings in that range more than moving the withdrawal of the family element of Child Tax Credit out of that range reduces them.[22]

Apart from that, the reforms excluding Universal Credit reduce average EMTRs fall at all levels of earnings. They do so most at low levels of earnings – below about £15,000 a year – though there is some reduction all the way up to £40,000 and beyond.[23] The falls come about largely because reductions in the generosity of means-tested benefits mean that they run out at lower levels of income (or are removed entirely from particular groups), so that some people currently facing benefit withdrawal no longer have any benefit left to lose.

[22] Figure 3.7 appears to show the rise in EMTRs beginning at lower earnings than £50,000. But that is just a consequence of the statistical smoothing used in constructing the figure: in fact nobody in the £45,000 to £50,000 earnings range sees their EMTR increase.
[23] Reductions at such high levels of earnings arise because those with children currently face withdrawal of the family element of Child Tax Credit at family incomes of £50,000 to £58,000 and some two-earner couples have, say, one partner earning £40,000 and the other £15,000, putting them in the relevant range for Child Tax Credit withdrawal despite neither partner having an income high enough to face losing Child Benefit.

Figure 3.7 Average EMTRs across the earnings distribution of workers in Wales



Note: Benefit and tax credit reforms only, as described in Section 1: tax system held constant in its expected 2014–15 form. Sample includes all individuals in Wales aged between 19 and the SPA.
Source: Authors' calculations using the IFS's tax and benefit micro-simulation model, TAXBEN, run on uprated data from the Family Resources Survey 2007–08 to 2009–10.

EMTRs fall most for those with non-working partners and children, especially those with low earnings. This is partly because WTC eligibility has been removed from those working 16–24 hours per week, so they no longer face having their WTC withdrawn over the £6,000 to £15,000 income range; but more generally, the pre-reform benefits system is relatively generous to one-earner couples, so the wider welfare cuts leave many fewer of those working 24 hours or more facing withdrawal of benefits. Lone parents also receive relatively high levels of support and their low average earnings mean that most are within the scope of means-testing, so they are the group that see the second-largest reduction in average EMTRs. Yet it is worth noting that for both single parents and parents with non-working partners there is a range of earnings (from about £15,000 to about £22,000 for lone parents and £28,000 for parents with non-working partners) where average EMTRs actually rise. That is because many of them are affected by the increase in the tax credit withdrawal rate from 39% to 41%; and because even with a less generous WTC and this more rapid withdrawal, the 41% taper does not run out any sooner than the 39% taper did, since the child element of Child Tax Credit has been increased and the family element is being withdrawn at the same 41% rate immediately afterwards (rather than at a rate of 6.7% above incomes of £50,000).

Table 3.2 Mean EMTR among workers in Wales by group

	April 2010	Change in average EMTR (percentage points) from:			Number (thousands)
		Reforms excluding UC	UC	Reforms including UC	
Single, no children	33.6%	-1.4	-0.3	-1.7	258
Lone parent	63.0%	-1.5	-10.8	-12.3	56
Partner not working, no children	39.8%	0.1	2.9	3.0	89
Partner not working, children	59.3%	-2.2	2.8	0.6	64
Partner working, no children	30.5%	-1.0	-0.1	-1.2	383
Partner working, children	37.5%	-1.0	-0.4	-1.5	350
Without children	32.7%	-1.0	0.2	-0.8	729
With children	43.5%	-1.2	-1.2	-2.5	469
Aged 19–24	29.1%	-0.6	2.1	1.6	141
Aged 25–54	38.8%	-1.3	-0.8	-2.1	867
Aged 55–SPA	34.2%	-0.6	-0.2	-0.8	191
White	36.9%	-1.2	-0.4	-1.5	1,148
Non-white	38.1%	0.3	-0.7	-0.3	50
Receiving a disability benefit	46.9%	-1.7	-6.8	-8.5	22
Partner receiving a disability benefit	46.3%	1.2	1.2	2.4	51
No adult in the family receiving a disability benefit	36.4%	-1.2	-0.3	-1.5	1,130
Owner-occupier	35.1%	-0.8	-0.4	-1.2	979
Private renter	41.7%	-2.5	-0.5	-3.0	123
Social renter	52.3%	-3.0	-0.3	-3.2	84
All	36.9%	-1.1	-0.4	-1.5	1,198

Note: Benefit and tax credit reforms only, as described in Section 1: tax system held constant in its expected 2014–15 form. Sample includes all individuals in Wales aged between 19 and the SPA.

Source: Authors' calculations using the IFS's tax and benefit micro-simulation model, TAXBEN, run on uprated data from the Family Resources Survey 2007–08 to 2009–10.

But lone parents and people with non-working partners are a small minority of workers. More than four-fifths of workers in Wales either have a working partner as well or are single without children, and these are groups that see smaller reductions in their average EMTRs. Single people without children straightforwardly see their average EMTR reduced because benefit cuts leave fewer of them subject to

means-testing.[24] The falls occur mainly for those earning less than about £17,000 a year: maximum support for single people without children is relatively low, so those (the majority) earning more than that are much less likely to fall within the scope of means-testing. Two-earner couples can see their EMTR affected by the reforms only if the couple's combined earnings still leave them within the scope of means-testing. For those without children that is rare, and the fall in EMTRs is confined to those earning below about £15,000. The greater generosity of the benefit system towards families with children means that two-earner couples with children are more likely to fall within the scope of means-testing. Those receiving help with childcare costs, for example, can see tax credit withdrawal extend a long way up the earnings distribution, and the reduction in the proportion of costs covered from 80% to 70% will reduce the run-out point and take some of them out of means-testing (though others will see their EMTR increase because of the rise in the tax credit withdrawal rate from 39% to 41%); others might see their EMTR fall because their earnings take the couple's combined income into the £50,000 to £58,000 range in which the family element of Child Tax Credit was withdrawn before the reforms (see footnote 23).

Of all the groups shown in Table 3.2, the ones seeing the biggest falls in their EMTRs are those in rented accommodation. The large reduction in EMTRs for social renters partly reflects the fact that they tend to have low incomes and fall within means-testing (especially with Housing Benefit itself providing a great deal of support to low-income families in rented properties), so they are more likely to be affected by the cuts. That is much less true of private renters, who tend to have higher incomes and are less commonly receiving means-tested support (as Table 3.2 shows, their average EMTR before the reforms is much more similar to that of owner-occupiers than to that of private renters); but those private renters who do fall within means-testing are affected profoundly by the extensive cuts to Local Housing Allowance – cuts that remove that plank of support, and the associated disincentives to increase earnings, from many of them.

Universal Credit increases average EMTRs at the very lowest level of earnings (below about £7,000 per year) and reduces average EMTRs at higher earnings levels than that, with the biggest falls at earnings of around £12,000.

The reasons average EMTRs rise at very low earnings are subtler. The main reason is that, while in general Universal Credit is less aggressively means-tested than the benefits it replaces, some people would be facing withdrawal of Universal Credit and/or council tax support after the reform who would not be facing such steep withdrawal of benefits beforehand. Almost all cases of very low earners facing rises in their EMTRs involve people working 16–24 hours at a low wage. At present, working 16 hours or more disqualifies them from receiving Income Support or income-based Jobseeker's Allowance, so they do not face that 100% withdrawal rate. They may or may not face tax credit withdrawal, depending on whether the WTC hours requirement for that family type is 16, 40 or 30 hours; yet their income may not be high enough for them to face withdrawal of Housing Benefit or Council Tax Benefit, in which case they will face an EMTR of 41% (if they are facing tax credit withdrawal) or zero (if they are not). Under Universal Credit, withdrawal starts as soon as earnings exceed the relevant disregard; for those receiving the housing element, that disregard is lower than the point at which Housing Benefit starts to be withdrawn, creating a range in which the EMTR rises. And in this report we have assumed that the Welsh government adopts a form of council tax rebate scheme in which, after the introduction of Universal Credit, the rebate starts to be withdrawn from the first pound of private income. For those previously facing a zero EMTR, that alone represents an increase. Under-25s are excluded altogether from eligibility to WTC (unless they have children), and see a 2.1 percentage point rise in their average EMTR in part because Universal Credit is extending in-work entitlements (and therefore means-testing of those entitlements) to them for the first time.

[24] In an income range of about £6,000 to £13,000 this is offset by the increased withdrawal rate of WTC; but since single people without children must be working 30 hours per week to qualify for WTC, the minimum wage makes it barely possible to fall within this bracket and relatively few people do.

The very lowest earners aside, Universal Credit tends to reduce EMTRs at low levels of earnings, since it is at low levels of earnings that people currently face multiple overlapping tapers, which Universal Credit removes. Universal Credit reduces the average EMTR of working lone parents by an impressive 10.8 percentage points because many of them are currently in exactly that position, subject to the simultaneous withdrawal of several benefits that Universal Credit does away with. However, for people who would otherwise face tax credit withdrawal but no other means-test, the 65% withdrawal rate of Universal Credit is steeper than they currently face, and those people see an increase in their EMTRs.

Taking Universal Credit alongside the other welfare reforms, it is lone parents that stand out, with a 12.3 percentage point reduction in their average EMTR. Single people without children and two-earner couples see more moderate falls, while the (relatively few) sole earners in couples see a weakening of their incentives to earn more. Incentives for those in work to increase their earnings are strengthened particularly for those renting their accommodation, and weakened particularly for under-25s. Average EMTRs are sharply reduced at earnings of £10,000 to £15,000 – where incentives were weakest to start with – and reduced a little from there up to earnings of about £40,000, though average EMTRs are slightly increased overall for the very lowest earners and for families with children in the £50,000 to £60,000 range.

3.5 Conclusion

Although at first glance the government's welfare reforms appear to have relatively modest effects in strengthening financial work incentives, we have seen that the averages conceal more significant changes for different groups across the population, depending on earnings and family circumstances (amongst other things). One-earner couples with children are the biggest gainers from Universal Credit and the biggest losers from the government's other welfare reforms; correspondingly, the biggest changes in work incentives are seen by those in couples with a non-working partner. But changes in the generosity of support for one-earner couples also affects how worthwhile it is for couples to have a second earner; and since most people in couples have a working partner, those smaller changes in average incentives affect many more people. What effects changes in financial work incentives have on people's work patterns, however, also depends on how responsive people are to those incentives. It is to that question that we now turn.

4. A review of the literature on labour supply responsiveness

So far we have examined how the reforms to the benefit and tax credit system introduced since 2010 and planned over the coming years affect both financial work incentives and non-financial work incentives. However, the effect of the reforms on people's work behaviour in Wales depends not only upon how their work incentives change but also how *responsive* people are to changes in their work incentives. Hence, this chapter reviews the evidence on how responsive people are to changes in financial work incentives, how this varies across the population, and the dimensions of people's labour supply that are most responsive (e.g. whether to work or not, or the hours one works conditional upon working). This review of evidence helps put our own estimates of the responsiveness of labour supply in Wales, discussed in the next chapter, in context, and allows us to obtain plausible ranges of the size of responses for use in the calibration approach carried out in Chapter 6. The focus of this review is summarising what is known about labour supply responsiveness as opposed to reviewing the methods and results of particular pieces of work. However, it is important to identify those results that are most reliable and plausible, and this does necessitate some discussion of the methods used to obtain them. We pay particular attention to reviewing papers that analyse labour supply behaviour in the UK (to the best of our knowledge there is no relevant literature that examines Wales in particular), but we do draw from a wider pool of research covering similar advanced economies in Europe and North America where appropriate. It is worth noting that in conducting this review we have made use of earlier reviews of the literature by Blundell and MaCurdy (1999), Meghir and Phillips (2010), Keane (2011) and Bargain et al. (2011).

The rest of this chapter proceeds as follows. In Section 4.1, we provide a brief discussion of the ways in which labour supply may respond to financial work incentives, how these responses are quantified, and some of the issues that make estimating responsiveness difficult. This helps understand why we place more weight on some empirical estimates of the size of responses than others, and to structure the discussion of the estimates. In Section 4.2 we examine how responsive males' hours of work and employment is to financial work incentives, and do the same for females in Section 4.3. In each case we attempt to identify sub-groups which are likely to be more or less responsive to financial work incentives. Together, Sections 4.2 and 4.3 provide the evidence base to put in context the estimates we obtain for labour supply responsiveness in Wales in Chapter 5, and to perform the calibration approach utilised in Chapter 6. In Section 4.4, we move beyond simply looking at hours of work and look at evidence about how much an individual's taxable or total gross income responds to changes in financial work incentives: this may capture broader responses such as the effort one puts in whilst working or in seeking promotion. It is also worthwhile considering the longer run effects of changes in financial work incentives. In Section 4.5 we look at the literature on the longer term responsiveness of people's work, education, marriage and fertility choices to financial work incentives, and suggest that the shorter-run impacts on employment and hours of work that are the focus of this study may capture only part of the story. Section 4.6 concludes and summarises our review of the literature. Tables of results from the studies discussed in this chapter can be found in Appendix B, and a list of references in Appendix C.

4.1 Concepts, methods and difficulties

Before we consider the range of estimates of responsiveness to financial work incentives, it is worthwhile briefly considering the conceptual and methodological issues underlying them. First, what do we mean by 'labour supply', and how do we quantify how it responds to changes in financial work incentives?

By labour supply, we mean the supply of work effort by individuals for monetary remuneration. Unfortunately, 'work effort' cannot generally be observed, so it is not possible to examine directly how 'work effort' responds to financial work incentives (although as we will see in Section 4.4, examining how changes in work incentives affects income can be seen as doing this indirectly). Instead, most research has focused on examining the relationship between whether one works, and if so, the hours one works, and financial work incentives. The model we estimate in Chapter 5 is of this ilk, and these models allow one to discuss many of the key conceptual and methodological issues involved in understanding the results from the labour supply literature. The fact that such models focus on the link between financial work incentives and labour supply does not mean that other factors are unimportant in explaining whether people are able or willing to work. For instance, people may have different preferences for income versus leisure, or may face constraints that make working difficult, such as childcare and other caring commitments. As well as having a direct impact on the likelihood of working or not and hours of work, such factors may influence how responsive people are to changes in financial incentives: those unable to work due to childcare commitments may be unresponsive to changes in incentives at low wages, but very responsive at moderate to high wages as formal childcare becomes affordable. These differences in responsiveness can be picked up by labour supply models.

We begin with a basic model of hours of work. In such a model, individuals choose the number of hours of work based on their preferences, their unearned income, and the net hourly wage. How might people respond to changes in their net wage (for instance due to a change in the rate at which benefits are withdrawn as income increases), and how can we measure the degree of responsiveness in a consistent way?

First, notice that a change in the net wage consists of two quite distinct effects:

- First, it affects how much extra earnings one obtains from working a little bit more or less at the margin. An increase in net wage increases how much one gets from working more at the margin, which one can think about as increasing the price of leisure time (i.e. time spent not working). When the price of something rises, we generally consume less of it. Hence, the increase in the marginal net wage causes one to consume less leisure and instead work longer. This is known as the **substitution effect** and leads people to work more when net wages increase.
- Second, it affects how much earnings one obtains *given* a particular number of hours of work. An increase in your net wage makes you better off. Again, it is helpful to consider how this might affect how much leisure one wants to take. We consume more of most things the more income we have, so that the **income effect** of an increase in the net wage is to make people work less so that they can take more leisure.

This means that, in principle, an increase in the net wage has a theoretically ambiguous effect on how much people work: they would work more if the substitution effect outweighed the income effect, and vice versa. It is therefore, in general, an empirical exercise to determine not only the size of response to changes in financial work incentives, but also the direction of the response.

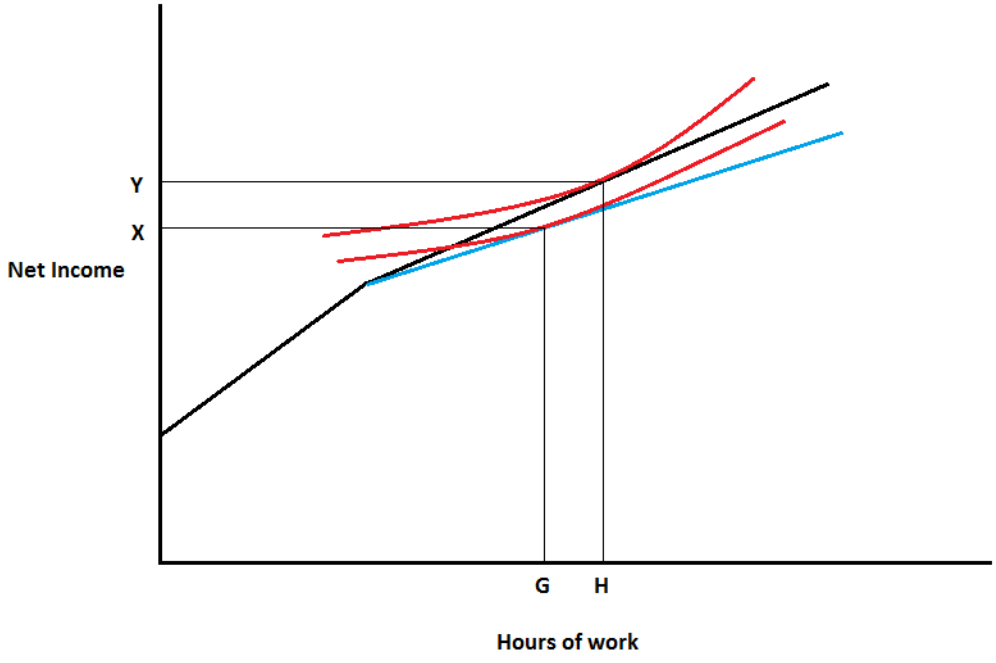
How do we quantify how responsive people are to financial work incentives? The key concept here is the **elasticity of labour supply.** This measures the percentage change in labour supply for a 1% change in the net wage. So, for instance, a labour supply elasticity of 0.5 means that a 1% increase in the net wage would lead to a 0.5% increase in the amount of labour supplied. There are three key types of elasticities that are of relevance to the analysis of how labour supply responds to changes in benefit and tax credits:

- The **uncompensated** elasticity with respect to wages measures the percentage change in labour supply given a 1% change in the net wage.
- The **compensated** elasticity with respect to wages measures the percentage change in labour supply given a 1% change in the marginal net wage, if one held fixed the level of income. This measures the substitution effect discussed above.

- The elasticity **with respect to income** measures the percentage change in labour supply given a 1% change in income, holding the wage fixed. This measures the income effect discussed above.

To see why we care not only about the overall uncompensated elasticity, consider Figure 4.1, which shows (in black) the initial **budget constraint** (that is the various combinations of hours of work and net incomes) faced by an individual subject to a tax system where the marginal rate of tax increases in steps as income increases, and (in red) the **indifference curve** (which shows all the combinations of hours and net incomes which they like just as much – or little – as the option on the budget constraint they choose). The optimal choice is found where the budget constraint is tangent to the indifference curve: in this case, they initially choose to work H hours per week, with net earnings of Y and a net marginal wage of $(1-t_2)W$. Now imagine that the tax rate they face is so that their net marginal wage falls by 5% (to $0.95*(1-t_2)W$), as shown by the blue line. Notice that this does not imply that their net income also falls by 5% as the change in the tax rate only applies to part of their earnings. This means that one would need knowledge of both the compensated wage elasticity and the income elasticity to calculate the effect of the change on the individual's hours of work (that is, the shift to G hours and net income X). The combination of these two effects will generally be a larger reduction in hours of work than implied by the uncompensated wage elasticity. In our calibration analysis in Chapter 6, we side-step such problems by following the work of Saez and assuming that the elasticity of labour supply with respect to income is zero.

Figure 4.1 Examining changes in tax rates under a progressive tax system



Before discussing how economists estimate the responsiveness of hours of work to financial work incentives (and simulate the impact of policy reforms), two further conceptual issues need to be addressed. Both are illustrated in Figure 4.2. The first is the fact that there exist certain 'fixed costs' of work (for instance related to commuting, childcare or purchasing suitable clothing), which mean that people are actually worse off when working few hours than when not working at all: this is why net income in-work starts at a level below out-of-work income. The result of this is that, if people like both income and leisure time, they would not choose to work few hours (the downward jump in the black budget constraint). If someone is not working (like person A with red indifference curves), a small

increase in the net wage rate they would receive if working may not result in any change in behaviour, whilst a second small increase may result in them entering work at significant hours (h_A). In other words, fixed costs of work mean that you can get discrete jumps between not working and working many hours per week that cannot be easily captured by simple elasticities of hours of work. Instead, one may also want to estimate an **elasticity of employment:** but a key question is 'the elasticity with respect to what?'

This was not an issue when considering the elasticity of hours of work with respect to the wage (although, as discussed above, one does need to consider whether a compensated or uncompensated elasticity is most appropriate): because the effective marginal tax rate people face is usually constant for a marginal change in income, a 1% increase in the gross marginal wage implies a 1% increase in the net marginal wage, and vice versa, meaning it is not important whether an elasticity is calculated with respect to the net or gross marginal wage. But, when thinking about the discrete choice of whether to work or not, there are at least three different measures one could be interested in, depending on the context: the elasticity of participation with respect to the gain-to-work; the elasticity of participation with respect to net in-work income; or the elasticity of participation with respect to the gross wage/earnings. These will, in general, will not be the same.[25] It turns out that the type of elasticity required for carrying out the kind of labour supply analysis we do in Chapter 6 of this report (the 'calibration and simulation' approach) is the 'elasticity with respect to the gain-to-work', but that the existing literature reports elasticities with respect to the net in-work income or gross wages. This literature review thus obtains estimates of the elasticity of employment with respect to income/wages, which we then convert into 'elasticities with respect to the gain-to-work' in Chapter 6. This conversion process is not ideal, but is the best that can be done in the circumstances. With all the measures of the elasticity of employment, it is important to recognise that they will vary according to the tax and benefit system (including the in- and out-of-work financial support they receive) and the fixed costs people face.

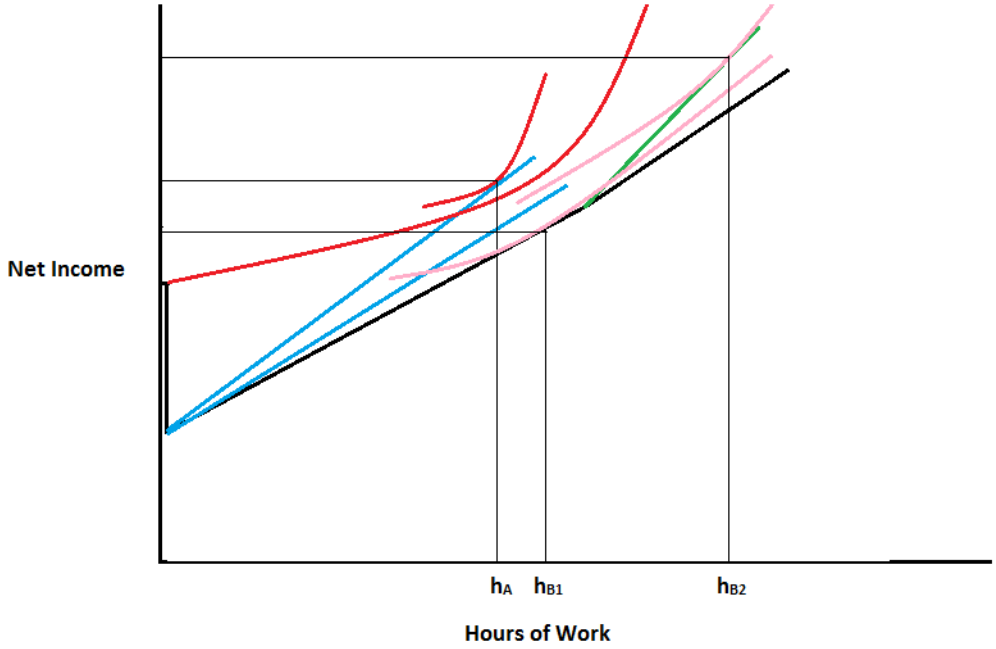
The distinction between moves into and out of employment and marginal changes in hours means that one may estimate a number of different kinds of labour supply elasticity:

- the **total hours elasticity,** which measures the impact of a change in the net wage on total hours of work, including changes in employment and changes in hours of those working;
- the self-explanatory **elasticity of employment;** and
- the **elasticity of hours conditional upon working**, which can be either compensated or uncompensated, as discussed above (the elasticities of total hours and employment are uncompensated).

The 'calibration and estimation' approach requires elasticities of employment and hours conditional upon working, but a number of papers provide only total hours elasticities when conducting breakdowns by demographic groups (for instance Bargain et al. (2011)), making it worthwhile including these in the scope of the review.

[25] The elasticity with respect to work will generally be smaller than the elasticity with respect to net in-work income, because the government provides out-of-work benefits to people. This means that a 1% increase in net income in work is a *more than 1%* increase in the gain-to-work, and thus a given behavioural response implies a smaller elasticity with respect to the gain-to-work. The elasticity with respect to the gross wage can be higher or lower than the elasticity with respect to net income, depending on the circumstances.

Figure 4.2 Examining a changes in tax rates when there are fixed costs and decreases in marginal tax rates as income increases



The way in which benefit and tax credit entitlements vary with hours of work and income can also lead to jumps in labour supply. This is because once entitlements are fully withdrawn, the net marginal wage increases (it is now subject to only tax and not tax and benefit withdrawal). Consider person B (with pink indifference curves), who is initially working a relatively small number of hours (h_{B1}) and on the benefits taper (notice the low net marginal wage). If the rate of tax on income after benefits are fully withdrawn is reduced slightly (as shown by the green reform budget constraint), they choose to increase their hours of work substantially to h_{B2}. Notice that if the net wage was constrained to be constant or decreasing (as opposed to increasing) with hours of work, such jumps would not be possible if people value both leisure and income. The 'calibration and simulation' approach and many standard models of labour supply are unable to take into account such jumps in labour supply (apart from the decision to enter employment itself). But because means-tested benefits and tax credits are important in many countries such as the UK, this has led to a growing use of methods better able to cope with such features.

Estimating labour supply responsiveness

It would be a major undertaking to review the various ways in which labour supply responsiveness could be and has been measured (Blundell and MaCurdy (1999) and Keane (2011) provide useful reviews of the literature from a technical viewpoint). Instead, here we briefly contrast two major classes of models, and discuss a number of difficulties in identifying the causal effect of financial work incentives on work behaviour. In the rest of this chapter, we put most weight on those papers we feel have best addressed these issues.

Complex budget constraints where the net marginal wages can increase with hours and income make modelling labour decisions more difficult: it turns out you cannot specify a simple model of hours of work but have to specify the satisfaction (or utility) that individuals obtain from each hours-net income combination. Such a calculation is onerous when you allow individuals to choose from an essentially

infinite number of continuous hours options, and this has led to the growing use of models that treat the decision of how many hours to work as a discrete choice (e.g. full time, part time, not work) rather than a continuous one: in that case you need only to find the optimal choice of the small set of allowed options. The models we estimate and use in Chapter 5 of this report are discrete choice models, and such models have been increasingly used for tax and benefit policy analysis, especially in the UK and Europe (for instance, see the later discussion of papers examining the UK's Working Families Tax Credit programme). A key issue when using such models is ensuring there are enough discrete hours options to pick up the behavioural effects of reforms, with more options required for those whose hours take on a wider range of values (e.g. women with children) than those who generally are either working full time or not at all (e.g. men), and more options required when the budget constraints people face are more complicated (e.g. when there are hours-of-work conditions for benefit entitlements). It is our view that such models are likely to perform better than traditional continuous hours-of-work models – which with a few exceptions do not deal well with such complex budget constrains – for analysing the responsiveness of labour supply by low- and (as means-testing has expanded up the income distribution in recent years) middle-income workers.

There are, unfortunately, a number of econometric problems that make estimating labour supply elasticities and models difficult. To show these let's take as an example, a single cross-section of data covering the earnings, hours, unearned income and demographic characteristics of a number of individuals. What difficulties prevent us from simply using the correlation between individuals' hours of work and their net wages to estimate labour supply elasticities?

Perhaps the most obvious problem is the fact that, even after controlling for observable demographic characteristics, those who choose to work longer hours (because they like work) are also likely to be the same people who work harder, are more able, and hence produce more when at work. This causes a positive correlation between wages and hours of work (i.e. those with high wages also have long working hours) that one could mistakenly interpret as a causative effect of wages on hours of work, leading to an upward bias in estimated labour supply elasticities. A common solution to this problem is to control for such variation in tastes for work by assuming they are fixed over time (either at the individual or demographic group level) and identifying labour supply elasticities from changes in net wages and changes in hours of work over time. This approach is best when the changes in net wages are most realistically independent of any changes in tastes for work: changes due to tax or benefit reforms are particularly useful in this regard. We put most weight on the results of studies that make use of such changes in work incentives.

But taxes can also cause problems when trying to identify labour supply elasticities. For instance, a typical income tax system has progressively higher tax rates at higher income levels. This means that as hours of work (and hence income) increase, the net marginal wage *falls,* leading to a negative correlation between net wages and hours of work, leading to a downward bias in estimated labour supply elasticities. Several methods have been proposed for dealing with the problems created by both progressive taxation and the withdrawal of benefits, although these are controversial, and some studies have selected samples likely to face constant marginal tax rates in order to sidestep the issue – although at the possible expense of making results less widely representative. Again, we think it is important to put more weight on studies that practically address this issue.

Finally, it is worthwhile discussing the problems raised by mismeasured wages and unearned income. It is well known that if wages are measured on average correctly, but with a degree of random noise, then estimates of the labour supply elasticity will be biased towards zero (this effect is sometimes termed attenuation bias). Hence, studies using reported hourly wages that do not attempt to control for such measurement error may understate the degree of labour supply responsiveness. But what if the errors in reported wages are not random? In many of the studies discussed below, and all the UK studies, hourly wages are calculated by taking the ratio of weekly (annual) earnings to weekly (annual) hours of work.

Let us suppose that hours of work and earnings are reported with error that is uncorrelated. Hence, someone reporting an erroneously high number of hours of work would be given an erroneously low calculated hourly wage, and vice versa. This induces a negative correlation between measured hours and the calculated hourly wage, negatively biasing estimated wage elasticities. Indeed, as Keane (2011) points out, studies that use such ratio measures of wages tend to find smaller labour supply elasticities than those that use direct measures of hourly wages. One reason we include non-UK studies in this review is because some non-UK studies use direct measures of hourly wages. More generally, we also place more weight on studies that attempt to overcome these wage measurement problems when drawing our conclusions.

We now examine how responsive different parts of the population are to changes in financial work incentives, bearing in mind the methodological issues we have just discussed.

4.2 Responsiveness of men's hours of work and employment

In this section we summarise the findings of the literature on how responsive men are to changes in financial work incentives. Our conclusion is that most of the literature, especially for the UK, finds that men's hours of work respond little to financial work incentives, although whether they work or not may be somewhat more responsive, with some evidence that this is more the case for those with low levels of education or are single. This was certainly the view of Meghir and Phillips (2009) who state that 'it would be a fair description to say that male hours adjustment to changes in marginal wages is very low indeed', and Blundell and MaCurdy (1999) come to a similar conclusion. Keane (2011) argues that the evidence does not support the supposed consensus that male hours of work are unresponsive to changes in financial work incentives, and highlights a number of problems that might downwardly bias estimates of responsiveness in many of the studies that do indeed find small labour supply elasticities. This means our second conclusion is that there is a real chance that men may be rather more responsive than generally thought; this observation will help inform our scenario analysis using the calibration approach in Chapter 6 of this report.

How responsive are men's hours of work?

The modern literature on men's labour supply has traditionally focused upon examining how responsive their hours of work are to financial work incentives, ignoring the decision of whether to participate or not. This is driven by the fact that the employment among prime-aged men has generally been very high, especially in the 1970s and earlier, when the first studies took place. As we see in the next sub-section, this has started to change. The literature has also focused on the behaviour of married men as opposed to single men.

A number of papers have examined men's patterns of work in the UK and they generally find a low degree of responsiveness. Many of the earlier papers on British men find negative uncompensated wage elasticities (the average of those surveyed in Pencavel (1986) is –0.16) implying that an increase in the net wage would lead to a reduction in hours of work, although compensated wage elasticities (which measure the effect of a change in the marginal wage holding income fixed) are generally positive and average a modest 0.13. Pencavel (1986) and Keane (2011) point out that many of the sample sizes are small, single cross-sections of data only are used, and the treatment of the 'budget constraint' households face when deciding how much to work does not account for the progressive tax system. The studies also rely on a ratio measure of wages calculated as earnings/hours, which will engender a downward bias to estimated wage elasticities. This means these estimates must be treated with caution.

Blundell and Walker (1986) is a somewhat more advanced study of men's labour supply, being consistent with optimising behaviour over the lifetime (and not just within one period) and within the family. It again finds small negative uncompensated elasticities of hours of work for men, and a small positive

compensated elasticity (0.024). However, some of the assumptions underlying the model are criticised in Keane (2011), and its use of a ratio measure of wages may have downwardly biased results. Again this suggests caution in using these results.

More recent papers examining how responsive men's hours of work are to financial work incentives in the UK are thin on the ground. A recent cross-Europe study carried out using the EUROMOD model of the tax and benefit system (Bargain et al. (2011)) finds an (uncompensated) elasticity of total hours of work for married British men of between 0.03 and 0.06 depending on the year of data used. This effect is driven almost entirely by changes in employment: among those working, hours of work are found to be essentially unresponsive to financial work incentives (an uncompensated elasticity of -0.01). The paper provides one of the only estimates for single men, and finds their total hours to be significantly more responsive (a total hours elasticity of 0.34), although the hours of work among those working are found to be unresponsive (an elasticity of 0.02). Table B.1(A) in Appendix B provides the results of the papers looking at the responsiveness of British men's hours of work.

In order to obtain a larger sample of high-quality estimates, it is worthwhile examining the findings of papers looking at men's labour supply in other similar advanced economies in North America and Western Europe. Table B.1(B) in Appendix B provides the results of the papers looking at the responsiveness of hours men's hours of work outside the UK.

The largest literature examines labour supply behaviour in the US, with the modern literature taking its lead from Hall (1973), who was the first to come up with a solution to modelling piecewise linear budget constraints (see Section 4.1). Wales and Woodland (1979) and Hausman (1981) also accounted for the fact that those with a strong preference to work earn more and therefore face higher tax rates (and lower net wages). Wales and Woodland and Hausman find small uncompensated elasticities (0.14 and 0, respectively), but very much larger income effects that imply very large compensated elasticities (0.84 and 0.74, respectively). Remember that if changes in tax rates or benefit withdrawal rates only apply to a small portion of the budget constraint, the compensated elasticities may be more relevant than the uncompensated ones.

The methods employed in these papers were criticised in MaCurdy, Green and Paarsch (MGP, 1990) who argue that they bias results towards finding a positive labour supply elasiticity. Using the same data as Hausman but a method that overcomes this issue, they find an uncompensated elasticity of 0 and a compensated elasticity of 0.07. Their approach is careful and this paper has influenced much of the subsequent literature (see for instance Blundell (1992), Meghir and Phillips (2010)), but is not without its flaws. Eklof and Sacklen (2000) show that the results are sensitive to the definition of wages and non-labour income used and that *this* is what drives the differences between MGP and Hausman's results, and not the methodological issues identified by MGP. But they are unable to replicate Hausman's results even when using the same method, and suggest that the results obtained are very sensitive to minor differences in the sample. Our reading of this is that although MGP's critique may not have the bite they believe it to have, the results in Hausman (1981) are not robust enough to be given much weight.

Other US studies have tended to find much smaller elasticities of labour supply for men. A series of papers examines the so-called NIT experiments undertaken in the US from 1968, which provided an income guarantee to some households that would then be tapered away (the treatment group) whilst other households continued to face the standard tax and benefit system (the control group). Using this experimental data, Burtless and Hausman (1978), one of the first papers to deal with the problems of modelling labour supply when benefits are tapered away, found the uncompensated elasticity to be 0, with small income effects implying a compensated elasticity of between 0.07 and 0.13. Pencavel (1986) finds that eight other analyses of these experiments find small positive uncompensated elasticities (a mean of 0.03), and small compensated elasticities (bunched fairly tightly around the mean of 0.13). Pencavel (2002) uses a long time series of US data and finds that depending on method used,

uncompensated elasticities for white men can vary from moderately negative (-0.175) to moderately positive (0.25).

There is also a literature examining behaviour in continental Europe. These papers generally find small uncompensated and compensated wage elasticities, suggesting that men do increase their hours of work when their net wage increases, but only slightly. There is a particularly well developed literature in Sweden which has been internationally influential due to its high quality and methodological innovation. A series of papers by Blomquist and co-authors (Blomquist (1983), Blomquist, Hansson and Brusewitz (1990), Blomquist, Ecklof and Newey (2001), Blomquist and Newey (2002)), using several different methods, finds uncompensated wage elasticities that fall in fairly tight bands between 0.07 and 0.12. Studies using data from France (Bouguignon and Magnac (1990)), Germany (Kaiser et al. (1992)), and the Netherlands (van Soest et al. (1990), Euwals and van Soest (1999)) find a low degree of responsiveness of male hours of work to financial work incentives. The cross-country study by Bargain et al. (2011) finds low elasticities of hours of work for men *in couples* across Europe: uncompensated elasticities of total hours of work average around 0.1, and the uncompensated elasticity of hours of work among those working averages approximately 0.01 to 0.02.

Taken together, our reading of the literature is that most of the more credible papers since the 1980s find that the responsiveness of male hours of work to changes in net wages and changes in unearned income is low: this means both the uncompensated and compensated wage elasticities are small, although the latter is likely to be a little bigger than the former (meaning income effects are unlikely to be absent but are likely to be fairly small). In other words, men, if they work, respond little to changes in financial work incentives, and overwhelmingly choose to work full time. An uncompensated hours-of-work elasticity of around 0.0 to 0.1 would seem a sensible 'central estimate'. This is similar to the value predicted for UK men in a meta-study of the labour supply literature (Evers et al. (2008)). We should note, however, that Keane (2011) points out that previous critiques of the Hausman-type literature that found rather high *compensated* wage elasticities may have overplayed their hand, and that he argues that many of the papers finding small elasticities use measures of wages that could downwardly bias results. Together with the potentially large dynamic effects we shall discuss in Section 4.5, this means that it is worthwhile looking at how the effects of the welfare reforms differ if men's labour supply is rather more elastic (e.g. an elasticity of 0.25).

Few papers for men examine how men's hours of work respond to financial work incentives have investigated how elasticities vary by demographic group. The one exception is the EUROMOD study, which examines how responsiveness varies by where in the household income distribution a man falls: not by much, as it turns out for the UK. As we shall see below, there is more evidence about how employment and taxable income elasticities vary by type of individual.

How responsive are men's employment decisions?

The literature examining how men's employment decisions are affected by financial work incentives is fairly limited. Bargain et al., discussed above, finds that the increase in total hours of work predicted is largely or entirely accounted for by changes in employment. The employment elasticity is estimated to be very small for British men in couples (0.06 to 0.08), but rather higher for single British men (0.22 to 0.35). This pattern of significantly greater responsiveness for single men than men in couples is something that they find in most of Europe, although the authors do not offer an explanation for this phenomenon. Meghir and Phillips (2010) is the only other paper we could find that estimates employment elasticities for British men. In a careful study that tries to account for many of the estimation issues discussed in Section 4.1, they find employment elasticities that vary by education level and partnership status. The elasticity of employment with respect to in-work income is estimated to be fairly low for highly educated men (those who left full-time education aged 19 or older), at around 0.04 for married men and around

0.08 for single men. However, they find much bigger responses amongst those who left school aged 16 or under (0.27 for single men, 0.53 for married men).

The large elasticities found for men with statutory levels of education in Meghir and Phillips (2010) are considerably bigger than those that have been found for the general male population in other countries. The two US studies (Eissa and Hoynes (2004) and Heim (2009)) discussed by Bargain et al. found small employment elasticities for men (0.03 and 0, respectively), as did Aaberge et al. (1999, 2002) for Italy, Brink et al. (2007) for Sweden, Labeaga et al. (2008) for Spain, and a number of papers for Germany.

Results from these studies are summarised in Table B.1(C) in Appendix B.

It is also worth looking beyond the general labour supply literature and examining the literature on responses to the work incentives generated by welfare and unemployment insurance schemes. Krueger and Meyer (2002) examine a large body of papers on this from the United States and Europe, and find that the elasticity of 'lost work time' (which accounts for the number and duration of claims) with respect to the level of benefits is around 1 for unemployment insurance. Generally lower elasticities are found for other forms of insurance such as disability benefits. Krueger and Meyer suggest a number of reasons why the elasticities are greater than found in most studies for men. One interpretation is that those likely to be affected by unemployment are likely to have lower levels of education or income than men as a whole; and recall that Meghir and Phillips (2010) find higher degrees of responsiveness among men with low education.

Overall, the employment decisions of men appear to be somewhat more sensitive to financial work incentives than their hours of work conditional upon working. An uncompensated employment elasticity of around 0.1 to 0.2 would seem a sensible 'central estimate' based on the existing evidence from advanced economies. It is likely that there is a 'gradient', however, with lower income/education men being more responsive than higher income/education men. As with hours-of-work elasticities, the literature does provide quite a wide range of results, and it is therefore again worthwhile testing the sensitivity of results to rather larger elasticties.

4.3 Responsiveness of women's hours of work and employment

We now turn to examine how responsive women are to financial work incentives. As with most previous reviews of the literature, our conclusion is that women's total hours of work are rather more responsive to financial work incentives than men. This reflects somewhat larger elasticities of hours conditional upon working, but largely, greater responsiveness at the employment margin, especially for those with children. However, whilst children appear to be a key determinant of women's working behaviour, much of the literature differentiates between married/cohabiting women and single women, and we find it useful to follow this convention in setting out the findings of the literature in more detail.

How responsive are married women?

There are a number of important and influential papers examining the labour supply behaviour of married British women, and unlike for men, several of these studies break down results by demographic sub-group.

Perhaps the best estimates come from Blundell, Duncan and Meghir (1998), who use many years of data and estimate effects using differential trends in net-of-tax wages and hours of work by education group and cohort. This allows them to overcome many of the problems that make identifying the effect of work incentives (as opposed to differences in preferences) on labour supply. They find that hours of work elasticities are 'moderately sized', but differ by the age of the youngest child. Among married women without children, the uncompensated and compensated wage elasticity equals 0.14, and a similar degree

of responsiveness is found among women with children aged 5 or over. However, those with a youngest child aged under 0 to 4 are found to be much more responsive. For instance, the uncompensated elasticity is 0.37 and the compensated elasticity 0.44 for those with a youngest child aged 3 or 4. The results indicate that the hours of work of married mothers with young children are *much* more responsive than their partners and other married women, even conditional on whether or not they work (the sample used in this paper includes only employed women). Arrelano and Meghir (1992) also examine how the responsiveness of married British women's labour supply varies by age of youngest child, but look at total hours of work as opposed to hours of work conditional upon working. Unsurprisingly, the elasticities found are higher than in Blundell, Duncan and Meghir (because they refer to *total* hours as opposed to hours *conditional upon working*). The uncompensated wage elasticity is 0.37 for women without children, with responsiveness significantly greater for those where all children are school-aged (i.e. 5 or over). This is a point of difference with Blundell, Duncan and Meghir, where it is those with pre-school-aged children who are most responsive, although this may reflect differences in behaviour at the employment and hours margins. Meghir and Phillips (2010) point out that Arrelano and Meghir's work rests on an assumption that education only affects labour supply via wages: if, as may seem likely, those with more education also have a greater preference for work, estimates of wage elasticities from this study would be upwardly biased.

Bargain et al. (2011) find a rather low degree of responsiveness, with a total hours elasticity of only 0.09–0.12 for married British women as a whole, with around three-quarters of this being the result of changes in employment and one-quarter the result of changes in hours among those employed. Elasticities of total hours are a little higher for those with children (0.11–0.13) than without (0.07–0.10), and increase with a woman's position in the household income distribution (they are around twice as high for women in the top quintile than bottom quintile). They find an elasticity that increases with household income in more than half of the samples/countries they examine, including Italy, where an earlier influential paper by Aaberge et al. (1999) finds an elasticity that is much higher for women among the poorest tenth of households (3.44) than among the middle eight-tenths (0.83) and the top tenth (0.04). Blundell et al. (2000) also estimates a rather low uncompensated wage elasticity for married women of 0.14, but the paper does not break results down by demographic sub-group.

Results from these papers and the rest of the literature covering Britain can be found in Table B.2(A) in Appendix B. A paper by Arrufat and Zabalza (1986) finds a much higher degree of responsiveness: a total hours elasticity of 2.03, consisting of a employment elasticity of 1.41 and an elasticity of hours conditional upon employment of 0.62. This is at the very upper end of elasticities found for married women in any advanced economy. On the other hand, Blundell, Ham and Meghir (1987) find an elasticity of total hours in their main specification of only 0.08, and Blundell et al. (1988) find an uncompensated wage elasticity of hours conditional upon employment of 0.09 (although a large income elasticity suggests a rather higher compensated elasticity). Hence, there is a very wide range of elasticities for married women in the UK.

Table B.2(B) in Appendix B includes estimates from studies from other advanced economies. Overall, these reinforce the picture obtained for the UK: elasticities of total hours of work that are rather higher than for men, on average, but that differ quite significantly between studies. Bargain et al. (2011) suggests that elasticities vary with the level of employment among married women (they are higher where employment is lower), which suggests the results for countries such as the Netherlands or Germany where employment patterns are similar to the UK may be of most relevance. Uncompensated wage elasticities of total hours of work for the studies in the Netherlands are typically between around 0.5 and 1.0, whilst recent studies in Germany estimate elasticities between around 0.25 to 0.4. In both instances, perhaps around half of this is via employment effects, with the rest due to changes in hours conditional on employment; the contribution of employment decisions is a little greater in most of the rest of Europe. American studies have typically found elasticities of total hours of work of around 1, with Triest (1990)

suggesting that about seven-tenths of this is due to employment responses, and the rest due to changes in hours conditional on employment.

There is also a large literature examining how married or cohabiting women's labour supply has responded to specific reforms to the welfare system, although these studies generally do not report comparable elasticities. The Working Families Tax Credit has been one of the most analysed policies in the UK context and studies by Blundell et al. (1999) and Brewer et al. (2005) both find similar policy impacts. Increased entitlements to in-work support reduced the employment of married or cohabiting women with employed partners (by around 0.6 percentage points) and increased it for those with unemployed partners (by between 0.1 and 1.3 percentage points). The main lesson from this work is that benefit changes designed to improve the work incentives and increase employment amongst those with low wages may sometimes weaken them for secondary earners (often women in couples).

Taking the literature as a whole, we think that it is fair to say that married women's labour supply looks more elastic than that of men, in terms of both hours of work, and employment. Central 'estimates' of around 0.1 to 0.2 for both dimensions for married women without children would seem plausible, with elasticities higher for those with young children, perhaps twice as high as those without (we place significant weight on the findings of Blundell, Duncan and Meghir (1998), which is a high quality paper). However, the range of estimates is, as pointed out in Meghir and Phillips (2010), 'very wide' and, as with men, sensitivity tests should use fairly wide bounds. Given results from some studies in the US, Europe and UK, total elasticities of around 1 for married women as a whole would not be out of the question, although most of this would likely be due to employment as opposed to changes in hours. It is also important to recognise that income effects, when reported, tend to be somewhat higher for women than for men, which suggests that the assumption of no income effects underlying the calibration analysis in Chapter 6 of this report may be somewhat more problematic than for men.

How responsive are single women?

Studies examining the behaviour of single women have tended to focus on single women with children as opposed to childless women. This reflects both a particular policy focus on lone parents and the fact that the variation in their work behaviour provides more scope for estimating labour supply models. Table B.2(C) in Appendix B shows results from UK studies, whilst Table B.2(D) in Appendix B shows results from overseas studies.

The UK literature examining the behaviour of single mothers begins with Walker (1990) who examines employment decisions, and finds an employment elasticity of 0.7. Even larger employment elasticities of 1.7 to 1.8 are found in papers by Ermisch and Wright (1991) and Jenkins (1992), although the latter paper relies on only a single cross-section of data. A convincing alternative approach is given by Brewer et al. (2005) who combine use of a structural model of labour supply and welfare participation, with data covering the period both before and after the introduction of the UK's Working Family Tax Credit. They do not report an elasticity of employment or hours, but the implied elasticity is around 1 (a 10% increase in average in-work income as a result of the reform is estimated to lead to around a 10% increase in employment rate).

Blundell, Duncan and Meghir (1992) examine how the hours of work of lone parents, conditional upon working, vary with respect to financial work incentives. They find hours elasticities that are between 0.14 and 0.34 for lone parents as a whole depending on specification, with the highest elasticities for single mothers with pre-school children (0.23 to 0.52), and the lowest elasticities for those with secondary school-aged children (0.11 to 0.26). This is a similar pattern to that found for mothers in couples in the 1998 paper by the same authors. This is a paper we place significant weight upon, given its high quality and UK focus.

Blundell and Shephard (2011) examine both employment, hours of work (conditional upon working) and total hours of work elasticities for lone mothers in the UK, and like the papers of Ermisch and Wright and Jenkins they find very high employment and total hours elasticities. For instance, the average uncompensated employment elasticity is 1.40, and the average total hours elasticity is 1.53. On the other hand, the elasticity of hours conditional upon working is just 0.04, significantly lower than in earlier work. Employment and total hours elasticities are found to be higher for lone parents with younger children (for instance, the total hours elasticity is 2.25 for women whose youngest child is aged 4 or under versus 1.00 for those whose youngest child is aged 11 or over), although far lower initial employment among those with younger children means the percentage point changes in the employment rate are larger for those with older children.

The US also has a number of studies looking at labour supply elasticities for lone parents, again focusing on the employment response. Eissa and Liebman (1996) and Keane and Moffit (1998), both find employment elasticities of around 1, although in the former case, there may be worries that the control group used for analysis (single women without children) is inappropriate as they had much higher employment than lone parents at the start of the period of analysis.

The literature specific to lone parents is fairly sparse for continental Europe, although there is a literature examining the behaviour of single women more generally (often pooled with single men). Bargain et al.'s (2011) cross-country study provides a set of estimates for single women, separately by whether they have children or not. Elasticities vary considerably across countries and datasets: total hours of work elasticities for single women with children are estimated at over 0.5 in Belgium, Greece, Ireland and Italy but are around 0.1 in many countries including France (2001 data), the Netherlands, Spain (1998 data), Estonia, Hungary and Poland. Their estimates for single mothers in the UK are 0.39 using 1998 data and 0.35 using 2001 data, with corresponding figures of 0.41 and 0.29 for single women without children. In this study, although elasticities are generally a little higher for single women with children than those without, the reverse is true in 8 out of 25 datasets used (including the 2001 UK data).

There is a more sizeable European literature examining the behaviour of single women as an aggregate group, especially in Germany. For instance, Bargain et al. (2009) finds an elasticity of total hours of work of 0.267 for single women when using a traditional labour supply model, and a rather low 0.104 when using a model where employment opportunities are constrained by weak demand for labour. Around two-thirds of the response is found to reflect changes in employment (elasticities of 0.197 and 0.069, respectively). This is an interesting paper to which we will return in Chapter 6 when examining how the labour supply impacts of the UK government's welfare reforms may differ in a labour market characterised by low demand for workers (especially low skilled workers). Other estimates for single women in Germany also tend to find moderate hours and employment elasticities. Clauss and Schnabel (2006) find an employment elasticity of 0.18 for single women, with an elasticity of total hours of 0.38. Bargain and Orsini (2006) find an employment elasticity of 0.13 and an overall hours-of-work elasticity of 0.16, for Germany, with responsiveness a little lower in France, and a little higher in Finland.

Taking the literature as a whole, we think that it is fair to say that the labour supply of single mothers looks to be the most elastic of the broad demographic groups, with the decision to participate or not being especially responsive to financial work incentives. A central estimate of the employment elasticity of around 1 for lone parents would not be unreasonable, with an elasticity of hours-of-work conditional upon working similar to women in couples with children appearing sensible. Employment among lone parents in the UK is low compared to the rest of Europe, and there is evidence that responsiveness is greater when employment is lower: this, together with the fact that models are typically estimated for single women as a whole, is why we put little weight on the typically lower estimates of responsiveness found in studies in European countries such as Germany. However, these estimates do mean it is worthwhile examining the impact of assuming lower degrees of responsiveness (for instance, an employment elasticity of 0.4, and an elasticity of hours conditional on working of 0.1) as well as higher

degrees (for example, an employment elasticity of 1.6, and hours elasticity of 0.4). The studies examined do not report compensated wage elasticities for lone mothers. But, it seems likely that, as with women in couples, income effects are somewhat larger than for men, again meaning that the impacts predicted by the calibration and simulation approach (Section 6) must be treated with a bit more care for lone mothers.

The evidence suggests that elasticities of employment and, possibly, hours of work conditional upon working, are somewhat higher for lone parents with children aged around 3–5. However, higher employment elasticities for those with children in this age group reflects, at least in part, the fact that employment among such lone mothers is significantly lower than those with older children. This means that the larger elasticities translate into small changes in the numbers in employment than the lower elasticities for those with older children.

For single women without children, the evidence is much sparser: we are aware of only a single paper for this group that provides estimates for the UK. However, drawing on the results of studies from Germany, we feel an employment elasticity of 0.1 to 0.2 and an hours elasticity of around 0.1 would be a plausible central scenario.

4.4 Responsiveness of income and wages

As we discussed in Section 4.1, individuals may respond to changes in financial work incentives in more ways than simply changing how many hours they work: they may change the amount of effort they exert during their working hours, especially if self-employed or paid fully or partly on a performance basis, or they may attempt to avoid or evade taxes (or, similarly, not report earnings to those managing the benefits system). Whilst we cannot observe work-effort directly, we are able to observe reported incomes, and this may be seen as a proxy for total effort (i.e. hours and effort-per-hour). Much of the literature on how responsive total and taxable income is to financial work incentives focuses on high income individuals, in part because such individuals are felt to have more scope to respond by reordering their financial affairs, but also because this group has seen large changes in their marginal tax rates (large falls during the 1980s and, more recently, an increase in the UK) and this is especially true of the UK literature. As the focus of this review is to provide information on how the supply of labour by Welsh people may respond to changes in the welfare system, and those affected significantly by these changes tend to have low to middle incomes, the results in the UK literature are of only limited direct relevance. We include them to emphasise that *time worked* is not the only element of labour supply that matters, and for future use by researchers. However, there are some papers, mainly from the US, that are of more direct relevance.

A number of studies from the US do examine how *earnings* respond to changes in financial work incentives for lower income people, making use of variation created by the Earned Income Tax Credit (EITC). Grogger (2003), for instance, estimates that a $1,000 increase in the EITC would lead to an increase in employment of US single mothers of 3.6 percentage points (around 5%), and an increase in average gross earnings of $610 (also around 5%). This means that either there was no effect on the gross earnings of those already in employment, or at best only a small increase if those entering work had lower than average wages (it seems unlikely that new entrants earned more than average).

A number of other studies of the EITC have found evidence that earnings increased by more than employment. For instance, unpublished work by Chetty, Friedman and Saez uses variation in 'bunching' around the points at which EITC is fully phased in and starts to phase out to argue that knowledge of the EITC varies dramatically across the US. Then, using areas with the 'lowest levels of knowledge' as a control group, they examine the effect of EITC on earnings by comparing earnings around the birth of first-born children (when EITC entitlements increase significantly). Whilst they find only a small employment elasticity (0.09 or 0.18 including self-employment), estimates of earnings elasticities based

on the phase-in of EITC are considerably higher (0.37 and 0.52), suggesting either increases in hours or increases in wage-per-hour. Estimates of earnings elasticities based on the phase-out are 0, however (suggesting a fall in wages). Dahl et al. (2009, 2012) compare single mothers with one child with those with two children to assess the impact of EITC on earnings growth. Those with two children have a higher maximum EITC entitlement and earn more before EITC begins to be withdrawn, and therefore have a greater incentive to increase their wages. The study finds that the wages of two-child mothers increase more rapidly than those of one-child mothers over a 1-, 3- and a 5-year horizon, and find that their wages grew more quickly, with the most difference occurring in the first year of employment. Wage growth among mothers with two children was 18 percentage points higher than that for those with one child after 1, 3 and 5 years, following the introduction of the EITC (previously there was no statistically significant difference).

Other US literature, however, finds that recipients of the EITC see falls in their wages. Leigh (2010), for instance, finds that the wages of high school drop-out recipients fell by 5% relative to non-recipients and those of college graduates fell by 2%, whilst Rothstein (2008) found that low-skilled mothers saw 30% of the increase in income from the EITC lost in the form of lower wages. These wage falls are interpreted not as a reduction in effort, but as part of the tax credit is incident on the employer (i.e. they can reduce wages because the increase in tax credits means recipients are willing to work for a lower wage).

The only UK study of the effect of welfare on wages that we are aware of is a forthcoming paper by Azmat (2012). This study found that the increase in in-work financial support resulting from the introduction of Working Families Tax Credit (WFTC) led to a *reduction* in the wages of those in receipt of the tax credit relative to those not receiving it , (that implies 34% of WFTC entitlement is lost in the form of lower relative wages), especially for men, and some evidence of a spill-over to lower wages in industries with high numbers of WFTC recipients. However, Azmat is also able to test whether the reduction in wages is due to the fact that benefit entitlements increased or because WFTC, unlike Family Credit, which it replaced, was paid through wages and was therefore more visible to employers. She finds that it is the latter effect that was key, with the change in entitlement itself having little or no effect on wages. Both current benefits and the new Universal Credit are paid directly to recipients rather than via employers; Azmat's results would therefore suggest little or no effect on wages.

The broader literature on how total and taxable income changes in response to changes in financial work incentives (sometimes termed the 'New Tax Responsiveness Literature'), also has been most developed in the US. Gruber and Saez (2002) present perhaps one of the most careful studies that attempts to control for the numerous issues that make estimating the responsiveness of income difficult and find a taxable income elasticity of 0.4 for US taxpayers as a whole. Much of this is driven by individuals towards the top of the distribution, however. For those with total incomes greater than $100,000, the taxable income elasticity is 0.57, but it is only 0.18 for those with incomes between $10,000 and $50,000 and 0.11 for those with incomes between $50,000 and $100,000. Elasticities of total income are not statistically significantly different from zero for any of the groups, suggesting that the response may result for changes in tax avoidance as opposed to changes in work effort. Other studies including those by Feldstein (1995) and Sillamaa and Veall (2000) also find that taxable income elasticities are considerably larger for those with the highest income than the rest of the population (their studies find higher degrees of responsiveness overall, although this may reflect methodological failings).

Two recent studies examine behaviour in the UK, but focus on the top 1% of earners who were affected by the cuts in the top rates of income tax in the 1980s and the recent introduction of a 50% rate of income tax (to be reduced to 45% in April 2013). Both find taxable income elasticities of around 0.45 to 0.5, indicating a sizeable degree of responsiveness for this group, despite the fact that available evidence suggests their hours of work are fairly unresponsive (most of the top 1% of earners are men). Unfortunately, no taxable income elasticities for those on low and middle incomes exist for the UK

presently, although a programme of study is under way at the IFS and will produce results in the next 12 months.

It is therefore unclear from the literature on income responses to welfare and tax changes whether one should expect wages to rise or fall in response to increased financial work incentives. In fact, a consideration of economic theory means one should not be surprised by this. On the one hand, an increase in financial work incentives will encourage people to work harder, which may lead to an increase in hourly wages. But if people are willing to increase their labour supply in response to greater financial work incentives, firms may be able and willing to reduce the wages they pay. This means it will be important to monitor what happens to wages of benefit recipients as reforms take place.

4.5 Longer run responses

We now briefly consider the literature which considers the long run impact of financial work incentives on labour supply and behaviour. The key focus of this work is how financial work incentives affect human capital acquisition, whether by changing the amount of formal education one obtains, or changing the amount of on-the-job experience one obtains. This literature is largely US and Germany based, although estimates are becoming available for the UK due to on-going work at the IFS. The results reported in these papers indicate that the short run effects on hours of work and employment rates that are the focus of this paper are potentially only a small part of the potential impact of welfare reform on work behaviour. Incorporation of such effects is beyond the scope of the current project, but could form part of a longer term project on understanding people's work behaviour in Wales and the UK.

One strand of work examines whether on-the-job learning means that changes in hours of work affect future productivity and wages. This literature stems from the recognition that one may increase one's productivity directly through work or devote part of one's work time to investment in one's productivity (an early paper in this field, Heckman (1976), estimated around 35% of a 23-year-old man's work time was spent investing in his skills). Shaw (1989) uses data on American men aged 18 to 64 and finds that a temporary 25% increase in hours leads to a 12.8% increase in hourly wages. Eckstein and Wolpin (1989) and Altug and Miller (1990) find that women's wages also increase following an increase in their hours of work. The work also provides a clue to why people's working hours do not increase over their lifetime as their wages increase: the total return to work increases by far less because, as they age, the value of 'learning-by-doing' declines. This is important because it implies that changes in wages may have substantially different impacts on work behaviour at different stages of the lifetime: when one is young, wages are a far smaller part of the return to work than when one is older, and so one may respond less to changes in wages.

This is something investigated in Imai and Keane (2004), who develop a more advanced model of work and saving behaviour that includes learning-by-doing. They find that a 2% unanticipated temporary change in wage leads to a change in hours of 0.6% for someone aged 20, but nearly 4% for someone aged 60: this is because a 2% change in wages is a much smaller change in total return-to-working for the young worker. Keane (2011) simulates the effect of a 5% permanent tax increase on hours of work. Ignoring learning-by-doing, he obtains an uncompensated elasticity of hours of 0.24 (which would lead to a reduction in hours of work of 1.2%). However, allowing for learning-by-doing, the elasticity increases to 0.4, reflecting second-round effects: a fall in hours leading to a fall in wages leading to a further fall in hours, and so on. Over the lifetime, this leads to dramatic effects: a 5% increase in the rate of tax leads to a reduction in hours of work that increases from 0.7% at age 20, to 1.0% at age 45, to 2.3% age 50, and 9.4% at age 60. Work by Adda et al. (2006) using German data has found that changes in financial work incentives can also impact the decision of whether to remain in formal education or enter the labour market. They find that introduction of in-work tax credits in Germany would increase male employment by around 1 percentage point, but that it would also reduce the proportion engaging in formal vocational

training by around 6 percentage points as the return to training is reduced. This shows that policies designed to increase work incentives for low earners may also weaken incentives for people to engage in training. On-going work at the IFS suggests that the increase in in-work support for low-income women may have a similar effect in the long run.

The literature on women often adds additional dimensions of behaviour including fertility and marriage. Van de Klaauw (1996) uses US data and models labour force participation and marriage decisions allowing for on-the-job learning. Using such a model, a $1,000 increase in wage at all ages (7.3% on average), leads to a 2.5-year increase in work experience by age 35, implying a very large uncompensated elasticity of 3.6. Part of this is due to the fact that increases in wages lead to later marriage and a higher probability of separation (unfortunately results are not presented that close down experience and/or marriage effects). Keane and Wolpin (2010) also add in fertility and the decision whether to participate in welfare programmes. They find extremely large effects of financial work incentives on employment once one takes into account these issues. For instance, the uncompensated elasticity is 0.6 for highly skilled women and an incredible 9.2 for low skilled women (the average is 2.8). For instance, a 5% wage increase is seen to increase employment of low skilled women by 47% (from 34% to 50% of the group), to lead to a big fall in high-school drop-out rates (from 42% to 24%), and large falls in welfare participation and teen pregnancies. The magnitude of these effects do seem somewhat implausible but, at the very least, they indicate that tax and benefit policies can have big impacts on work through indirect channels such as fertility. There is evidence that fertility responded to the UK's WFTC: Brewer et al. (2011) finds that an increase in the generosity of benefits and tax credits for low-income families led to an increase in fertility of 15% relative to groups unaffected by the reforms, which may have offset some of the increase in labour supply attributed to the policy change.

4.6 Conclusion

The literature on labour supply is voluminous and we have been able to touch upon only a small part of it here. However, this does provide key insights into how responsive different groups in the population are, and along which dimensions (i.e. hours or employment). It has also highlighted that there is evidence that financial work incentives can lead to changes in gross wages, and education, fertility and marriage decisions, and that a longer run agenda of building models that can examine such impacts may be worthwhile (albeit challenging).

Our reading of the literature is that men's hours of work and employment decisions are least responsive to financial work incentives, and lone parents and married women with children are most responsive. Married women without children seem to be a little more responsive than men, but rather less responsive than women with children. There is, unfortunately, little information on the behaviour of single men and single women without children. However, it seems plausible that they may behave in a similar way to married/co-habiting men, as these groups also have relatively high rates of employment and work as a 'norm'.

Overall, studies indicate that employment decisions are more responsive than hours-of-work decisions, especially for groups facing high fixed costs of work, such as lone parents and low earners. Men seem unfairly unresponsive on both dimensions, in general, with higher overall responsiveness for married/cohabiting women reflecting both greater responsiveness in terms of hours of work and employment. The high degree of responsiveness among lone parents is largely driven by very high employment elasticities.

The evidence on whether employment elasticities are higher for low income or high income groups is rather mixed, although recent UK work has found that it is low skilled (and therefore likely low income) individuals that have higher elasticities than high skilled individuals. The large literature evaluating welfare reforms affecting, generally, low to moderate income individuals, also tend to find fairly

significant impacts, suggesting a higher degree of responsiveness to financial work incentives than for the population as a whole (see, for instance, evaluations of Working Families Tax Credit in the UK, and the Earned Income Tax Credit in the US). The fact that employment is generally initially lower for low skilled and low income individuals also suggests that there is likely to be more room for response on the employment margin. It is unclear whether elasticities of hours of work vary across the income distribution. However, there is evidence that the taxable income of those towards the top of the income distribution is more responsive to changes in financial work incentives, suggesting they may be more responsive in ways other than hours (for instance, effort, or by changes in tax avoidance behaviour).

Our review of the literature has struggled to find studies that provide estimates of hours or employment elasticities by age. However, two strands of work suggest that responses, especially on the employment margin, are likely to be particularly large for those in their 50s or older. First, the literature on longer run responses that incorporates on-the-job learning suggests that older workers respond more to changes in financial work incentives as they are no longer acquiring human capital whilst working (see Section 4.5). Part of the greater responsiveness of older workers reflects the fact that a given change in wages translates into a larger change in the overall 'return to work' for them. Second, the literature on the effects of retirement incentives on the employment of older workers finds sizeable effects of pension wealth and disability benefits (which discourage work), and pension accrual (which encourages work). Although these findings are not expressed in terms of labour supply elasticities, the results of such work (see Gruber and Wise (1999, 2005)) do imply employment elasticities above those typically found for most of the population (and certainly prime-aged men).

It is difficult to provide a precise quantification of these findings, but the calibration approach utilised in Chapter 6 means we need to decide upon particular elasticities to use. Because of the significant degree of uncertainty about the size of responses, high-, central- and low-responsiveness scenarios are examined in the calibration exercise, drawing on the findings and conclusions of this review.

5. Modelling the impact of the welfare reforms: the estimation and simulation approach

In this chapter of the report we simulate the impact of the changes in financial work incentives (due to the welfare reforms) on the labour supply of married and cohabiting couples–including both those with and without children–and lone mothers using models estimated for this project. The highly non-linear relationship between hours of work and net income generated by the tax and benefit system means that it is extremely challenging to model individuals' choices over all possible hours of work. Therefore, instead, we utilise discrete-choice models where lone mothers choose between a relatively small set of hours options, and couples choose between a relatively small set of *combinations* of hours options. In particular lone mothers choose one of 7 options (0 hours, 1 to 7 hours, 8 to 15 hours, 16 to 19 hours, 20 to 29 hours, 30 to 34 hours, or 35 or more hours per week), women in couples choose from one of 5 options (0 hours, 1–15 hours, 16–19 hours, 20–29 hours or 30 hours or more) and men in couples choose to work or not. These models allow us to estimate the relationship between individual and couples' net income under each hours option and the probability of individuals and couples choosing each hours option. The impact of the welfare reforms is then assessed by calculating the effect on net income in each hours option and, hence, on the probability of choosing each hours option. We can then use these results to simulate the impact of the reforms on employment and hours of work.

Fuller methodological information can be found in Appendix D of this report. However, it is important to note the groups that are *not* included in this model. First, and most obviously, our model for 'couples and lone mothers' excludes lone fathers and single adults without children. Second, we *exclude* from the estimation sample all adults aged 21 or less or who report being students; those aged 60 or over; and those who are registered as disabled or who are in receipt of a disability benefit. In the model for couples, this means our sample includes only those couples where *both* partners are aged between 22 and 59, are not students and are non-disabled. We do this because standard models of labour supply may not be appropriate for the excluded groups: the young face decisions over education as well as between working and not working; individuals 60 or over have more possibility of retiring than those aged less than 60, and we are unable to model their incomes properly if they retired (because of private pensions); and the decisions of the disabled will be affected by complex interactions between health and employment, which we are unable to model. Next, we *exclude* those adults who report that they are self-employed or who report earnings or losses from self-employment from the analysis (meaning we exclude couples where this applies to one or both partners). Finally, we exclude those lone mothers or couples with very high actual or predicted net incomes (more than about £4,800 per week in 2012 prices). This is done because the small number of observations with very high incomes can 'skew' the results, and at least for the purposes of analysing the labour supply impact of welfare reforms, they are not a group we wish to focus on. Ultimately our sample includes just under half of the Welsh working-age population (and around half of Welsh workers). But this restricted sample is a group for which we are much more confident about modelling labour supply behaviour using the canonical model employed here.

It is also worth highlighting three main caveats to the results. First, the models allow us to simulate the impact of the changes in financial work incentives only. In the context of the welfare reforms, this allows us to simulate the impact of changes in maximum entitlements, earnings disregards and taper rates, but not the impact of things like the ease of transition between in-work and out-of-work benefits or the changes in conditionality (such as having to attend work-focused meetings). As discussed in Section 2, these changes would be expected to increase employment and earnings, but the impact may or may not be that large. Second, it is important to note that the models estimated consider the supply of labour by

lone parents and couples, and not the demand for labour. We discuss these issues qualitatively in Chapter 7 when discussing how the broader economic context may affect and be affected by the welfare reforms. The use of the 'calibration and simulation' approach also allows us to see how selecting lower elasticities affects results. Finally, because so few lone mothers in particular work jobs of 1–15 hours, the model's predictions of the impact of changes in financial work incentives at such hours of work may not be as reliable as one would wish (in effect, the issue is akin to using the model to 'predict out of sample').

The rest of this chapter proceeds as follows. The simulated impact of the welfare reforms excluding the roll-out of Universal Credit is set out in Section 5.1. Section 5.2 looks at the impact of the full set of reforms including Universal Credit.

5.1 Simulation results: the impact of reforms excluding Universal Credit

The impact of the welfare reforms is simulated using our labour supply models by simulating the behaviour of lone mothers and couples under the reform systems and comparing it to simulated behaviour under the baseline system (which, as discussed in Chapter 2, consists of the tax system as planned for April 2014 and the benefits and tax credit system as of April 2010, appropriately adjusted for inflation). This generates simulated probabilities for each hours option under both the baseline and reform systems, allowing the calculation of predicted changes in employment, hours of work, etc.

It is important to remember that the sample selection criteria used mean that the figures reported below exclude the self-employed, disabled, those aged 21 and under, 60 or over, and their partners. This means that of the 264 lone mothers in Wales in the 2007–08 to 2009–10 waves of the FRS (using population weights this equals 96,512 lone mothers in Wales), the simulations are based on a sample of 200 lone mothers (or 71,938 using population weights). Of the 2,693 working-age people in couples in Wales in the FRS (1,125,736 using population weights), the simulations are based on a sample of 1,516 (647,732).

The predicted impact on employment

Table 5.1 shows the predicted change in employment as a result of changes in financial work incentives due to the welfare reforms (excluding Universal Credit) in both percentage terms and in numbers for lone mothers, and for men and women in couples, with and without children. The first two rows show the simulated employment rates and numbers for the estimation sample in the baseline system; the next two rows show the impact on employment of the reforms; and the last two rows show the simulated figures for employment under the reform system.

The simulation suggests that the effect of changes in financial work incentives following the welfare reforms will be to increase slightly employment among the simulation sample, from 85.4% to 85.7%, which is equivalent to 2,000 extra people in paid work. The largest part of this is due to a simulated increase in the employment rate of men in couples with children: from an already high 91.5% to 92.2%, or by 1,300. On the other hand, the labour supply model suggests a slight fall among lone mothers from 65.0% to 64.7% (or 200 fewer in employment). The predicted impact on lone mothers accords with what one would expect given the increase in average PTRs following the welfare reforms for this group (see Table 3.1), reflecting, at least in part, a cut in the generosity of working tax credit.

Table 5.2 shows the predicted change in employment by ethnic group and housing tenure type. It shows that although employment rates are a little lower for the non-white members of the Welsh sample than for the white members, the employment effects are similar: increases in the employment rate of 0.4, and 0.3 percentage points, respectively. The effects are predicted to differ quite considerably between housing tenure groups, however. The reforms are projected to lead to a slight fall in the employment rate among those renting from a social landlord such as a housing association or local council (-0.2 percentage

Table 5.1 Estimated impact of welfare reforms (excluding Universal Credit) on employment

	Lone Mothers	Couples with Children		Couples without Children		Whole Sample
		Men	Women	Men	Women	
Employment in baseline (%)	65.0	91.5	75.4	94.0	91.1	85.4
Employment in baseline (number)	46,700	158,300	130,400	141,800	137,500	614,800
Change in employment (% points)	-0.3	0.7	0.1	0.3	0.2	0.3
Change in employment (number)	-200	1,300	100	500	400	2,000
Employment after reforms (%)	64.7	92.2	75.5	94.3	91.4	85.7
Employment after reforms (number)	46,500	159,600	130,600	142,300	137,900	616,800

Source: Estimation: FRS 1996–97 to 2009–10 and authors' calculations. Simulation: FRS 2007–08 to 2009–10 and authors' calculations.

Table 5.2 Estimated impact of welfare reforms (excluding Universal Credit) on employment

	Ethnicity		Housing Tenure		
	White	Non White	Social Rent	Private Rent	Owner Occupy
Employment in baseline (%)	85.6	82.4	68.0	72.5	89.0
Employment in baseline (number)	585,700	29,100	48,000	47,500	516,800
Change in employment (% points)	0.3	0.4	-0.2	1.3	0.2
Change in employment (number)	1,900	100	-100	800	1,400
Employment after reforms (%)	85.9	82.8	67.8	73.7	89.2
Employment after reforms (number)	587,600	29,200	47,900	48,300	518,200

Source: Estimation: FRS 1996–97 to 2009–10 and authors' calculations. Simulation: FRS 2007–08 to 2009–10 and authors' calculations.

Note: Figures for ethnicity groups and housing tenure groups do not sum to the total reported in Table 5.1 due to non-response to these questions.

points), but increase employment among private renters (1.1 percentage points) and, to a lesser extent, owner-occupiers (0.2 percentage points). This differential pattern by housing tenure makes sense given the findings of Chapter 3: the welfare reforms (excluding Universal Credit) are estimated to reduce PTRs and therefore increase the incentive to work at all for owner-occupiers and especially private tenants, but weaken them for those renting from a social landlord.

What is driving these results? The cuts to welfare taking place between 2010 and 2014 suggest that it is a simulated fall in out-of-work income as opposed to an increase in in-work income that is driving the predicted small increase in overall employment. Indeed, Figures 3.2 and 3.3 show that the reforms lead to the largest falls in income for out-of-work families, with somewhat smaller falls for couples with one worker and working lone parents, and very little impact for two earner couples without children and single working adults without children.

Because the model for couples models the behaviour of both partners jointly, it can be used to look at the impact of the reforms on the number of workless couples, couples with one earner and couples with two earners, as is done in Table 5.3. This shows that the welfare reforms (excluding UC) are predicted to lead to little change in the number of workless couples with a very small increase among couples with children offset by a very small decrease among couples without children. However, the model predicts a modest decline in the number of one-earner couples, and a modest increase in the number of two-earner couples, especially among those with children. This is consistent with the changes in financial work incentives described in Section 3. Table 3.1 shows that the reforms (excluding UC) increase average PTRs (i.e. reduce financial work incentives) for those in couples with a non-working partner (i.e. those in one-earner couples), especially among families with children, and reduce average PTRs (strengthen work incentives) for those with a working partner (i.e. those in two-earner couples). This reflects, in large part, reductions in the generosity of Working Tax Credit, which means less to gain from having one partner in work, and subsequently less financial support to lose when a second partner enters work.

Table 5.3 Estimated impact of welfare reforms (excluding Universal Credit) on the number of couples with 0, 1 and 2 earners

	% of couples with a given number of earners under	
	Baseline System	**Reform (ex. UC) System**
All Couples		
0 earners	2.0	2.0
1 earner	20.5	19.9
2 earners	77.4	78.1
Couples with children		
0 earners	3.0	3.1
1 earner	27.0	26.1
2 earners	70.0	70.8
Couples without children		
0 earners	0.9	0.8
1 earner	13.1	12.7
2 earners	86.0	86.4

Source: Estimation: FRS 1996–97 to 2009–10 and authors' calculations. Simulation: FRS 2007–08 to 2009–10 and authors' calculations.

Table 5.4 Estimated impact of welfare reforms (excluding Universal Credit) on hours of work per week

	Lone	Couples with Children		Couples without Children		Whole
	Mothers	Men	Women	Men	Women	Sample
Baseline						
Average working hours	18.1	38.7	21.9	39.8	31.0	31.2
Average working hours if work	26.9	N/A	28.4	N/A	33.8	N/A
% working <16 hours	4.0	N/A	8.0	N/A	3.9	N/A
% working 16–29 hours	29.3	N/A	27.5	N/A	16.1	N/A
% working 30+ hours	31.8	N/A	39.9	N/A	71.1	N/A
Change in						
Average working hours	-0.2	0.4	0.2	0.1	0.1	0.1
Average working hours if work	-0.1	N/A	0.2	N/A	0.0	N/A
working 1–15 hours (% point)	0.1	N/A	-0.0	N/A	-0.0	N/A
working 16–29 hours (% point)	0.0	N/A	-0.7	N/A	0.1	N/A
working 30+ hours (% point)	-0.4	N/A	0.9	N/A	0.2	N/A
Reform						
Average working hours	17.9	39.1	22.1	39.9	31.1	31.4
Average working hours if work	26.8	N/A	28.6	N/A	33.8	N/A
% working <16 hours	4.1	N/A	7.9	N/A	3.9	N/A
% working 16–29 hours	29.3	N/A	26.8	N/A	16.2	N/A
% working 30+ hours	31.3	N/A	40.8	N/A	71.3	N/A

Source: Estimation: FRS 1996–97 to 2009–10 and authors' calculations. Simulation: FRS 2007–08 to 2009–10 and authors' calculations.

The predicted impact on hours of work

As well as employment, the labour supply models allow us to simulate the impact of the reforms on how much people choose to work. For women, where the models incorporate four in-work hours options for couples and six for lone mothers, Table 5.4 shows the simulated fractions working 1–15 hours, 16–29 hours and 30 plus hours, as well as average hours if working, and overall average working hours (including non-workers). Because the model for couples includes only two options for men (working or not working), only the impact of the reforms on overall average working hours (including non-workers) is reported.

For lone mothers, the simulations imply a reduction in average working hours (-0.2 per week) and average working hours conditional upon working (-0.1 per week). This is driven by a small reduction in the fraction of lone mothers in full-time work of 30 hours per week or more (from 31.8% to 31.3%), and a small increase in those working in jobs of 1 to 15 hours per week (from 4.0% to 4.1%). This may again reflect the fall in the generosity of working tax credit, which acts to boost incomes at 16 and 30 hours per week.

For women in couples with children, the simulations suggest a small increase in average working hours (0.2 per week), and average working hours conditional upon working (0.2 per week), driven by an increase in the fraction in full-time work (from 39.9% to 40.8%) and a fall in the number working 16–29 hours per week (from 27.5% to 26.8%). The predicted small increase in employment and average hours of work among women in couples without children is also driven by a small increase in the fraction working full time (from 71.1% to 71.3%). This is in accord with declines in PTRs for those with working partners for those in couples with working partners (which is the case for the vast majority of women in couples).

For men in couples, the increase in employment rate is reflected in an increase in average hours of work from 38.7 to 39.1 among those with children, and a smaller increase from 39.8 to 39.9 for those without children.

Summary

The welfare reforms (excluding Universal Credit) are, together, expected to have a very small positive effect on labour supply, increasing employment and average hours of work slightly. However, there are differences across the population, with lone parents and those renting from a social landlord predicted to see slight reductions in labour supply, and men in couples with children and private tenants predicted to see larger-than-average increases in labour supply.

5.2 Simulation results: the impact of reforms including Universal Credit

We now repeat the analysis of the previous section but including a fully rolled-out Universal Credit as part of the reform package under consideration.

The predicted impact on employment

Table 5.5 shows the predicted change in employment as a result of changes in financial work incentives due to the welfare reforms (excluding Universal Credit) both in percentage terms and in absolute numbers for lone mothers, and for men and women in couples, with and without children. The first two rows show the simulated employment rates and numbers for the estimation sample in the baseline system; the next two rows show the impact on employment of the reforms; and the last two rows show the simulated figures for employment under the reform system.

Table 5.5 Estimated impact of welfare reforms (including Universal Credit) on employment

	Lone Mothers	Couples with Children		Couples without Children		Whole Sample
		Men	Women	Men	Women	
Employment in baseline (%)	65.0	91.5	75.4	94.0	91.1	85.4
Employment in baseline (number)	46,700	158,300	130,400	141,800	137,500	614,800
Change in employment (% points)	+1.2	-0.3	-0.5	0.1	0.4	0.0
Change in employment (number)	800	-400	-900	200	600	300
Employment after reforms (%)	66.1	91.3	74.9	94.1	91.5	85.5
Employment after reforms (number)	47,600	157,900	129,600	142,000	138,100	615,100

Source: Estimation: FRS 1996–97 to 2009–10 and authors' calculations. Simulation: FRS 2007–08 to 2009–10 and authors' calculations.

Table 5.6 Estimated impact of welfare reforms (including Universal Credit) on employment

	Ethnicity		Housing Tenure		
	White	Non White	Social Rent	Private Rent	Owner Occupy
Employment in baseline (%)	85.6	82.4	68.0	72.5	89.0
Employment in baseline (number)	585,700	29,100	48,000	47,500	516,800
Change in employment (% points)	0.1	-0.2	0.1	1.9	-0.1
Change in employment (number)	400	-100	100	1,300	-1,000
Employment after reforms (%)	85.6	82.2	68.1	74.4	88.8
Employment after reforms (number)	586,100	29,000	48,100	48,700	515,800

Source: Estimation: FRS 1996–97 to 2009–10 and authors' calculations. Simulation: FRS 2007–08 to 2009–10 and authors' calculations.

Note: Figures for ethnicity groups and housing tenure groups do not sum to the total reported in Table 5.1 due to non-response to these questions.

Universal Credit is hoped to improve work incentives and hence increase employment and hours of work. However, the results of the simulations suggest that the changes in financial work incentives under Universal Credit act to *reduce* employment very slightly relative to the pre-Universal Credit system (analysed in Section 5.1). Indeed, employment is predicted to be little changed compared to its level under the baseline pre-reform 2010 benefit and tax credits system: for the simulation sample, the employment rate is 85.5% under Universal Credit compared to 85.4% under the 2010 system. This is significantly different to what one may expect given the impact on EMTRs and PTRs discussed in Chapter 3, and differs quite substantially from the results presented in the 'calibration and simulation' approach of Chapter 6, where a fairly substantial positive effect on employment of Universal Credit is predicted. We discuss in Section 6.3 what may be driving these differences. The main conclusion of this is that it is difficult to determine which model is likely to be giving the more accurate results; hence, the impact of Universal Credit on employment appears to be highly uncertain.

Returning to Table 5.5, it can be seen that compared to the 2010 welfare system, the 2014 welfare system including Universal Credit is predicted to lead to a slight fall in employment among men and women in couples with children, an increase in the employment rate of 1.2 percentage points among lone parents, and a slight increase in employment among men and women in couples without children. The results for those in couples with children are especially interesting: an increase in employment due to the welfare reforms prior to Universal Credit becomes a slight decrease. This means Universal Credit is predicted to reduce employment for couples with children, while having little effect on employment among couples without children, and a positive effect for lone parents. These patterns reflect the fact that Universal Credit increases PTRs for couples with children who have a working partner, thereby reducing their incentives to be in work; has the same type of effect on the PTRs of couples without children, but one that is much smaller in magnitude; and reduces PTRs somewhat for lone parents, thereby increasing their incentive to be in work (see Table 3.1).

Table 5.6 shows how employment effects differ by ethnicity and housing tenure and show a similar pattern to that found for the reforms excluding Universal Credit: little difference between whites and non-whites, but substantial differences by tenure type. In particular, the employment rate among our sample of private tenants is predicted to increase by 1.9 percentage points, compared to an increase of 0.1 percentage points for social tenants, and a fall of 0.2 percentage points for owner-occupiers.

Table 5.7 shows the impact of the reforms (including UC) on the number of workless couples, couples with one earner and couples with two earners. Following the introduction of UC, the number of workless couples is predicted to decline by about 0.3 percentage points from 2.0% to 1.7% of couples in the sample. This is mostly driven by a predicted fall from 3.0% to 2.5% of couples with children being workless. Together with predicted declines in the number of workless lone mothers, this suggests the reforms are likely to reduce the number of children growing up in workless families, albeit only modestly. The number of one-earner couples with children is predicted to increase a fair bit, from 27.0% to 28.9% of couples with children in the sample. This reflects the improved incentives to have at least one person in work: higher earnings disregards, and the slower tapering of UC compared to the multiple tapers that families sometimes face at the moment, mean they will be able to keep more of their earnings. Combined with the earlier cuts to benefit entitlements, this means a fairly substantial *decrease* in PTRs (increase in financial work incentives) for first earners. On the other hand, the number of couples with two earners is predicted to decrease from 70.0% to 68.6% of couples with children. This is because the greater entitlements to UC when there is one person working mean more support to lose when a second person enters work, who will typically face a benefit higher taper rate (e.g. 65p of every £ earned lost in reduced UC as opposed to 39p lost in reduced tax credits prior to the welfare cuts). Overall, therefore, the predicted changes in the numbers of 0-, 1- and 2-earner couples are consistent with the changes in PTRs shown in Table 3.1.

Table 5.7 Estimated impact of welfare reforms (including Universal Credit) on the number of couples with 0, 1 and 2 earners

	% of couples with a given number of earners under	
	Baseline System	**Reform (inc. UC) System**
All Couples		
0 earners	2.0	1.7
1 earner	20.5	21.4
2 earners	77.4	76.9
Couples with children		
0 earners	3.0	2.5
1 earner	27.0	28.9
2 earners	70.0	68.6
Couples without children		
0 earners	0.9	0.8
1 earner	13.1	12.8
2 earners	86.0	86.4

Source: Estimation: FRS 1996–97 to 2009–10 and authors' calculations. Simulation: FRS 2007–08 to 2009–10 and authors' calculations.

The predicted impact on hours of work

Table 5.8 shows the predicted impact of the welfare reforms (including Universal Credit) on hours of work. For the sample as a whole, average hours of work (including non-workers) are predicted to be unchanged compared to the baseline (2010) welfare system. However, this does mask differences between different parts of the population.

The models predict that the average working hours of all lone mothers in the sample will hold steady at 18.1 but fall from 26.9 to 26.5 for those in work. This reflects a predicted increase in the number of lone parents working between 1 and 15 hours per week (from 4.0% to 4.15), an increase in those working between 16 and 29 hours (from 29.3% to 30.4%), offset by a fall in those predicted to be in full-time work (from 31.8% to 30.9%).

This reflects the impact of Universal Credit on the incentive to work different numbers of hours. Working for only 1–15 hours will become significantly more attractive as higher disregards and lower taper rates for benefits act to increase net income relative to those before Universal Credit: under the baseline system, small earnings disregards (£20 per week) and a pound-for-pound reduction in Income Support as earnings increase provide little incentive to work such few hours. On the other hand, the removal of the jumps in earnings at 30 hours for low earners currently entitled to the Working Tax Credit will reduce net income and, hence, the incentive for many lone mothers to work longer hours. This factor may also play a

Table 5.8 Estimated impact of welfare reforms (including Universal Credit) on hours of work per week

	Lone	Couples with Children		Couples without Children		Whole
	Mothers	Men	Women	Men	Women	Sample
Baseline						
Average working hours	18.1	38.7	21.9	39.8	31.0	31.2
Average working hours if work	26.9	N/A	28.4	N/A	33.8	N/A
% working 1–16 hours	4.0	N/A	8.0	N/A	3.9	N/A
% working 16–29 hours	29.3	N/A	27.5	N/A	16.1	N/A
% working 30+ hours	31.8	N/A	39.9	N/A	71.1	N/A
Change in						
Average working hours	0.0	-0.1	-0.0	0.0	0.1	-0.0
Average working hours if work	-0.4	N/A	0.1	N/A	-0.0	N/A
working 1–15 hours (% point)	0.9	N/A	0.1	N/A	0.0	N/A
working 16–29 hours (% point)	1.1	N/A	-1.0	N/A	0.3	N/A
working 30+ hours (% point)	-0.8	N/A	0.4	N/A	0.0	N/A
Reform						
Average working hours	18.1	38.6	21.9	39.8	31.1	31.2
Average working hours if work	26.5	N/A	28.5	N/A	33.8	N/A
% working 1–16 hours	4.9	N/A	8.1	N/A	3.9	N/A
% working 16–29 hours	30.4	N/A	26.6	N/A	16.5	N/A
% working 30+ hours	30.9	N/A	40.3	N/A	71.1	N/A

Source: Estimation: FRS 1996–97 to 2009–10 and authors' calculations. Simulation: FRS 2007–08 to 2009–10 and authors' calculations.

role in explaining the predicted small fall in employment among men in couples with children (many of whom will be the main earner in a family).

Among women in couples with children, the picture is quite different: the fraction working in jobs of 16 to 29 hours is expected to fall, and the fraction working 30 or more hours per week is expected to rise somewhat. The predicted change in average hours of work for couples without children is a small increase of 0.1 hour per week.

Summary

The results suggest that for the sample considered, the introduction of Universal Credit will do much to offset the small increase in employment predicted to occur due to the earlier welfare reforms, leaving employment little changed compared to under the baseline welfare system (up 300 on a baseline employment level of around 615,000). This is due to a predicted fall in employment among couples with children, who, given that most have a working partner, see a fairly substantial increase in average PTRs.

The predicted negative impact of Universal Credit on employment of our sample of lone mothers and couples in Wales contrasts with the aims of the policy (which is to encourage work and increase employment). It is also a little unexpected given the analysis presented in Chapter 3, which suggested that Universal Credit will lead to a strengthening of the financial incentives to be in work (a fall in the PTR), on average, especially for those in couples with non-working partners. However, it may reflect the fact that, whilst it increases the financial incentive to have one partner in a couple in work, it weakens the incentive to have a second partner in work. An important issue to bear in mind is that the sample for which we can simulate behaviour using our estimated labour supply models excludes a significant number of people: around 25% of lone mothers, and around 42% of working-age people in couples are excluded due to the sample selection criteria we use to generate a sample suitable for estimation of the canonical labour supply model we use in this chapter. Chapter 6 therefore uses a 'calibration and simulation' approach to analyse the impact of the reforms on labour supply for the entire working-age population of Wales. Section 6.3 of the chapter compares the results of the two approaches.

6. Modelling the impact of the welfare reforms: the calibration and simulation approach

Our second approach to modelling the labour supply effects of the UK government's welfare reforms is to use a calibration approach. This involves dividing the population into groups (based on income and demographic characteristics) and assuming plausible labour supply elasticities for each group of workers, based on the literature review in Chapter 4. Specifically, we assume elasticities for two decisions: the decision to be in paid work or not (the 'extensive' or employment decision); and, for those that do work, the decision whether to increase or decrease their hours of paid work slightly (the 'intensive' or hours decision). These elasticities can be combined with our estimated changes in PTRs and EMTRs respectively to predict changes in employment and hours of work across the population. Our methodology and the elasticities we assume are described more fully in Appendix E.

The key advantage of this approach is that it is relatively straightforward, transparent and can be applied across the whole population. It also means we can make use of what has been learned from decades of careful research into labour elasticities that has gone on in the past.[26] But we should acknowledge that there are a number of drawbacks, which mean that results should be considered only indicative.

First, the literature reviewed in Chapter 4 provides only limited guidance as to what elasticities to choose, for three reasons:

1. The literature is much more developed for some groups of the population than others: in particular, the groups excluded from our model in Chapter 5 (people who are self-employed, disabled, over 59 or under 22, and the partners of all these people, as well as the very large group of single people without children) are often excluded from other models as well for similar reasons, and so elasticity estimates that include these groups are rarer. So while an advantage of the calibration approach adopted in this chapter is that it can be applied to a broader population than the estimation approach of the previous chapter, we must acknowledge that the calibration estimates are more uncertain for these extra groups. In Section 6.3 we therefore show how our results change when we restrict attention to just the subset of the population that was included in our analysis in Chapter 5.
2. Even where there is a well-developed literature, it is clear from Chapter 4 that there is significant uncertainty surrounding the elasticities as different studies produce different findings.
3. The employment elasticities required for our calibration approach are elasticities of employment with respect to the gain-to-work (or equivalently, with respect to one minus the PTR). However, as discussed in Chapter 4, elasticities are never reported in this form in the labour supply literature: the literature reports elasticities with respect to in-work income (or sometime gross earnings), rather than with respect to the *difference* between in-work and out-of-work income. When choosing elasticities to assume, we must therefore 'convert' them from one form to the other. We perform such a conversion in Appendix E, but since the conversion is valid only under certain assumptions, which will not hold perfectly in practice, there is even more uncertainty as to what the true elasticities with respect to the gain-to-work are.

Given the uncertainty around the true elasticities, it is important to do sensitivity analysis of different elasticities as well as simply making a central best guess at what the elasticities might be. We present such a sensitivity analysis in Section 6.2.

[26] For those reasons the calibration approach has been used in a number of recent studies, including Adam (2005), Immervol et al. (2007), Centre for Social Justice (2009), Brewer, Saez and Shephard (2010) and Mirrlees et al. (2011).

The second drawback with the calibration method is that it assumes that changes in taxes and benefits can only affect whether you enter work by changing your PTR, the proportion of your gross earnings that you keep (the rest being paid in taxes or lost in benefits), and can only affect your hours of work by changing your EMTR, the proportion of any additional gross earnings that you would keep. But while PTRs and EMTRs are useful summary measures, they are not the whole story. This rules out 'income effects' of the kind discussed in Chapter 4: whether the reforms make you richer or poorer (changing the *need* to work rather than the *reward* from work) is not, by itself, allowed to affect whether or how much you work. Previous work using this methodology has tended to focus on analysing revenue-neutral reforms, where it can be argued that income effects will tend to balance each other out across the population, even if this is only a rough approximation since people will not all respond the same way to a change in their income. In our case, the reforms we are analysing are far from revenue-neutral, making the omission of income effects more problematic. On a practical level, ignoring income effects makes it difficult to know whether to base the assumed elasticities on compensated or uncompensated elasticities estimated in the literature: while most studies find that income effects are quite small, there is by no means a consensus that they are near zero, and estimates of compensated and uncompensated elasticities are often non-negligibly different.

Assuming that changes in work incentives operate only via PTRs and EMTRs also rules out sharp jumps in hours of work other than stopping work entirely, an assumption that might be questioned. For instance, the introduction of Universal Credit will lead to the abolition of the 16 hours rule for tax credit eligibility. Someone currently working 16 hours in order to qualify for Working Tax Credit may decide to cut their hours of work when the rule is abolished, even if the proportion of any additional earnings they would get to keep if they remained at 16 hours is unaffected by the reform. These are all features that are explicitly built into the model of the previous chapter.

6.1 Simulation results

Across the whole working-age population in Wales, our central estimate is that the reforms excluding Universal Credit would:

- have no effect on the overall employment rate;
- increase aggregate hours worked by employees by 0.4%;
- increase aggregate gross earnings by 0.2%, or around £60 million.

Including Universal Credit, we estimate that the reform would:

- increase employment by 0.3 percentage points, or around 5,000 people;
- increase aggregate hours worked by 1.0%;
- increase aggregate gross earnings by 0.5%, or around £150 million.

Table 6.1 provides details of the estimated changes in employment, hours and earnings of people in different family circumstances for the reforms excluding Universal Credit. Unsurprisingly, groups whose employment rates rise are generally those that see their reductions in their average PTRs. Thus, in line with the changes in work incentives described in Chapter 3, we find that employment falls among lone parents and people with non-working partners, and rises among single people without children and people with working partners, with these offsetting changes resulting in the zero overall change in employment mentioned above.

Bigger changes in employment are associated with bigger changes in PTRs, but also with being in a group for whom we assume high participation elasticities. However, the results also reflect variations within

these groups: the effect of the welfare reforms on PTRs varies a great deal within each of these groups, and there is also considerable variation in elasticities within groups (notably by earnings and age of youngest child). The overall employment rate does not change despite the reduction in average PTRs because those people whose PTRs are reduced by the reform are typically less responsive than those whose PTRs are increased.

Even within the different groups shown in Table 6.1, it is striking how small the changes are. Most remarkably, among mothers with non-working partners the number in paid work falls by just 600 despite a rise of almost 20 percentage points in their average PTR. This surprising finding arises essentially because this is a small and relatively unresponsive group, which was facing low PTRs to start with.[27]

Among the groups seeing increases in employment, the increase in employment rates is fairly even, at around 0.1–0.2 percentage points. In absolute terms, this means that the biggest increases in employment come from the most numerous of those groups, single people without children and women with working partners and no children, which together account for about 1,200 more people in work.

Changes in aggregate hours of work are shown for employees only (we have less complete data available on hours of work for the self-employed), and reflect a combination of changes in the number of people working and changes in the hours worked by those already in employment. Accordingly, they are affected by both PTRs and EMTRs, and by both employment and hours elasticities. With overall employment unchanged, we might expect the reduction in average EMTRs to lead to a rise in hours worked – though this is potentially complicated as those starting work might work different hours from those stopping work, and existing workers seeing an increased EMTR may be more or less responsive than those seeing a reduced EMTR. In the event, overall hours do increase by 0.4%. Hours of work fall among those with non-working partners (except mothers with non-working partners), but rise for other, more numerous groups. Aggregate earnings do not change in proportion to hours worked, because those within each group who move into work or increase their hours of work may be unusually high or low earners. As we saw earlier, the welfare cuts affect work incentives differently at different levels of earnings.

On the whole, the changes shown in Table 6.1 are small – perhaps surprisingly so, given the magnitude of the welfare cuts. Once Universal Credit is included (Table 6.2), the changes are somewhat more pronounced, but still modest. Men and women with non-working partners and without children see their employment rates rise by 2.0 and 1.1 percentage points respectively: these figures translate into more than 3,000 extra families in Wales (predominantly those approaching retirement age) with someone in paid employment than would otherwise be the case. By far the biggest percentage rises in hours worked and gross earnings are seen among lone parents and mothers with non-working partners, responsive (albeit small) groups who experience much stronger incentives to increase their earnings because of Universal Credit (in the case of lone mothers) and benefit cuts (in the case of mothers with non-working partners) – a strengthening of incentives that is much more powerful because these groups had especially high EMTRs to start with. Falls in employment and earnings are restricted to those with children whose

[27] To explain more fully, a 19.6 percentage point increase in the average PTR of mothers with non-working partners leads to a fall of only 600 in the number employed for the following reasons:

- This group has low PTRs. As stressed in Chapter 3, an increase in average PTRs from around 40% to 60% (typical of what this group experiences) will have a much smaller impact on behaviour than, say, an increase from 70% to 90%. A rise from 40% to 60% means that the gain-to-work is reduced by a third, whereas a rise from 70% to 90% would mean it was reduced by two-thirds.
- This group has high replacement rates, so the moderate elasticities with respect to in-work income suggested by the literature (averaging around 0.26) imply rather low elasticities with respect to the gain-to-work (averaging around 0.07).
- This is a very small group (45,000 people) with a very low employment rate (34%), so a moderate percentage change in the number employed (a 3.7% fall) translates into a very small change in the absolute number employed (600).

partners are in work: as we saw in Chapter 3, the less aggressive means-testing associated with Universal Credit significantly weakens incentives for families with children to have a second earner in work – or for second earners in such families to increase their earnings – because it increases the state support available if only one of the couple brings significant earnings into the family.

Despite the adverse effect on the behaviour of (actual or potential) two-earner couples, these estimates suggest that the government's welfare reforms could induce labour supply responses that add around £150 million to the gross earnings of people in Wales, and that the biggest chunk of those earnings would go to lone parents, a particularly vulnerable group.

Table 6.1 Effects of welfare reforms excluding Universal Credit: central estimates

Family type	Number	Number employed	Change in average PTR	Change in average EMTR	Change in number employed	Change in employment rate (ppts)	% change in aggregate hours worked (excl. self-employed)	% change in aggregate gross earnings	Change in aggregate gross earnings (£m)
Single, no children	452,000	258,000	-1.0%	-1.4%	600	0.1	0.6%	0.4%	22
Lone parent	104,000	56,000	2.2%	-1.5%	-400	-0.4	1.1%	0.5%	4
Man, no children, working partner	215,000	191,000	-1.9%	-1.0%	300	0.2	0.4%	0.2%	11
Man, no children, non-working partner	99,000	52,000	-0.1%	1.6%	-300	-0.3	-1.0%	-0.4%	-6
Man, children, working partner	190,000	175,000	-2.4%	-0.8%	400	0.2	0.4%	0.2%	9
Man, children, non-working partner	78,000	49,000	3.7%	0.8%	-500	-0.6	-1.9%	-1.1%	-16
Woman, no children, working partner	245,000	192,000	-2.3%	-1.0%	600	0.2	0.5%	0.3%	12
Woman, no children, non-working partner	105,000	37,000	0.2%	-2.0%	-300	-0.3	-0.2%	-0.3%	-2
Woman, children, working partner	223,000	175,000	-0.8%	-1.3%	100	0.1	0.8%	0.7%	23
Woman, children, non-working partner	45,000	15,000	19.6%	-11.9%	-600	-1.2	1.8%	0.9%	2
Total	**1,756,000**	**1,198,000**	**-0.4%**	**-1.1%**	**0**	**0.0**	**0.4%**	**0.2%**	**58**

Table 6.2 Effects of welfare reforms including Universal Credit: central estimates

Family type	Number	Number employed	Change in average PTR	Change in average EMTR	Change in number employed	Change in employment rate (ppts)	% change in aggregate hours worked (excl. self-employed)	% change in aggregate gross earnings	Change in aggregate gross earnings (£m)
Single, no children	452,000	258,000	-1.8%	-1.7%	1,800	0.4	1.2%	0.6%	35
Lone parent	104,000	56,000	0.1%	-12.3%	800	0.8	7.0%	5.1%	44
Man, no children, working partner	215,000	191,000	-1.1%	-1.2%	700	0.3	0.3%	0.1%	7
Man, no children, non-working partner	99,000	52,000	-3.7%	3.9%	2,000	2.0	0.4%	0.5%	8
Man, children, working partner	190,000	175,000	2.5%	-2.0%	-900	-0.5	0.3%	0.0%	0
Man, children, non-working partner	78,000	49,000	-5.9%	3.5%	600	0.8	1.3%	0.5%	7
Woman, no children, working partner	245,000	192,000	-0.9%	-1.2%	500	0.2	0.8%	0.4%	18
Woman, no children, non-working partner	105,000	37,000	-4.0%	1.8%	1,200	1.1	1.3%	0.5%	3
Woman, children, working partner	223,000	175,000	4.6%	-0.9%	-1,800	-0.8	0.1%	0.2%	7
Woman, children, non-working partner	45,000	15,000	-7.3%	-8.8%	100	0.2	11.2%	9.7%	21
Total	**1,756,000**	**1,198,000**	**-0.8%**	**-1.5%**	**5,000**	**0.3**	**1.0%**	**0.5%**	**149**

6.2 Sensitivity analysis

Because of the significant degree of uncertainty about the size of labour supply elasticities, in this section we test how sensitive the employment predictions are to the choice of elasticities, drawing on the literature to define low- and high-responsiveness scenarios. These should not be seen as providing upper and lower bounds on the potential impact of the reforms. Instead, they demonstrate how far uncertainty about how responsive people are to financial work incentives translates into uncertainty about the likely impacts of the welfare reforms on labour supply.

Low-responsiveness scenario

In our 'low-responsiveness' scenario, we reduce the intensive elasticities assumed in the central scenario by around three-quarters (but by more for men and for single women without children than for other women), so that the average intensive elasticity is 0.038. The extensive elasticities are simply halved relative to our central scenario, so that across the whole of the population we analyse, our low-responsiveness scenario is for an overall average extensive elasticity with respect to in-work income of 0.159, and with respect to the gain-to-work 0.064 (see Appendix E for full details).

The labour supply effects of the reforms excluding Universal Credit looked small in our central scenario; if elasticities are significantly lower than that the effects are virtually non-existent. Across the whole working-age population in Wales, these lower levels of responsiveness would imply that the reforms excluding Universal Credit would;

- have virtually no effect on overall employment in Wales;
- increase aggregate hours worked by employees by 0.1%;
- increase aggregate gross earnings by 0.1%, or around £16 million.

Table 6.3 shows that the effects look small across a range of family circumstances. While there may still be some effects offsetting each other at the individual level, the picture is clear: if labour supply elasticities are as low as some of the literature suggests, the changes to financial incentives caused by the UK government's welfare reforms (excluding Universal Credit) could have very little impact indeed.

Table 6.3 Effects of welfare reforms excluding Universal Credit: low-responsiveness scenario

Family type	Number	Number employed	Change in average PTR	Change in average EMTR	Change in number employed	Change in employment rate (ppts)	% change in aggregate hours worked (excl. self-employed)	% change in aggregate gross earnings	Change in aggregate gross earnings (£m)
Single, no children	452,000	258,000	-1.0%	-1.4%	300	0.1	0.2%	0.1%	6
Lone parent	104,000	56,000	2.2%	-1.5%	-200	-0.2	0.1%	-0.1%	-1
Man, no children, working partner	215,000	191,000	-1.9%	-1.0%	200	0.1	0.1%	0.1%	3
Man, no children, non-working partner	99,000	52,000	-0.1%	1.6%	-100	-0.1	-0.2%	-0.1%	-2
Man, children, working partner	190,000	175,000	-2.4%	-0.8%	200	0.1	0.1%	0.1%	4
Man, children, non-working partner	78,000	49,000	3.7%	0.8%	-200	-0.3	-0.5%	-0.3%	-4
Woman, no children, working partner	245,000	192,000	-2.3%	-1.0%	300	0.1	0.2%	0.1%	5
Woman, no children, non-working partner	105,000	37,000	0.2%	-2.0%	-200	-0.2	-0.4%	-0.3%	-2
Woman, children, working partner	223,000	175,000	-0.8%	-1.3%	100	0.0	0.3%	0.2%	7
Woman, children, non-working partner	45,000	15,000	19.6%	-11.9%	-300	-0.6	-0.1%	-0.2%	0
Total	**1,756,000**	**1,198,000**	**-0.4%**	**-1.1%**	**-100**	**0.0**	**0.1%**	**0.1%**	**16**

Table 6.4 Effects of welfare reforms including Universal Credit: low-responsiveness scenario

Family type	Number	Number employed	Change in average PTR	Change in average EMTR	Change in number employed	Change in employment rate (ppts)	% change in aggregate hours worked (excl. self-employed)	% change in aggregate gross earnings	Change in aggregate gross earnings (£m)
Single, no children	452,000	258,000	-1.8%	-1.7%	800	0.2	0.3%	0.2%	8
Lone parent	104,000	56,000	0.1%	-12.3%	400	0.4	1.7%	1.2%	10
Man, no children, working partner	215,000	191,000	-1.1%	-1.2%	300	0.1	0.1%	0.0%	1
Man, no children, non-working partner	99,000	52,000	-3.7%	3.9%	800	0.8	0.7%	0.4%	7
Man, children, working partner	190,000	175,000	2.5%	-2.0%	-400	-0.2	-0.1%	-0.1%	-5
Man, children, non-working partner	78,000	49,000	-5.9%	3.5%	300	0.4	0.4%	0.3%	4
Woman, no children, working partner	245,000	192,000	-0.9%	-1.2%	200	0.1	0.3%	0.2%	7
Woman, no children, non-working partner	105,000	37,000	-4.0%	1.8%	500	0.4	0.4%	0.1%	1
Woman, children, working partner	223,000	175,000	4.6%	-0.9%	-1,000	-0.4	-0.2%	-0.1%	-2
Woman, children, non-working partner	45,000	15,000	-7.3%	-8.8%	0	0.1	3.3%	2.9%	6
Total	**1,756,000**	**1,198,000**	**-0.8%**	**-1.5%**	**1,900**	**0.1**	**0.2%**	**0.1%**	**37**

Once Universal Credit is included, the effects still look tiny (see Table 6.4). In our low-responsiveness scenario, we estimate that the full set of reforms would:

- increase employment by 0.1 percentage points, or around 1,900 people;
- increase aggregate hours worked by 0.2%;
- increase aggregate gross earnings by 0.1%, or around £37 million.

The pattern of positive and negative labour supply responses looks similar to that in our central scenario, but rather dampened.

High-responsiveness scenario

In our 'high-responsiveness' scenario, we essentially double the intensive elasticities assumed in the central scenario (giving an average of 0.32), and increase the extensive elasticities assumed by either 40% (for men, and for women in couples without children, who are under 55) or 75% (for other women and for those aged 55 or over). This gives an overall average extensive elasticity of 0.63 (with respect to in-work income) or 0.208 (with respect to the gain-to-work).

Even with these higher levels of responsiveness, the reforms excluding Universal Credit would not have a large net effect on overall labour supply across the whole working-age population in Wales (see Table 6.5). These high elasticities imply that the reforms excluding Universal Credit would:

- have almost no effect on the employment rate (just 300 more people in work);
- increase aggregate hours worked by employees by 1.0%;
- increase aggregate gross earnings by 0.5%, or around £145 million.

Including Universal Credit, however, the effects become somewhat larger (Table 6.6). We estimate that the reforms would:

- increase employment by 0.7 percentage points, or around 13,000 people;
- increase aggregate hours worked by 2.7%;
- increase aggregate gross earnings by 1.5%, or over £400 million.

This last set of results suggests significant overall effects are possible: 13,000 more people in work and £400 million more in aggregate earnings are not trifling changes. Yet they are still not as dramatic as one might have expected, given the radical reshaping of the benefits system that is under way. So while this sensitivity analysis shows that the estimated effects are somewhat sensitive to the assumed elasticities, the basic picture is clear: we expect the reforms to have a modest overall labour supply impact, with offsetting effects for first and second earners in couples.

Table 6.5 Effects of welfare reforms excluding Universal Credit: high-responsiveness scenario

Family type	Number	Number employed	Change in average PTR	Change in average EMTR	Change in number employed	Change in employment rate (ppts)	% change in aggregate hours worked (excl. self-employed)	% change in aggregate gross earnings	Change in aggregate gross earnings (£m)
Single, no children	452,000	258,000	-1.0%	-1.4%	1,000	0.2	1.3%	0.8%	42
Lone parent	104,000	56,000	2.2%	-1.5%	-600	-0.6	3.9%	2.1%	18
Man, no children, working partner	215,000	191,000	-1.9%	-1.0%	500	0.2	0.7%	0.4%	20
Man, no children, non-working partner	99,000	52,000	-0.1%	1.6%	-400	-0.4	-1.5%	-0.5%	-9
Man, children, working partner	190,000	175,000	-2.4%	-0.8%	600	0.3	0.6%	0.3%	15
Man, children, non-working partner	78,000	49,000	3.7%	0.8%	-700	-0.9	-3.1%	-1.9%	-28
Woman, no children, working partner	245,000	192,000	-2.3%	-1.0%	900	0.4	1.0%	0.6%	22
Woman, no children, non-working partner	105,000	37,000	0.2%	-2.0%	-400	-0.4	1.0%	0.2%	1
Woman, children, working partner	223,000	175,000	-0.8%	-1.3%	300	0.1	1.9%	1.7%	53
Woman, children, non-working partner	45,000	15,000	19.6%	-11.9%	-900	-2.0	6.9%	4.4%	9
Total	**1,756,000**	**1,198,000**	**-0.4%**	**-1.1%**	**300**	**0.0**	**1.0%**	**0.5%**	**145**

Table 6.6 Effects of welfare reforms including Universal Credit: high-responsiveness scenario

Family type	Number	Number employed	Change in average PTR	Change in average EMTR	Change in number employed	Change in employment rate (ppts)	% change in aggregate hours worked (excl. self-employed)	% change in aggregate gross earnings	Change in aggregate gross earnings (£m)
Single, no children	452,000	258,000	-1.8%	-1.7%	3,400	0.8	2.5%	1.3%	73
Lone parent	104,000	56,000	0.1%	-12.3%	1,600	1.6	23.7%	16.2%	138
Man, no children, working partner	215,000	191,000	-1.1%	-1.2%	2,100	1.0	0.7%	0.3%	17
Man, no children, non-working partner	99,000	52,000	-3.7%	3.9%	4,900	5.0	0.8%	1.1%	18
Man, children, working partner	190,000	175,000	2.5%	-2.0%	-1,200	-0.6	0.9%	0.3%	14
Man, children, non-working partner	78,000	49,000	-5.9%	3.5%	900	1.2	2.6%	0.9%	12
Woman, no children, working partner	245,000	192,000	-0.9%	-1.2%	1,000	0.4	1.6%	0.9%	36
Woman, no children, non-working partner	105,000	37,000	-4.0%	1.8%	3,300	3.1	5.0%	2.4%	17
Woman, children, working partner	223,000	175,000	4.6%	-0.9%	-3,000	-1.4	1.0%	1.0%	33
Woman, children, non-working partner	45,000	15,000	-7.3%	-8.8%	200	0.4	27.9%	24.2%	51
Total	**1,756,000**	**1,198,000**	**-0.8%**	**-1.5%**	**13,200**	**0.7**	**2.7%**	**1.5%**	**411**

6.3 Comparing the results of the two approaches to modelling labour supply

Comparing the results for our central scenario in Section 6.1 with those found in Sections 5.2 and 5.3, it is clear that, especially for the full set of reforms including Universal Credit, the 'calibration and simulation' and 'estimation and simulation' approaches produce broadly similar predictions of the impact on employment, but there are nevertheless some notable differences, in particular:

- The estimated models predict an increase in employment of 2,000 for its sample of lone mothers and couples following the welfare reforms (excluding Universal Credit), compared to unchanged employment for the wider working-age population according to the calibration and simulation approach.
- Including Universal Credit in the set of reforms leads to a fall in the impact on employment to a negligible 300 under the estimation and simulation approach, but increases to 5,000 for the whole working-age population according to the calibration and simulation approach.
- Hence, Universal Credit itself is predicted to have a small negative effect (-1,700) on the employment of the sample of lone mothers and couples included in the estimated models, but increase employment among the working-age population as a whole (+5,000) according to the calibration and simulation approach.

The first thing to note is that the populations covered by the two approaches significantly. The calibration and simulation approach is applied to all adults aged between 19 and State Pension age. On the other hand, the estimated models sample excludes all single adults without children. It also excludes those aged 19–21, those aged 60 or over, those who are entitled to a disability benefit (excluding Income Support disability premiums), those who are self-employed, *and* the partner of any such individual. How far do these differences in sample explain the differences in findings?

Tables 6.7 and 6.8 show the predicted impact on employment of the reforms excluding and including Universal Credit respectively, for the two approaches, for the sample of lone mothers and couples included in the estimated models. In other words, it shows what differences remain when the same sample is used with both the calibration and estimation methods.

The results for the reforms excluding Universal Credit (Table 6.7) show that for the same sample of lone mothers and couples, the estimation approach predicts an increase in employment of 2,000, while the calibration approach predicts an increase in employment of 200. Whilst this looks like a large difference, it should be borne in mind that this is on a baseline of employment in the sample of 615,800, and so both represent very small employment effects. Looking at the sample sub-groups, it can be seen that the predicted changes in labour supply are very similar for couples without children, for women in couples with children, and for lone mothers. There are larger differences for men in couples with children, for whom the estimation approach predicts an increase in employment of around 0.8%, versus very little change in employment according to the calibration approach. This suggests that the estimated model may find men to be more responsive to changes in financial work incentives than assumed in the calibration and simulation approach.

After including Universal Credit in the set of the reforms considered (Table 6.8), we find small employment effects according to both techniques: an increase of around 300 (0.05%) according to the estimation approach versus 200 (0.03%) according to the calibration approach. In this instance, predictions look similar for all groups.

Table 6.7 Comparing the estimated impact of welfare reforms (excluding Universal Credit) on employment obtained using the 'estimation and simulation' and 'calibration and simulation' approaches

	Lone Mothers	Couples with Children		Couples without Children		Whole Sample
		Men	Women	Men	Women	
Baseline employment	46,700	158,300	130,400	141,800	137,500	614,800
Change in employment (estimation)	-200	1,300	100	500	400	2,000
Change in employment (calibration)	-300	-0	100	200	200	200

Source: Estimation: FRS 1996–97 to 2009–10 and authors' calculations. Simulation: FRS 2007–08 to 2009–10 and authors' calculations.

Table 6.8 Comparing the estimated impact of welfare reforms (including Universal Credit) on employment obtained using the 'estimation and simulation' and 'calibration and simulation' approaches

	Lone Mothers	Couples with Children		Couples without Children		Whole Sample
		Men	Women	Men	Women	
Baseline employment	46,700	158,300	130,400	141,800	137,500	614,800
Change in employment (estimation)	800	-400	-900	200	600	300
Change in employment (calibration)	500	-200	-1,000	300	500	200

Source: Estimation: FRS 1996–97 to 2009–10 and authors' calculations. Simulation: FRS 2007–08 to 2009–10 and authors' calculations.

Using the figures in the two tables to look at the impact of Universal Credit on its own, the estimation approach suggests this leads to a fall in employment of around 1,700 for the population as a whole, while the calibration approach suggests no change. Both effects are small and, relative to a baseline employment level of around 600,000, practically indistinguishable. However, this difference is almost entirely driven by men in couples with children: the introduction of Universal Credit is predicted to reduce employment by 1,700 for this group according to the estimated model, but just 200 according to the calibration and simulation approach. This difference is equivalent to around 1% of baseline employment for this group.

Therefore, whilst overall one obtains employment impact predictions from the two methods that are similar, once one delves down into the figures, there does appear to be some difference for men in couples with children. This leads to an obvious question: which of these predictions/models should one believe for this group? Unfortunately, the answer to this is not clear-cut. On the one hand, the calibration and simulation approach is based on hours and employment elasticities chosen for different groups following an in-depth review of the empirical labour supply literature. Utilising the findings of multiple papers, weighted by their quality, should allow one to obtain a more reliable and more nuanced picture of how responsive different groups are to changes in work incentives. In particular, it allows us to vary elasticities by age of youngest child, by income, and by partner's employment status in a more explicit way than in the estimation and simulation approach. And, it utilised evidence from studies that are able to better control for some of the estimation issues discussed in Section 4.1, than the canonical models used in our estimation approach.

However, the calibration and simulation approach also suffers from significant drawbacks compared to the estimation approach. First, it does not allow for 'income effects' whereby the amount of income an individual or couples receives is able to directly affect their labour supply decisions (only changes in PTRs and EMTRs can affect such behaviour). Second, it does not properly account for particular features of these reforms, such as the removal of the 'jumps' in welfare entitlement at 16 and 30 hours when Universal Credit is introduced. Third, it does not account for the fact that couples are likely to make their labour decisions jointly, taking into account the behaviour of the other partner, and any changes in behaviour of the other partner. Fourth, by using evidence from a wide range of studies, including those outside the UK, it is possible that the degree of responsiveness assumed in the central case does not properly reflect how responsive people are in Wales.

Given the arguments in favour of both approaches, we cannot favour one estimate of the impact on employment among men in couples with children over another. But what is clear is that both methods produce very similar estimates of the impact for most population groups considered, and for the sample of lone mothers and couples as a whole.

However, this still leaves the gap in employment effects predicted using the calibration approach for both the overall sample and the estimation sample of lone parents and couples with children. For instance, after the introduction of Universal Credit, the central prediction from the calibration and simulation approach is for a 5,000 (0.3 percentage point) increase in employment among a working-age population totalling 1,756,400, compared to a 200 increase (0.0 percentage point) increase among a sub-population of 719,700. Of the other 4,800 additional workers, the results in Section 6.1 show that around 1,800 are single adults without children; the remaining 3,000 are a combination of people who are self-employed, disabled, over 59, under 22 or the partner of someone in one of those positions.

However, the reason we excluded these various groups from the estimated labour supply models of Chapter 5 is that we were concerned that the work incentives they face, and their responses to them, may not be best captured in a standard labour supply model of hours and employment. Other models often exclude these same groups for the same reasons, and therefore there is little evidence about how responsive these groups are to changes in their EMTRs and PTRs. Together with the differences in

predicted employment effects found in the sensitivity analysis of the previous section, this leads us to conclude that the employment effects of the welfare reforms (including Universal Credit) are somewhat uncertain. Whilst the impact of the change in financial work incentives looks to be fairly modest in our quantitative assessment, the fact that much of the response appears to be driven by groups for which relatively little is known about their responsiveness means we cannot be entirely confident of this conclusion. Added to the uncertain impact of the changes in non-financial incentives (discussed in Sections 2.4 and 2.5), this means the ultimate impact on employment could yet be higher than the 'high-responsiveness' scenario presented in Section 6.2.

6.4 Conclusion

The central estimates in this chapter suggest that the reforms excluding Universal Credit are likely to have little impact on overall employment – a marginal increase, if any – but are predicted to increase slightly the number of workless families in Wales. However, Universal Credit could then lead to a modest increase in employment and a somewhat larger fall in the number of workless families in Wales, leaving the number of workless families lower than it would have been in the absence of any of the UK government's welfare reforms. While the reforms excluding Universal Credit weaken incentives to be in work for those with non-working partners and strengthen them for those with working partners, on average, Universal Credit does exactly the opposite, increasing the incentive for families to have someone in work, but reducing the incentive for couples to have both partners in work. These patterns, and the modest impact on employment, are in accord with the findings of the estimated model of labour supply in Chapter 5 and with what we might expect from the pattern of work incentive changes described in Chapter 3. The predicted effects of the reforms on hours of work and earnings, while still not dramatic, are somewhat larger than the predicted effects on employment.

The sensitivity analysis carried out does suggest some uncertainty about the precise impact of Universal Credit on labour supply, but under both the low- and high-responsiveness scenarios, the impact appears to be positive but small. This does not mean that we should be overly confident in our assessment of the likely effects of the reforms, however. First, as discussed in Chapter 2 of this report, there are many changes to non-financial work incentives that could, in principle, be more important than the changes in financial incentives (or might, on the other hand, have very little impact). And in the next chapter we turn to look at whether interactions between the reforms and the state of the labour market and wider economy may mean that, at least in the short term, the impact of the reforms on employment, hours of work and earnings may differ from the predicted changes in desired labour supply.

7. The interactions between the welfare reforms and the wider economy

Chapters 5 and 6 examined the impact of the welfare reforms on labour supply in Wales, using both an estimated model of labour supply behaviour in Wales, and a 'calibration' approach, which utilises sets of assumed labour elasticities that are based on a review of the literature on labour supply responsiveness. In a simple sense, the results presented represent the impact of the welfare reforms for Wales as a whole; the responses of individuals and couples are aggregated up using the population weights provided with the FRS survey to be representative for the nation. However, there are a number of reasons why the effects of the welfare reforms may not correspond to a simple aggregation of predicted individual responses. This chapter discusses *qualitatively* how the reforms may interact with the wider economic environment, with reference to basic economic theory and the existing empirical literature.

The economy, presently, can be characterised as fairly weak. Following a 'Great Recession' that saw output fall by 6.3% between its peak in the first quarter of 2008 to its trough in the second quarter of 2009, the stop–start recovery has been fairly weak. The economy grew by 1.8% in 2010, by 0.9% in 2011 and the Office for Budget Responsibility predicts the economy will have shrunk by 0.1% in 2012 (OBR (2012b)). Indeed, the economy remains 3.9% below its peak following over 3 years of 'recovery' (that included a 'double-dip' recession). Unemployment remains significantly higher than prior to the late 2000s recession, at 7.8% for the UK as a whole, and 7.9% for Wales (ONS (2012)), although this represents a stronger performance than would be expected given the weak growth performance. Looking ahead, the OBR forecasts unemployment to rise in 2013 to 8.2%, remain at this level in 2014, before slowly declining to 8.0% in 2015, 7.6% in 2016, and 7.1% in 2017. In other words, unemployment is predicted to be higher than now over the next 3 years for the UK as a whole. And given that the forecast is for further cuts to public sector employment (overall employment is forecast to grow due to more jobs in the private sector), and the relatively high share of public sector employment in Wales, the labour market in Wales may be expected to be particularly weak in the coming few years. Given continuing high unemployment, it is important to investigate whether this may mean those seeking to enter employment following the reforms will be able to do so, and whether they will crowd out existing workers or job-seekers.

With these issues in mind, Section 7.1 considers the evidence on whether changes in employment among some groups will displace (or create space for) others competing for the same jobs that are not directly affected by the reforms themselves. Section 7.2 discusses how the impact of the reforms may vary with the state of the labour market (i.e. whether there is low or high demand for labour), and we explore whether the results from the calibration and simulation approach can be used to understand how the impact of the reforms on employment and hours may differ given different economic conditions. Section 7.3 discusses the impact the welfare reforms may have on aggregate demand, utilising available evidence on how large the knock-on effects for changes in welfare spending are for the rest of the economy.

7.1 Spillover effects on the employment of other workers

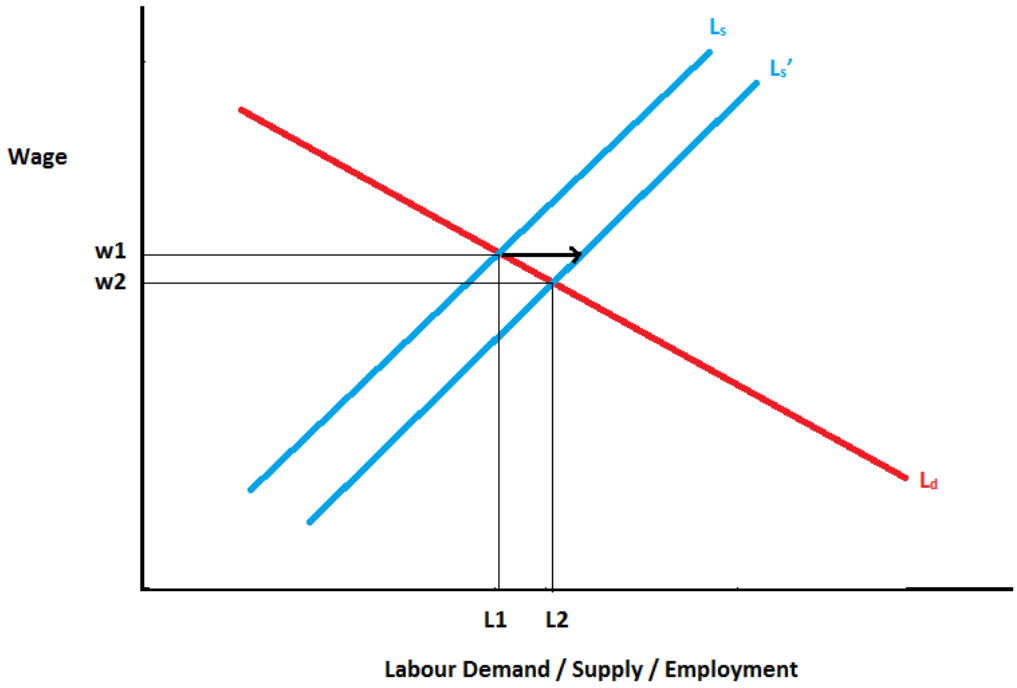
The analysis of Chapter 5 and 6 concludes that there is a great deal of uncertainty about the impact of the welfare reforms on labour supply in Wales. However if the central scenario for the calibration and simulation approach is correct, the fraction of the working age people in employment of would increase by 0.3 percentage points following the introduction of Universal Credit. However, an implicit assumption of the models used is that the demand for labour is perfectly elastic: in other words employers are willing to hire everyone willing to work at the going wage rate for their skill level, and the wage rate is unaffected

by the numbers of people employed. So, everyone who wishes to enter employment following the reform is able to, and everyone already employed is able to continue working. The following Section (7.2) discusses how the impact of the welfare reforms on overall employment and hours of work may differ when labour demand is **not** perfectly elastic (i.e. firms are willing to employ more people only if wages fall) or is constrained, leading to a gap between labour supply and labour demand. Here we focus on a particular issue that arises in such circumstances: the possibility of spillover effects from the reforms on the employment and wages of people who are not directly affected by the reforms.

A stylised picture of the potential impact of the reforms on the labour market helps illustrate how spillover effects may occur. Figure 7.1 shows a standard economic supply and demand graph for the labour market, with wages on the vertical (Y) axis and labour supply and demand on the horizontal (X) axis. The labour supply curve (L_s) shows how much labour is supplied at a given wage: this slopes upwards because in order to encourage more people to enter work, and existing workers to work more, firms would have to pay a higher wage. The labour demand curve (L_d) shows how much labour is demanded at a given wage: assuming that firms are willing to hire additional labour only if wages fall (perhaps reflecting a decline in output-per-worker as the number of workers increases), this is downward sloping. Labour market equilibrium takes place when supply equals demand (with initially, employment L_1 and wage W_1).

We can represent an increase in desired labour supply (such as that which might occur following the welfare reforms) by a rightward shift in the labour supply curve (to L_s'): the increase in work incentives means people would to be willing to supply more labour for a given wage. However, downward-sloping demand for labour means employers are not willing to hire all the additional labour supplied at the existing wage rate. Instead, employers respond by cutting wages, and the new labour market equilibrium involves a lower wage, and an increase in employment that is smaller than it would be than if wages had remained at their initial level.

Figure 7.1 Downward-sloping labour demand and 'spillover' effects



This could mean that some of those who would have liked to increase their labour supply as a result of the reforms are unable to do so. However, it could also mean that other existing workers may find themselves 'crowded out' by those wishing to work longer hours or enter employment. In particular, those who do not see their work incentives improve under the reforms may not be willing to work so much at the new lower equilibrium wage, and will therefore reduce their hours or exit employment.

These negative spillover effects are likely to be greater, the greater the degree of substitutability between the labour supplied by 'new workers' and that supplied by existing workers. For instance, low-wage or low-skill workers are likely to be more substitutable for other low-skill workers than they are for those with a higher level of skills. Furthermore, to the extent to which high-skill jobs make use of job-specific knowledge and skills, the degree of substitutability between different low-skilled workers is likely to be higher than the degree of substitutability between different high-skilled workers. Indeed, some groups of workers may have skills that are complementary to each other rather than being substitutable: an increase in the supply of one group may therefore lead to additional opportunities for work for the other group.

The analysis of the impact of the welfare reforms on work incentives (Chapter 3) found that work incentives improve most significantly following the reforms for those in couples without working partners and single adults without children. These are rather heterogeneous groups, but given that the biggest changes in work incentives occur for those with incomes of around £15,000 to £25,000 (Figure 3.2), and that employment decisions seem to be more responsive to work incentives for low and mid income/education individuals than high income individuals, any negative spillover effects are likely to be concentrated among similar low to mid income/skill individuals. This may include second earners in couples who face a weakening of work incentives, or younger single adults without children who face smaller changes in their work incentives.

It is worth noting that negative spillover effects are likely to become less important over time. This is because, over time, firms will be able to invest in new capital (such as offices, factories and equipment) to complement the additional supply of labour. In other words, the demand for labour is likely to be more elastic in the long run than it is in the short run, as the economy moves to a new equilibrium of higher output and higher employment.

Identifying whether a change in tax or welfare policy has a spillover effect on those not directly affected is difficult. One of the most common methods to analyse the impact of reforms is to compare changes in the employment or hours of work of those directly affected by the reform (the 'treatment group') and compare it to the changes in behaviour of those not directly affected (the 'control group'). Using such a method to analyse the scale of spillover effects requires defining a group, which is expected to be unaffected directly *or indirectly* by the reforms, but is similar enough to those groups that it can be used as a control group. This means much of the empirical evidence on spillover effects comes from the US where policy changes often vary across states, or from pilot programmes where some areas are subject to a reform and others are not (the working assumption here is that spillover effects are geographically restricted).

The empirical evidence on spillover effects from welfare reforms is mixed, suggesting that such effects are likely to be highly context-specific, depending upon the particular reforms and groups affected, and the general labour market conditions.

For instance, Bartik (2002) examines the impact of mid-1990s welfare reforms in the US, which acted to significantly increase employment among lone mothers, on the wages and employment rates of groups not targeted by the reforms. The main finding is a significant negative impact on the wages and employment rate among men who did not complete high school. Lubotsky (2004), on the other hand, which examines the impact of reforms in Michigan and in the US, finds little evidence of wage or employment effects among the rest of the population.

Unfortunately, as with the US work just described, the UK work on spillover effects from welfare reforms focuses on reforms that are focused on improving non-financial work incentives as opposed to financial ones. This is because such reforms are often trialled using pilot studies, whereas changes to benefit rates, tapers or earned income disregards are nearly always rolled out nationally in the UK.

The evaluation of the UK's New Deal for Young People, a programme designed to increase the speed with which young job seekers exit unemployment, found no evidence of spillover effects on job finding rates among other parts of the population (Blundell et al. (2004)). This finding is based on the observation that the impact of the programme on unemployment exit rates for the eligible group (19–24 year olds) is estimated to be the same whether one uses as a control group the eligible group living in different areas of the country where the programme was yet to be rolled out, or one uses ineligible people in the same areas aged either 25 to 30 or 31 to 40 (these were too old to take part in the programme). If negative spillover effects were present, one would expect instead that the impact would look larger when using 25 to 30 year olds as the control group than when using 31 to 40 year olds. This is because 19 to 24 year olds are likely to be closer substitutes for 25 to 30 year olds than they are for 31 to 40 year olds and, as discussed, negative spillovers are likely to affect groups that are more substitutable with those directly affected by a programme. However, because the evaluation looked at exit from unemployment only, rather than duration of it, it is unable to examine whether an increase in the numbers of 19 to 24 year olds exiting unemployment increased the number of older workers *entering* unemployment. However, a macro-economic study of the programme (Riley and Young (2000)) suggests that employment among the rest of the population *increased* very slightly due to the programme, mainly due to a slight decline in wages due to the greater number of young people in work.

The evaluation of the UK's Pathways to Work scheme, a programme designed to increase the exit rate from Incapacity Benefit (IB) into employment, finds little evidence of broad spillover effects on other (ineligible) recipients of out-of-work benefits (Adam et al. (2008)). However there was some evidence of a negative impact on the probability of exiting unemployment for those claiming Job Seeker's Allowance (JSA) in areas the scheme was rolled out in October 2003 (but not areas where the programme was rolled out in April 2004). It is notable that JSA recipients are typically more likely to exit to employment than other types of benefit recipients, meaning that, perhaps, they represent a group that is a close substitute for the IB recipients helped and encouraged into work. The authors of the evaluation offer a number of explanations for the spillover effects including an inability for the labour market to provide jobs at this time (a lack of labour demand), or Jobcentre Plus staff having difficulties in coping with the additional number of people seeking work, or being diverted from other groups to deliver the Pathways to Work scheme.

This raises an important point. Spillover effects on the rest of the population from welfare reforms may not only be the result of substitution or complementarity of different types of workers. They may also occur because of changes in the way institutions delivering welfare reform (such as Jobcentre Plus or Welfare-to-Work providers) deal with their other clients. On the one hand resources may be diverted away from other groups, reducing the likelihood that they find or maintain employment. But a new scheme may also encourage the use of 'best practice' more broadly, increasing the quality of support provided to others, thereby raising the likelihood that they find or maintain employment.

7.2 The influence of labour demand conditions

As discussed in Section 7.1, most of the existing empirical literature on labour supply responsiveness to taxes and welfare, as well as the models of lone mother and couples labour supply estimated for this report, are grounded in a world where anyone who wishes to work at the going wage rate is able to, and demand for labour is perfectly elastic. However, in the context of significant levels of unemployment and weak demand for labour, this assumption may not be appropriate. It is therefore worthwhile considering

how the employment and hours of work effects of the welfare reforms may differ when the demand for labour is constrained. In other words, how might the state of the Welsh labour market affect the impact of the welfare reforms on employment and hours of work?

There are a number of separate – but interlinked – conceptual issues to consider when addressing this question. First, it is helpful to draw a distinction between two different ways in which labour demand may limit the extent to which increases in labour supply translate into increases in employment. One way is a downward-sloping demand curve for labour so that increases in labour supply lead to reductions in the wages employers are willing to offer (see Figure 7.1, above). In such a case, the labour market does clear so that labour supply equals labour demand, but at a lower wage than before. Alternatively, it could be the case that the labour market does not clear, meaning that there is involuntary (under-) unemployment: people willing to work (or work more) at the going wage rate but unable to obtain employment (or work extra hours).

In the latter case, with a stock of potential workers willing to work at the going market rate, but wages stubbornly refusing to fall *before* the reforms, it seems likely that many of those encouraged to increase their labour supply following the reforms would find it difficult to do so, reducing the positive impact on employment and hours of work.

A number of papers incorporate such involuntary unemployment. Blundell, Ham and Meghir (1987) is one of the seminal papers in the field, modelling women's employment and hours of work in the UK as the result of a two-stage process: women first decide whether to work given the financial work incentives they face, and then they attempt to find a job. In this model, those observed not working consist of two distinct groups: those who do not want to work given the wage they could command in the labour market; and those who do want to work but are unable to find a job. They find that allowing for such involuntary unemployment leads to a fall in the estimated labour supply elasticity compared to a standard labour supply model (for those working or seeking work, the elasticity is negative even in the standard model). Bargain et al. (2010) use German data and examine how biased estimates of labour supply elasticities from standard labour supply models are in variety of circumstances, once one allows for the possibility of involuntary unemployment. They find that a standard model generally overestimates the labour supply elasticity, but with significant variation in the size of this bias across demographic groups. For instance, the bias is large and positive for parts of the population with high involuntary unemployment (such as single men); however it negative, albeit statistically insignificantly, for groups where non-employment is often voluntary (such as women in couples). Phipps (1991) finds similarly smaller elasticities once constrained labour demand is accounted for, this time using Canadian data.

Because these results relate to the impact of allowing for involuntary unemployment on *desired* labour supply as opposed to actual employment, the findings are actually more relevant to the long-run impact of the welfare reforms, rather than the short-run impact in the face of constrained labour demand. Bargain et al. (2010) also examine how predicted changes in actual employment vary according to the constraints on labour demand. They find that the bias is small when the reform is fairly minor and the impact is concentrated among groups, such as women with children, who have chosen to be out of the labour market rather than being involuntarily unemployed. However, when reforms are large and when the groups affected are those more affected by involuntary unemployment, such as single men, the employment effects of reforms are significantly smaller once one takes into account constraints on labour demand. Phipps (1991) performs similar simulations using models with and without constraints on demand, and finds that under assumptions of significant constraints on labour demand, that the employment effects of policies that would otherwise provide a substantial boost to employment are essentially zero.

These results therefore suggest that in the short run at least, significant unemployment and labour market weakness in Wales could mean that the positive predicted impact of the welfare reforms on

labour supply is not reflected in an increase in the number of people actually in work. Over time, as the labour market recovers, these demand-constraints would be expected to unwind, allowing a stronger employment response. In March, the OBR predicted that unemployment for the UK as a whole would still be 8% in 2014, before falling substantially to 6.3% in 2016. However, the OBR does not break down its forecasts by nation and region, and the greater reliance on the public sector undertaking significant spending cuts in Wales, might mean that the outlook for the labour market in Wales is less rosy.

As discussed, the 'double hurdle' models incorporating involuntary unemployment also suggest that labour supply may be less responsive in the long run than one would estimate from models ignoring this feature of the real world (i.e. most models). It turns out that even if labour markets do clear, so that there is no involuntary unemployment, downward-sloping labour demand (as in Figure 7.1) can also affect both the estimation of labour supply elasticities and the reliability of predictions of the effect of policy reforms on employment and hours of work.

We showed in Section 7.1 that downward-sloping labour demand means that the effects of reforms on the amount of labour employed are smaller than the increase in labour supply. This would suggest that simulating reforms using a model of labour supply would lead to one to predict too large an increase in employment, at least in the short run. However, if a model identifies the effects of financial work incentives on labour supply by comparing how employment/hours of work and financial work incentives change together over time (for instance, comparing employment before and after a tax reform), what one actually identifies may be the combined effect of the change in labour supply and downward-sloping labour demand. In other words, the elasticity one would estimate might actually be the correct one for predicting the short-run employment effects of a reform, but underestimate the 'pure' labour supply elasticity, which may be of more relevance in the longer run (when labour demand is more elastic). All else being equal, models that instead identify labour supply elasticities largely via variation in work incentives across the population rather than over time would estimate correctly the 'pure' labour supply effect but result in elasticities that would over-predict the short-run employment effects of a reform.

This might suggest using elasticities from time-series estimates to examine the short-run employment effects of reforms, and elasticities from cross-sectional studies to examine the longer run employment effects. Unfortunately, this is not possible for at least two reasons. First, as pointed out in Meghir and Phillips (2010), making use of policy reforms over time provides one of the most convincing avenues for overcoming the problem that wages and labour supply are likely to be correlated for reasons other than a direct causal link. Studies making use of such policy changes therefore often provide more credible estimates than cross-sectional studies. On the other hand, most studies rely on cross-sectional variation in work incentives and employment/hours of work to obtain the necessary sample sizes to estimate labour supply estimates with some precision. In order to come to a judgement on how responsive labour supply is for different parts of the population, we therefore have to make use of both models reliant on time-series variation and those reliant on (mainly) cross-sectional variation in work incentives.

Peichl and Siegloch (2011) examine how allowing for downward-sloping demand curves affect the employment impact of hypothetical welfare reforms in Germany and find that demand effects offset about one-quarter of the positive predicted labour supply effect of the reform. They use data from 2009, a year in which Germany was in a deep recession, but in which the labour market held up reasonably well. It is therefore unclear the extent to which the results are applicable to Wales.

The 'low-responsiveness scenario' used in the sensitivity analysis of the calibration approach results can help shed some light on how much smaller effects could be in the short run if labour demand holds back employment and hours changes. Overall, this scenario involves assuming hours are only around one-quarter as responsive to changes in financial incentives as in the central scenario, and participation is around half as responsive. Under these assumptions, the reforms including Universal Credit are estimated to increase employment by just 0.1 percentage point (versus 0.3 percentage points in the central

scenario).. While these are not 'predictions' of how weak labour demand will affect the employment impact of the reforms in the current climate, they do illustrate that short-term impacts are likely to be highly sensitive to the extent to which demand constrains supply-side responses.

7.3 The potential impact on aggregate demand

As well as interacting with the labour market, a wider economic impact may be caused by changes in spending by those whose income is affected by the welfare reforms (whether directly through changes in entitlements, via changes in employment and hours of work, or via spillover effects). For instance, if families see a fall in their income as they are hit by cuts in welfare payments, they may reduce their spending on goods and services. The firms producing those goods and services may respond to the reduction in demand for their products and hence revenues by laying off workers and cutting back on their input purchases from their suppliers. The firm's owners and suppliers, and laid-off workers, may then cut back their own expenditure, leading to further reductions in the level of demand, and so on. The effect does not get infinitely large: at each stage, some of the fall in income leads to a fall in savings rather than a fall in spending, so the additional reductions in demand get successively smaller further down the chain. And the effect on demand for domestic output is further limited, as some of the reduction in demand will lead to a reduction in imports, reducing foreign output rather than domestic output.

This simple example demonstrates two key factors influencing the size of the 'fiscal multipliers' that determine the impact of a change in spending on benefits and tax credits (and, indeed, spending on public services, public investment or changes in the tax take) on the size of the economy: the propensity of people to consume rather than save marginal income, and the extent of leakages in marginal consumption in the form of imports. Considering the first factor can provide some insight into the size of the multipliers associated with the welfare reforms in Wales.

First, there is clear evidence that the propensity to consume marginal income falls with the level of income. In other words, a £1 change in the income of a low-income family leads to a bigger change in their spending/consumption than a £1 change in the income of a higher income family. This reflects, in part, the fact that low-income families are more likely to be credit-constrained: if they were able to borrow money to spend more they would, but they cannot access such finance, and so changes in their income feed through one-for-one into their spending. Higher income families may instead respond to a fall in their income in part by reducing their savings or by increasing their borrowing. Because the welfare reforms lead to bigger falls in the income of poorer households than richer ones, we might therefore expect the impact on spending and, hence, the effect on the size of the economy to be greater, than for changes that mainly hit the incomes of higher income individuals.

In the June 2010 Budget the OBR published estimates of the size of fiscal multipliers for a number of different types of spending and taxes (OBR (2010)). These show the size of the impact on the level of Gross Domestic Product (GDP) of a reform that has a direct effect of changing revenue or spending by 1% GDP. The multiplier for changes in welfare spending chosen is 0.6, meaning that a measure that has a direct effect of reducing welfare spending by 1% of GDP is estimated to lead to a reduction in GDP of 0.6% in the short run. On the other hand, the OBR assumes that an increase in tax revenues equal to 1% of GDP through changes in income tax and National Insurance reduced GDP by just 0.3% in the short run.

Taken together, the direct effect of the welfare reforms is estimated to reduce welfare spending by around 1% of GDP.[28] The OBR's multipliers would then imply a hit to output of around 0.6% of GDP in the short run for the UK as a whole. However, it is important to recognise that using other methods to reduce the deficit may also entail costs. If the OBR's multipliers are correct, reductions in spending on public

[28] The welfare cuts represent a reduction in spending of £18 billion, offset by the £2 billion cost of Universal Credit, meaning an overall change in welfare spending of £16 billion, in a context where GDP is approximately £1,600 billion.

services would have a similar effect on the level of GDP, and reductions in investment spending (already being cut very significantly) would have an even greater impact (1% of GDP in the short term), and may lead to a reduction in the long-run productive potential of the economy. Increases in tax revenues are predicted to lead to a smaller short-term hit to output, but again may lead to longer run reductions in output through reductions in labour supply or investment.

The welfare reforms are happening during a period of economic weakness; whether the fiscal multipliers are likely to be larger or smaller than normal in this context is an issue subject to active debate. One key factor is the extent to which the spending of those in receipt of welfare crowds out other economic activity. If the economy was running close to capacity, an increase in demand from benefit recipients may not lead to an increase in overall economic output and employment, but instead, a diversion of labour and production from other uses. Similarly, a reduction in demand from benefit recipients may free up labour and productive capacity for other uses rather than seeing a fall in overall economic activity. This would suggest a small fiscal multiplier: government spending leads to changes in the allocation of output rather than the level. In a period with spare capacity and significant unemployment, however, the 'crowding out' effects of government spending on benefits may be smaller: changes in spending would then lead to changes in the level of output, implying a higher fiscal multiplier.

The marginal propensity to consume may also differ during a period of recession. If more people are credit constrained, and therefore have a high propensity to consume marginal income, the multiplier effects may be larger than normal. On the other hand, if people are more cautious during recessions and save a larger fraction of marginal income rather than spend it, the multipliers may be smaller.

Given that sound arguments can be made for the multiplier being larger or smaller in periods of economic weakness, ascertaining which way it varies in practice is necessarily an empirical question. Auerbach and Gorodnichenko (2012) estimate the size of fiscal multipliers for a number of advanced economies, and find that they are significantly larger during periods of recession than during periods of economic expansion. For instance, the fiscal multiplier for government purchases during recessions is estimated to peak at 3.5 after approximately 2 years (although there are wide margins of error around this, and there is only a 10% chance it is smaller than 0.6 or greater than 6.3) and average 2.3 over the 3 years following the chance, whilst the estimates are not statistically significantly different from 0 for periods of economic expansion. Bachmann and Sims (2011) find similar results. However, it is not immediately clear what these estimates imply for the size of the fiscal multipliers for Wales over the coming years: an economy that is operating below potential (for instance, with significant unemployment) but that is expected to be slowly expanding.

Using US state-level data, Shoag (2010) instead examines how fiscal multipliers vary with respect to whether employment is higher or lower than its long-run average, and finds multipliers of just over 3 for periods when employment is lower than normal and around 1.5 when employment is higher than normal. This would suggest that the impact of cuts in spending on welfare on the economy will be greater than normal whilst the economy is operating below potential and employment remains depressed. In addition, an examination of the effects of fiscal consolidation during the period between 2009 and 2011 by the International Monetary Fund (2012) finds evidence that fiscal multipliers have been between 0.9 and 1.7, as opposed to around 0.5 in the three decades to 2009.

The empirical evidence therefore suggests that the negative short-term impact of the welfare cuts on economic output and employment are likely to be larger than one might typically expect whilst significant slack remains in the economy. However, it is important to bear in mind that, in the longer run, as economic slack declines, and the economy moves to a new equilibrium, these short-term effects would be expected to fade. Indeed, given the predicted increase in labour supply, the long-run impact of the reforms is predicted to be an *increase* in employment (and hence, possibly, economic output).

How does the evidence compare with the analysis of fiscal multipliers in Stage 1 of the Welsh government's assessment of the UK government's welfare reforms in Wales (Welsh Government (2012))? Using a method based on input–output tables, this suggested a multiplier of between 1 and 1.5 for Wales would be likely. This is significantly higher than the OBR's estimate but is within the range of estimates from the International Monetary Fund, and is somewhat less than that found for periods of economic weakness found in largely US-based studies of cyclical variation in fiscal multipliers. Without further information on the method by which the Welsh government's estimate was calculated, it is unclear just how reliable it is, but it does not seem implausibly large or small. As with us, the Welsh government report emphasised that its estimates ignored the labour supply effects of the welfare reforms, and that in the long run, increases in employment may lead to increases in economic output.

7.4 Conclusion

This chapter has discussed how the wider economic context may affect and be affected by the welfare reforms. It is not possible to quantify the magnitude of these effects. However, economic reasoning and a study of the available empirical evidence suggests that, in the short run, constraints on labour demand may act to dampen any positive impact of the reforms on labour supply, and that there may be some negative spillover effects in the form of lower wages and lower employment for those already in work. It also seems likely that the cuts in welfare spending will have a bigger short-run impact on the economy than if the economy were stronger. However, such effects are also likely to be temporary, and the labour supply effects analysed in Chapters 5 and 6 of this report are likely to be more relevant in the longer run, once the economy has adjusted.

8. Conclusions

This report has examined the impact of the UK government's welfare reforms (as announced up to and including the 2012 Budget, but excluding announcements made in the 2012 Autumn Statement) on the financial and non-financial work incentives facing households in Wales, and considered the potential impacts of the changes on employment and hours of work in Wales, with the quantitative analysis focusing on the changes in *financial* incentives.

The impact of the welfare reforms on financial work incentives is reasonably clear. The welfare cuts lead to a slight strengthening of average incentives to be in work and a reduction in the number of people in work facing withdrawal of means-tested benefits if they increase their earnings. The introduction of Universal Credit leads to a further strengthening of financial work incentives, on average, with claimants able to earn more before they start to have their benefit withdrawn and nobody facing withdrawal of benefits at the most penal rates that are found in the current system.

The reforms have quite different effects on the work incentives faced by people in different circumstances. In particular, the reforms excluding Universal Credit tend to weaken the incentive for families with children to have someone in work, especially at low earnings; but they strengthen the incentives for couples to have a second partner in work and for single adults without children to work at all. Universal Credit has exactly the opposite effect: less aggressive means-testing strengthens the incentive for couples to have one partner in work, but the flip-side is that couples have more to lose from a second earner being in work as well, meaning those with working partners will see a reduced incentive to work at all.

It is also clear that many more people may face work search conditions than in April 2010: lone parents with a youngest child aged 5 to 9 and former claimants of Incapacity Benefit assessed as fit for work are being moved over to Jobseeker's Allowance, while Universal Credit allows for many more people in low-income couples to be subject to work search requirements, although the government does not plan to make full use of those powers initially.

The results of the labour supply modelling suggest that the impact of the changes in financial work incentives on employment and hours of work will be fairly modest: the central estimate is for employment to increase by around 5,000 (or 0.3 percentage points), for aggregate hours of work to increase by around 1%, and for aggregate earnings to increase by 0.5%, following the introduction of the full set of reforms (including Universal Credit). This is largely driven by Universal Credit: the other reforms are predicted to leave overall employment virtually unchanged, although they do look set to boost hours of work and hence aggregate earnings somewhat. The sensitivity analysis shows that there is some uncertainty around these predictions, but, overall, the impact of the changes in financial work incentives on labour supply appears to be positive, but relatively small.

The predicted labour supply effects are consistent with the changes in work incentives: those groups given stronger incentives are predicted to see an increase in labour supply, and vice versa. In particular, the reforms excluding Universal Credit are predicted to lead to an increase in employment among those with working partners, and a reduction in employment among lone parents and people with non-working partners. In other words, the reforms excluding Universal Credit are predicted to lead to fewer working families, but also more families where both partners work. In contrast, however, the introduction of Universal Credit is predicted to reduce the number of workless families, increase the number of one-earner couples, but reduce the number of two-earner couples. Taking all the reforms together, it is this pattern that prevails.

However, it should be emphasised that there is still significant uncertainty about the overall impact of the reforms on employment, hours of work and earnings in Wales.

First, it is not possible to quantify the likely impact of the changes in conditionality, transparency and other non-financial aspects of work incentives on labour supply. Whilst one would expect a positive impact, the magnitude of such an effect is unclear: it is possible that the impact of these non-financial changes could be larger than the changes in financial work incentives, but it is also possible that the impact may be very modest indeed. This uncertainty reflects, in part, the absence of formal evidence available of the effect of similar changes. It is also not yet clear just how many more people will face work-search requirements under Universal Credit: the regulations allow for the extension of work-search requirements to around 50,000 more people in Wales (mainly among couples), but the Department for Work and Pensions has not committed to using that option in full so it is not clear how many additional people will face the requirements in practice.

Second, evidence suggests that the reforms may have a smaller impact on employment in a labour market characterised by low demand for labour and high unemployment. Whilst any demand constraints would likely mean an even smaller impact on employment than our modest predictions, at least in the short run, the extent to which demand constraints will prevent entry into work (or lead to negative spillovers among other workers) is unclear.

Third, our quantitative analysis has analysed the impact of the reforms on employment, hours of work and earnings, holding the other characteristics of families fixed. However, in the long term, the reforms may impact people's decisions about education, partnership or fertility, affect the amount of work experience people obtain, or may affect the wages employers are willing and able to offer workers. These longer term impacts may then have additional effects on labour supply. For instance, the predicted increase in labour supply among lone parents and first earners in couples may lead to them obtaining more work experience, leading to higher wages, improved work incentives and ultimately a larger impact on labour supply. However, conversely, if such groups are willing to work more because they keep more of their wages, firms may be able to cut back wages (at least to the National Minimum Wage), reducing wages, and potentially ameliorating the impact on labour supply in the longer run. Therefore, the longer run impacts could both push up or depress the impact of the reforms on labour supply, and the magnitude of these possible effects is also unclear.

Thus the impact of the reforms on employment, hours and earnings in Wales is still uncertain, because there are several aspects that are difficult to model. A conclusion that emphasises uncertainty is rarely welcome. But it is a reminder that, while careful theoretical and empirical analysis can yield important insights, it would be folly to claim perfect foresight of the effects of large and complex reforms, involving numerous changes to both financial and non-financial work incentives, and taking place in a particularly uncertain economic climate.

General references

Note: For works cited in the literature review of Chapter 4, see Appendix C. This reference list covers items cited in the rest of the report.

Adam, S. (2005), 'Measuring the Marginal Efficiency Cost of Redistribution in the UK', IFS Working Paper No. W05/14 (http://www.ifs.org.uk/publications/3399)

Adam, S., A. Bozio, C. Emmerson, D. Greenberg and G. Knight, 'A cost-benefit analysis of Pathways to Work for new and repeat incapacity benefits claimants', DWP Research Report No. 98, Department for Work and Pensions

Adam, S., M. Brewer and A. Shephard (2006), 'Financial Work incentives in Britain: Comparisons Over Time and Between Family Types', IFS Working Paper No. W06/20 (http://www.ifs.org.uk/publications/3747)

Adam, S. and J. Browne (2010), 'Redistribution, Work incentives and Thirty Years of UK Tax and Benefit Reform', IFS Working Paper No. W10/24 (http://www.ifs.org.uk/publications/5367)

Adams, L. And K. Oldfield (2012), 'Welfare to Self Employment', Department for Business, Innovation and Skills Research Report

Auerbach, A. and Y. Gorodnichenko (2012), 'Fiscal Multipliers in Recession and Expansion', NBER Conference Paper

Bachmann, R. and E. Sims (2011), 'Confidence and the Transmission of Government Spending Shocks', Mimeo

Bargain, O., M. Caliendo, P. Haan, and K. Orsini (2010), ""Making work pay" in a rationed labor market", *Journal of Population Economics,* Vol. 23, No. 1, pp 323 – 351

Bargain, O., K. Orsini and A. Peichl (2011), 'Labor Supply Elasticities in Europe and the US', EUROMOD Working Paper Series EM1/11, University of Essex

Bartik, T. (2002), 'Instrumental Variable Estimates of the Labor Market Spillover Effects of Welfare Reform', Upjohn Institute Working Paper No. 02–78, Upjohn Institute for Employment Research

Blundell, R., A. Duncan and C. Meghir (1992), 'Taxation in Empirical Labour Supply Models: Lone Parents in the UK', *Economic Journal,* Vol. 102, pp. 265–278

Blundell, R., A. Duncan and C. Meghir (1998), 'Estimating Labour Supply Responses Using Tax Reforms', *Econometrica,* Vol. 66, No. 4, pp. 827–861

Blundell, R., J. Ham and C. Meghir (1987), 'Unemployment and Female Labour Supply', *The Economic Journal,* Vol. 97, Conference Edition, pp. 44–64

Blundell, R., M. Costa Dias, C. Meghir and J. van Reenen (2004), 'Evaluating the Employment Impact of a Mandatory Job Search Program', *Journal of the European Economic Association,* Vol. 2, No. 4, pp. 569–606

Blundell, R. and A. Shephard (2012), 'Employment, Hours of Work and the Optimal Taxation of Low-Income Families', *Review of Economic Studies,* Vol. 79, No. 2, pp. 481–510

Brewer, M., J. Browne and M. Jin (2011), 'Universal Credit: A Preliminary Analysis', IFS Briefing Note No. 116, IFS

Brewer, M., E. Saez and A. Shephard (2001), 'Means testing and tax rates on earnings', in *Dimensions of Tax Design: The Mirrlees Review,* J. Mirrlees, S. Adam, T. Besley, R. Blundell, S. Bond, R. Chote, M. Gammie, P. Johnson, G. Myles and J. Poterba (eds), Oxford University Press

Browne, J. (2010), 'The Impact of Tax and Benefit Reforms to be Introduced between 2010–11 and 2014–15 in Northern Ireland', IFS Briefing Note No. 114, IFS

Browne, J. (2011a), 'Average Losses for Pensioner Households from Tax and Benefit Changes to be Introduced Between January 2011 and April 2014', Mimeo, IFS

Browne, J. (2011b), 'The Impact of Tax and Benefit Reforms by Sex: Some Simple Analysis', IFS Briefing Note No. 118, IFS

Browne, J. (2012), 'The Impact of Austerity Measures on Households with Children', London: Family and Parenting Institute

Centre for Social Justice (2009), *Dynamic Benefits*, London: CSJ (http://www.centreforsocialjustice.org.uk/client/images/swf/CSJ%20dynamic%20benefits.zip).

Department for Work and Pensions (2011), 'Universal Credit Policy Briefing Note 12', Department for Work and Pensions

Finn, D. and R. Gloster (2010), 'Lone Parent Obligations: A review of recent evidence on the work-related requirements within the benefit systems of different countries', Department for Work and Pensions Research Report No. 632

Freud, D. (2007), 'Reducing dependency, increasing opportunity: options for the future of welfare to work', Independent Report, Department for Work and Pensions

Immervol, H., H.J. Kleven, C.T. Kreiner and E. Saez (2007), 'Welfare Reform in European Countries: A Micro-Simulation Analysis', *The Economic Journal*, Vol. 117 (January), 1–44 (http://elsa.berkeley.edu/~saez/immervoll-kleven-kreiner-saezEJ07euromod.pdf).

International Monetary Fund (2012), 'World Economic Outlook: October 2012', International Monetary Fund

Knight, G. and D. Kasparova (2006), 'Lone Parents: In Work Benefit Calculations–work and benefit outcomes', DWP Research Report No. 367, Department for Work and Pensions

Klepingr, D., T. Johnson and J. Joesch (2002), 'Effects of Unemployment Insurance Work-Search Requirements: The Maryland Experiments', *Industrial and Labor Relations Review,* Vol. 56, No. 1, pp. 3–22

Lane, P., J. Casebourne, L. Lanceley and M. Davies (2011), 'Lone Parent Obligations: work, childcare and the Jobseeker's Allowance regime', Department for Work and Pensions Research Report No. 782

Lubotsky, D. (2004), 'The Labor Market Effects of Welfare Reform', *Industrial and Labor Relations Review,* Vol. 57, No. 2, pp. 249–266

Meghir, C. and D. Phillips (2010), 'Labour supply and taxes', in *The Mirrlees Review: Dimensions of Tax Design*, J. Mirrlees, S. Adam, T. Besley, R. Blundell, S. Bond, R. Chote, M. Gammie, P. Johnson, G. Myles and J. Poterba (eds), Oxford University Press

Mirrlees, J., S. Adam, T. Besley, R. Blundell, S. Bond, R. Chote, M. Gammie, P. Johnson, G. Myles and J. Poterba, *Tax by Design: The Mirrlees Review*, Oxford: Oxford University Press for the Institute for Fiscal Studies (http://www.ifs.org.uk/mirrleesReview)

Mulheirn, I. and V. Menne (2008), 'The Flexible New Deal: Making it Work', The Social Market Foundation

National Audit Office (2012), 'The Introduction of the Work Programme', HC 1701, Session 2010–2012, National Audit Office

Office for Budget Responsibility (2010), 'Budget Forecast June 2010 Appendix C', Office for Budget Responsibility

Office for Budget Responsibility (2012), 'Economic and fiscal outlook, December 2012', Office for Budget Responsibility

Office for National Statistics (2012), 'Regional Labour Market Statistics', Office for National Statistics

Peichl, A. and S. Siegloch (2011), 'Accounting for labor demand effects in structural labor supply models', *Labour Economics,* Vol. 19, No. 1, pp. 129–138

Petrongolo, B. (2009), 'The long-term effects of job search requirements: Evidence from the UK JSA Reform', *Journal of Public Economics,* Vol. 93, pp. 1234–1253

Phipps, S. (1991), 'Behavioural Response to UI Reform in Constrained and Unconstrained Models of Labour Supply', *The Canadian Journal of Economics,* Vol. 24, No. 1, pp. 34–54

Riley, R. and G. Young (2000), 'New Deal for Young People: Implications for Employment and the Public Finances', Mimeo, National Institute for Economic and Social Research

Shoag, D. (2010), 'The Impact of Government Spending Shocks: Evidence on the Multiplier from State Pension Plan Returns', Mimeo

Welsh Government (2012), 'Analysing the impact of the UK Government's welfare reforms in Wales – Stage 1 analysis' (http://wales.gov.uk/topics/educationandskills/publications/reports/analysingreforms/?lang=en).

Appendix A. Calculating participation tax rates for non-workers

It is relatively straightforward to use a tax and benefit micro-simulation model to work out what someone's family income would be if they did not work. However, to calculate what non-workers' family income and PTR would be were they to start work, we need to make more assumptions – in particular, what their hours and earnings would be if they did work. Numerous econometric techniques have been devised to perform such analysis, but in this paper we keep to a relatively simple approach:[29]

- We first estimate an Ordinary Least Squares log earnings equation for each of four hours bands (0–15, 16–23, 24–29 and 30+) using those individuals observed in the relevant hours category in our data, regressing log weekly earnings of individuals observed employed in the relevant hours category on various characteristics including age, sex, region, ethnicity, education, housing tenure, number and ages of children, partnership status and any partner's employment status and earnings.[30]
- We then use the estimated impacts of these characteristics on earnings to predict earnings for the non-workers if they were to work in that hours band. Since a large part of the variation of earnings is unexplained by these characteristics, we add to each prediction an error term drawn from the distribution of residuals. This enables us to calculate a hypothetical PTR for each individual if they were to work in that hours band.
- Next, we use a multinomial logit model, again estimated using the observed behaviour of the workers in our data, to predict the probability of each individual's choosing to work in each hours band, conditional on working at all.
- To create a single PTR for each non-worker, we calculated the PTRs for their predicted earnings in each of the four hours bands and then take an average of these four PTRs, weighted using their predicted probabilities of working in each hours band.

There are disadvantages to this approach, the main one being that earnings in work are a major determinant of the decision to start work, and therefore it would be natural to expect that the earnings that would be earned by someone not currently working would be lower than those earned by someone currently in work with identical observed characteristics. So-called 'selection adjustments' can be made to overcome biases introduced into the model in this way, but these typically require strong assumptions about the relationship between an individual's wage rate and how many hours they decide to work. We therefore keep to a simpler approach, although it is likely that this will overestimate earnings in work for non-workers. The direction of any resulting bias in our estimates of PTRs for these individuals is ambiguous.

[29] This methodology follows that in Adam and Browne (2010), which is itself based on that in Adam et al. (2008).
[30] The full set of regressors and estimated coefficients of these equations are available on request.

Appendix B. Summary tables of elasticities from the literature

Table B.1(A) Estimates of responsiveness of male hours of work (UK studies)

Study	Data/Sample	Model Details	Uncompensated Elasticity	Compensated Elasticity
Studies Referenced in Pencavel (1987):				
Ashworth and Ulph (1981)	335 married men. Survey unknown.	Structural model of individual utility with choice of hours modelled over entire budget constraint (allows for benefits as well as taxes)	-0.13	0.23
Atkinson and Stern (1980)	1973 Family Expenditure Survey. 1,617 full time employed males	Structural model of consumption and labour supply. Avoid problems of changes in marginal tax rates by selecting sample of basic rate taxpayers	-0.16	-0.09
Blundell and Walker (1982)	1974 Family Expenditure Survey. 103 couples with working men and women	Structural model of consumption and labour supply	-0.23	0.13
Blundell and Walker (1983)	1977 Family Expenditure Survey. 308 couples with working men and women	Structural model of consumption and labour supply	-0.004	0.20
Brown, Levin and Ulph (1976)	1971 Private Survey of 284 married men with non-working wives	n/a	-0.13	0.22
Brown et al. (1982, 1983)	1980 Private Survey of 3307 households	Structural model of individual utility with choice of hours modelled over entire budget constraint (allows for benefits as well as taxes)	One-worker family: -0.33 Two-worker family: -0.06 to -0.14	One-worker family: 0.17 Two-worker family: 0.30 to 0.39
Layard (1978)	1974 General Household	Linear model of hours of work	-0.13	-0.09

	Survey with 2,700 married men			
Later studies				
Blundell and Walker (1986)	1980 Family Expenditure Survey, 1,378 couples	Structural model of individual utility consistent with life-time optimisation of welfare	-0.07	0.024
Bargain et al. (2011)	EU-SILC data (General Household Survey), 1998 and 2001. Married	Structural discrete choice model with 7 hours options for each individual (0, 10, 20,.., 60 hours).	1998 tax-benefit system: Hours if working: -0.01 Total hours: 0.06 2001 tax-benefit system Hours if working: - 0.01 Total hours: 0.03	n/a

Table B.1(B) Estimates of responsiveness of male hours of work (international studies)

Study	Data/Sample	Model Details	Uncompensated Elasticity	Compensated Elasticity
Wales and Woodland (1979)	USA: Married men in the Panel Study of Income Dynamics	Model of hours of work accounting for progressive taxation with wages and hours assumed to be measured without error and tastes uniform across population	0.14	0.84
Hausman (1981)	USA: Married men in the Panel Study of Income Dynamics	Linear model of hours of work accounting for progressive taxation with wages and hours assumed to be measured without error and tastes varying across population	0	0.77
MaCurdy, Green and Paarsch (1990)	USA: Married men in the Panel Study of Income Dynamics	Linear model of hours of work accounting for progressive taxation (smoothing tax rates around points where marginal rates change) with wages and hours assumed to be measured without error and tastes varying across population	0	0.07
Eklof and Sacklen (2000)	USA: Married men in the Panel Study of Income Dynamics	A meta-study of Hausman and MaCurdy, Green and Paarsch that attempts to identify why results differ so greatly by systematically varying assumptions	0 to 0.078	0.055 to 0.488
Burtless and Hausman (1978)	USA: NIT experimental data	Structural model of individual utility with choice of hours modelled over entire budget constraint (allows for benefits as well as taxes)	0	0.07 to 0.13
8 NIT studies listed by Pencavel (1986)	USA: NIT experimental data	Various	Mean: 0.03	Mean: 0.13
Pencavel (2002)	USA: Current Population Survey	Model of hours of work with no explicit treatment of tax and benefit system. Various methods	-0.175 to 0.25	
Blomquist (1983)	Sweden: 1974 Level of Living Survey, all employed men in	Linear model of labour supply with continuous hours and preference	0.08	0.11

	couples aged 25–55	variation		
Blomquist et al. (1990)	Sweden: 1981 Level of Living Survey, all employed men in couples, aged 25–55	Linear and quadratic model of labour supply with continuous hours and preference variation	0.12	0.13
Blomquist et al. (2001)	Sweden: 1973, 1980 and 1990 Level of Living Surveys, all employed men aged 18–60	Flexible ('non parametric') model of hours of work allowing for taxes and benefits	0.08	0.09
Blomquist and Newey (2002)	Sweden: 1973, 1980 and 1990 Level of Living Surveys, all employed men aged 18–60	Flexible ('non parametric') model of hours of work allowing for taxes and benefits	0.08	
Bourguignon and Magnac (1990)	France: 1985 Labour Force Survey, couples aged 18–60	Linear labour supply model accounting for taxation	0.10	
Kaiser et al. (1992)	Germany: 1983 Socio-Economic Panel Survey, working age men in couples	Structural model of individual utility with choice of hours modelled over entire budget constraint (allows for benefits as well as taxes)	-0.04	
van Soest et al. (1990)	Netherlands: 1985 Labour mobility survey, working age men in couples	Linear labour supply model accounting for taxation with preference variation	0.19	0.28
Euwals and van Soest (1999)	Netherlands: 1988 Socio-Economic Panel Survey, single working age	Discrete choice model of hours of work with fixed costs of working	Free choice of hours: 0.30–0.42 Restricted hours: 0.12 to 0.15	
Bargain et al. (2011)	Various: EU SILC, couples and singles, working age	Structural discrete choice model with 7 hours options for each individual (0, 10, 20,.., 60 hours).	Couples Hours if working: -0.01 to 0.03 Total hours: 0.04 to 0.26 Singles Hours if working: -0.08 to 0.09 Total hours: 0.03 to 0.67	

Table B.1(C) Estimates of responsiveness of male employment participation (UK and international studies)

Study	Data/Sample	Model Details	Uncompensated Elasticity	Compensated Elasticity
Bargain et al. (2011)	UK: EU SILC, couples and singles, working age	Structural discrete choice model with 7 hours options for each individual (0, 10, 20,.., 60 hours).	Couples 0.06 to 0.08 Singles 0.22 to 0.35	
Bargain et al. (2011)	Various: EU SILC, couples and singles, working age	Structural discrete choice model with 7 hours options for each individual (0, 10, 20,.., 60 hours).	Couples 0.03 to 0.27, mean: 0.08 Singles 0.04 to 0.62, mean: 0.23	
Meghir and Phillips (2010)	UK: 1996–2004 Family Resources Survey, couples and singles, 22–59	Discrete choice model of participation with exogenous variation in work incentives provided by differential effect of tax reforms and structure	Low Educated: Single: 0.27, Couples: 0.53 High Educated Single: 0.08, Couples: 0.04	
Eissa and Hoynes (2004)	USA: 1984–1996 Current Population Survey, age 25–54 years old	Compare behaviour of men in couples affected by EITC policy with those unaffected (difference-in-difference approach), and a discrete choice participation model identified using variation in tax and EITC entitlements across individual families	0.03	
Heim (2009)	USA: 2001 Panel Survey of Income Dynamics, married, working age	Structural model of family utility with choice of hours modelled over entire budget constraint (allows for benefits as well as taxes) jointly for a couple	0	
Aaberge et al. (1999)	Italy: 1987 Survey of Household Income and Wealth, married, aged 20–70	Structural model of participation and working hours at family level accounting for tax and benefit system	0.046	
Aaberge et al. (2002)	Italy: 1993 Survey of Household Income and	Joint estimation of hours and wages received by individuals using a discrete	0.06	

	Wealth, married, aged 20–70	number of hours options		
Brink et al. (2007)	Sweden: Longitudinal administrative data up to 1999, single	Discrete choice model of hours and participation with preference variation	0.35	
Labeaga et al. (2008)	Spain: 1995 ECHP Survey, all working-age couples	Discrete choice model of hours and participation with fixed costs of work	0.11	

Table B.2(A) Estimates of responsiveness of females in couples: participation and hours of work (UK studies)

Study	Data/Sample	Model Details	Uncompensated Elasticity	Compensated Elasticity
Blundell, Duncan and Meghir (1998)	1978–1992 Family Expenditure Survey, women in couples aged 20–50 with employed partners	Model of hours of work conditional upon working, estimated at group level under the assumption that differential changes in hours at education-age cohort levels reflect differential changes in work incentives	Hours elasticities: No child: 0.14 Youngest aged 0–2: 0.21 Youngest aged 3–4: 0.37 Youngest aged 5–10: 0.13 Youngest aged 11+: 0.13	Hours elasticities: No child: 0.14 Youngest aged 0–2: 0.30 Youngest aged 3–4: 0.44 Youngest aged 5–10: 0.17 Youngest aged 11+: 0.16
Arrelano and Meghir (1992)	1983 Family Expenditure Survey, women in couples, aged 20–59	Model of total hours of work with a fixed cost of working, and allowances for taxes (but not benefits)	Total hours elasticities: No child: 0.37 Youngest aged 0–2: 0.29 Youngest aged 3–4: 0.50 Youngest aged 5–10: 0.71 Youngest aged 11+: 0.62	Total hours elasticities: No child: 0.44 Youngest aged 0–2: 0.50 Youngest aged 3–4: 0.66 Youngest aged 5–10: 0.82 Youngest aged 11+: 0.77
Bargain et al. (2011)	EU SILC, couples and singles, working age	Structural discrete choice model with 7 hours options for each individual (0, 10, 20,.., 60 hours).	Total hours elasticities: No children: 0.07 to 0.10 Has children: 0.11 to 0.13 Hours if work: 0.02 to 0.03 Participation: 0.07 to 0.08	
Blundell et al. (2000)	Family Resources Survey	Structural discrete choice model with multiple hours options	Total hours elasticity: 0.13	
Arrufat and Zabalza (1986)	1974 General Household Survey, married women with working husbands	Structural model of individual utility with continuous hours choice and	Total hours elasticity: 2.03 Participation elasticity: 1.41 Hours if work: 0.62	
Blundell, Ham and Meghir (1987)	1981 Family Expenditure Survey, married women aged 16 to 59	Double-hurdle model with discrete choice of working subject to being able to obtain a job	Total hours elasticity: 0.08	
Blundell et al. (1988)	1980 Family Expenditure Survey, married women		Hours if work: 0.09	

Table B.2 (B) Estimates of responsiveness of females in couples: participation and hours of work (international studies)

Study	Data/Sample	Model Details	Uncompensated Elasticity	Compensated Elasticity
Bargain et al. (2011)	Various: EU SILC, couples and singles, working age	Structural discrete choice model with 7 hours options for each individual (0, 10, 20,.., 60 hours).	Total hours elasticities: No children: 0.07 to 0.53 Has children: 0.07 to 0.68 Hours if work: 0.01 to 0.13 Participation: 0.07 to 0.57	
van Soest et al. (1990)	Netherlands: 1985 Labour mobility survey, working age	Continuous model of hours with discrete choice of participating in employment, preference variation	Total Hours elasticity: 0.79	
van Soest (1995)	Netherlands: 1987 Socio-economic panel	Discrete choice model of hours and participation at family level	Total hours elasticities: Basic model: 1.03 With hours restricted: 0.52 With hours restricted and wage prediction errors: 0.47	
van Soest and Das (2001)	Netherlands: 1995 Socio-economic panel, aged 16–64	Discrete choice model of hours and participation at family level with fixed costs of work and preference variation	Total hours elasticity: 0.705	
van Soest et al. (2001)	Netherlands: 1995 Socio-economic panel, aged 16–64	Discrete choice model of hours and participation at family level with fixed costs of work and preference variation	Total hours elasticities: Overall: 1.04 to 1.16 Low Educated: 1.12 to 1.23 High Educated: 0.83 to 0.95	
Clauss and Schnabel (2006)	Germany: 2004-05 Socio-economic panel, aged 20 - 65	Discrete choice model of hours and participation at family level	Total hours elasticity: 0.37 Participation elasticity: 0.14	
Bargain and Orsini (2006)	Germany: 1998 Socio-economic panel, working age with employed partners	Discrete choice model of hours and participation with fixed costs and male partner determining behaviour	Total hours elasticity: 0.40 Participation elasticity: 0.33	

		without reference to female partner		
Haan and Steiner (2005)	Germany: 2002 Socio-economic panel, working age, one or two earner couples	Discrete choice model of hours and participation at family level. Incorporates labour demand effects	Total hours elasticity: 0.35 to 0.4	
Cogan (1981)	USA: 1967 Longitudinal Study of Mature Women, aged 30 – 55	Continuous model of hours choice with fixed cost of working	Total hours elasticity: 0.86	
Hausman (1981)	USA:1975 Panel Survey of Income Dynamics	Linear model of hours of work allowing for taxes and benefits	Total hours elasticity: 0.91 to 1.00	
Heckman (1974)	USA: 1967 Longitudinal Study of Mature Women, aged 30 – 55	Join estimation of wages and labour supply	Hours elasticity conditional upon 2000 hours per year: 0.8	
Triest (1990)	USA: 1983 Panel Survey of Income Dynamics	Linear model of hours of work allowing for taxes but not benefits	Total hours elasticity: 0.86 to 1.12 Hours if working: 0.03 to 0.27	

Table B.2 (C) Estimates of responsiveness of single women: participation and hours of work (UK studies)

Study	Data/Sample	Model Details	Uncompensated Elasticity	Compensated Elasticity
Walker (1990)	1979–1984 Family Expenditure Survey, single women with children	Discrete model of participation decision accounting for benefits income	Participation elasticity 0.7	
Ermisch and Wright (1991)	1973–1982 General Household Survey, single women with children	Discrete model of participation decision accounting for fixed costs, taxes and benefits	Participation elasticity: Overall: 1.7 Eligible for benefits: 1.8 Not eligible for benefits: 1.2	
Jenkins (1992)	1989 Lone Parents Survey, single women with children	Discrete choice of not working, part time or full time. Accounts for fixed costs and possibility of not obtaining a job offer	Participation Elasticity: 1.8	
Brewer et al. (2005)	1995-96 to 2002–03 Family Resource Surveys, single women with children	Discrete choice of participation and working hours, accounting for fixed costs, welfare participation, preference variation and tax and benefit system	Participation Elasticity: approximately 1	
Blundell, Duncan and Meghir (1992)	1981 to 1986 Family Expenditure Survey, single women with children	Model of hours of work conditional upon working, accounting for taxes but not benefits	Hours elasticities: Overall: 0.14 to 0.34 Pre-school: 0.23 to 0.52 Primary: 0.16 to 0.38 Secondary: 0.11 to 0.26	
Blundell and Shephard (2011)	1997–98 to 2002–03 Family Resources Survey, single women with children aged 18–45 living on their own, not disabled, 7,090	Discrete choice of participation and working hours, accounting for fixed costs, welfare participation, preference variation and tax and benefit system	Participation Elasticities: Overall: 1.40 Pre-school: 2.27 Primary: 1.76 Secondary: 1.09 Hours Elasticities: 0.03 to 0.05 depending on age of youngest child	

Table B.2(D) Estimates of responsiveness of single women: participation and hours of work (international studies)

Study	Data/Sample	Model Details	Uncompensated Elasticity	Compensated Elasticity
Eissa and Liebman (1996)	USA: 1985–1991 Current Population Survey, single women with children	Compares the employment of single women with and without children following a set of reforms which differentially affected work incentives	Participation Elasticity: 1.16	
Keane and Moffit (1998)	USA: 1989 SIPP, Single women with children and low-moderate assets	Discrete choice of not working, and working part or full time, accounting for benefits and benefit take-up but not taxes	Participation Elasticity: 0.96 Total Hours Elasticity: 1.82	
Bargain et al. (2011)	Various: EU SILC, single women with children, working age	Structural discrete choice model with 7 hours options for each individual (0, 10, 20,.., 60 hours).	Total Hours Elasticity: 0.1 to 0.5	
Bargain et al. (2009)	Germany: 2003 Socio-economic panel, single women	Discrete choice model of hours and participation, with option for constrained labour demand.	Total hours elasticity: Traditional: 0.27 Demand-constrained: 0.10 Participation elasticity: Traditional: 0.20 Demand-constrained: 0.07	
Claus and Schnabel (2006)	Germany: 2004-05 Socio-economic panel, single women	Discrete choice model of hours and participation	Total hours elasticity: 0.38 Participation elasticity: 0.18	
Bargain and Orsini (2004)	Germany: 1998 Socio-economic panel, single women	Discrete choice model of hours and participation with fixed costs of work	Total hours elasticity: 0.16 Participation elasticity: 0.13	

Appendix C. References for the literature review

Aaberge, R., U. Colombino and S. Strom (1999), 'Labour Supply in Italy: An Empirical Analysis of Joint Household Decisions with Taxes and Quantity Constraints', *Journal of Applied Econometrics,* Vol. 14, pp. 403–422

Aaberge, R., U. Colombino and T. Wennemo (2002), 'Heterogeneity in the Elasticity of Labour Supply in Italy and some Policy Implications', CHILD Working Paper, No. 21/2002

Adda, J., C. Dustmann, C. Meghir and J.-M. Robin (2006), 'Career Progression and Formal versus On-the-Job Training', IZA Working Paper

Altug, S. and R. Miller (1990), 'Household Choices in Equilibrium', *Econometrica,* Vol. 58, No. 3, pp. 543–570

Arrelano, M. and C. Meghir (1992), 'Female Labour Supply and On-the-Job Search: An Empirical Model Estimated Using Complimentary Datasets', *Review of Economic Studies,* Vol. 59, pp. 537–559

Arrufat, J. and A. Zabalza (1986), 'Female Labour Supply with Taxation, Random Preferences and Optimization Errors', *Econometrica,* Vol. 54, pp. 47–63

Azmat, G. (2012), 'The Incidence of an Earned Income Tax Credit: Evaluating the Impact on Wages in the UK', Mimeo

Bargain, O. and K. Orsini (2006), 'In-work policies in Europe: Killing two birds with one stone?', *Labour Economics,* Vol. 13, pp. 667–697

Bargain, O., K. Orsini and A. Peichl (2011), 'Labor Supply Elasticities in Europe and the US', EUROMOD Working Paper Series EM1/11, University of Essex

Bargain, O., M. Caliendo, P. Haan and K. Orsini (2009), 'Making Work Pay in a Rationed Labour Market', *Journal of Population Economics,* Vol. 23, No. 1, pp. 323–351

Blomquist, S. (1983), 'The Effect of Income Taxation on the Labor Supply of Married Men in Sweden', *Journal of Public Economics,* Vol. 22, No. 2, pp. 169–197

Blomqust, S., M. Eklof and W. Newey (2001), 'Tax Reform Evaluation Using Non-parametric Methods: Sweden 1980–1991', *Journal of Public Economics,* Vol. 79, No. 3, pp. 543–568

Blomquist, S., U. Hansson–Brusewitz (1990), 'The Effect of Taxes on Male and Female Labor Supply in Sweden', *Journal of Human Resources*, Vol. 25, No. 3, pp. 317–357

Blomquist, S. and W. Newey (2002), 'Nonparametric Estimation with Nonlinear Budget Sets', *Econometrica,* Vol. 70, No. 6, pp. 2455–2480

Bourguignon, F. and T. Magnac (1990), 'Labor Supply and Taxation in France', *Journal of Human Resources,* Vol. 25, No. 3, pp. 358–389

Blundell, R. (1992), 'Labour Supply and Taxation: A Survey', *Fiscal Studies,* Vol. 13, No. 3, pp. 15–40

Blundell, R., A. Duncan and C. Meghir (1992), 'Taxation in Empirical Labour Supply Models: Lone Parents in the UK', *Economic Journal,* Vol. 102, pp. 265–278

Blundell, R., A. Duncan and C. Meghir (1998), 'Estimating Labour Supply Responses Using Tax Reforms', *Econometrica,* Vol. 66, No. 4, pp. 827–861

Blundell, R., J. Ham and C. Meghir (1987), 'Unemployment and Female Labour Supply', *Economic Journal,* Vol. 97, supplemental, pp. 44–64

Blundell, R., A. Duncan, J. McCrae and C. Meghir (2000), 'The Labour Market Impact of the Working Families' Tax Credit', *Fiscal Studies*, Vol. 31, No. 1, pp. 75–103

Blundell, R., C. Meghir, E. Symons and I. Walker (1988), 'Labour supply specification and the evaluation of tax reforms', *Journal of Public Economics,* Vol. 36, No. 1, pp. 23–52

Blundell, R. and T., MaCurdy (2009), 'Labor Supply: A Review of Alternative Approaches', in *Handbook of Labor Economics*, Volume 3, O. Ashenfelter and D. Card (eds), Elsevier

Blundell, R. and A. Shephard (2012), 'Employment, Hours of Work and the Optimal Taxation of Low-Income Families', *Review of Economic Studies,* Vol. 79, No. 2, pp. 481–510

Blundell, R. and I. Walker (1986), 'A Life Cycle Consistent Empirical Model of Family Labour Using Cross Section Data', *Review of Economic Studies,* Vol. 53, pp. 539–558

Brewer, M., A. Duncan, A. Shephard and M. Suarez (2005), 'Did Working Families Tax Credit work? The final evaluation of the impact of in-work support on parents' labour supply and take-up behaviour in the UK', IFS report for HMRC

Brewer, M., A. Ratcliffe and S. Smith (2011), 'Does welfare reform affect fertility? Evidence from the UK', *Journal of Population Economics,* Vol. 25, No. 1, pp. 245–266

Brink, A., K. Nordblom and R. Wahlberg (2007), 'Maximum Fee versus Child Benefit: A Welfare Analysis of Swedish Child-Care Fee Reform', *International Tax and Public Finance,* Vol. 14, No. 4, pp. 457–480

Burtless, G. and J. Hausman (1978), 'The Effects of Taxation on Labor Supply: Evaluating the Gary Negative Income Tax Experiments', *Journal of Political Economy,* Vol. 86, No. 6, pp. 1103–1130

Clauss, M. and R. Schnabel (2006), 'Distributional and Behavioural Effects of the German Labour Market Reform', ZEW Working Paper

Dah, M., T. DeLeire and J. Schwabish (2009), 'Stepping Stone or Dead End? The Effect of the EITC on Earnings Growth', IZA Working Paper, No. 4146, IZA

Dahl, M., J. Schwabish, T. DeLeire and T. Smeeding (2012), 'The Earned Income Tax Credit and Expected Social Security Benefits among Low Income Women', CBO Working Paper 2012–6, Congressional Budget Office

Eckstein, Z. and K. Wolpin (1989), 'Dynamic Labour Force Participation of Married Women and Endogenous Work Experience', *Review of Economic Studies,* Vol. 56, No. 3, pp. 375–390

Eissa, N. and H. Hoynes (2004), 'Taxes and the labor market participation of married couples: the earned income tax credit', *Journal of Public Economics,* Vol. 88, No. 9–10, pp. 1931–1958

Eissa, N. and J. Liebman (1996), 'Labor Supply Response to the Earned Income Tax Credit', *Quarterly Journal of Economics,* Vol. 111, No. 2, pp. 605–637

Eklof, M. and H. Sacklen (2000), 'The Hausman-MaCurdy Controversy: Why Do the Results Differ across Studies? Comment', *Journal of Human Resources,* Vol. 35, No. 1, pp. 204–220

Ermisch, J. and R. Wright (1991), 'Welfare Benefits and Lone Parents' Employment in Great Britain', *Journal of Human Resources,* Vol. 26, pp. 424–456

Euwals, R. and A. van Soest (1999), 'Desired and actual labour supply of unmarried men and women in the Netherlands', *Labour Economics,* Vol. 6, No. 1, pp. 95–118

Evers, M., R. de Mooij and D. van Vuuren (2008), 'The Wage Elasticity of Labour Supply: A synthesis of empirical estimates', *De Economist,* Vol. 156, pp. 25–43

Grogger, J. (2003), 'The Effects of Time Limits, the EITC, and other Policy Changes on Welfare Use, Work and Income among Female-headed Households', *The Review of Economics and Statistics,* Vol. 85, No. 2, pp. 394–408

Gruber, J. and E. Saez (2002), 'The elasticity of taxable income: evidence and implications', *Journal of Public Economics,* Vol. 84, pp. 1–32

Hall, R. E. (1973), 'Wages, Income and Hours of Work in the U.S. Labor Force', in *Income Maintenance and Labor Supply,* G. Cain and H. Watts (eds), Markham

Hausman, J. (1981), 'Labor Supply', in *How Taxes affect Economic Behavior,* H. J. Aaron and J. A. Pechman (eds), Brookings Institution Press

Heckman, J. (1976), 'Estimates of a Human Capital Production Function Embedded in a Life-Cycle Model of Labor Supply', in *Household Production and Consumption,* N. Terleckyj (ed), NBER

Heim, B. (2009), 'Structural Estimation of Family Labor Supply with Taxes: Estimating a Continuous Hours Model Using a Direct Utility Specification', *Journal of Human Resources,* Vol. 44, No. 2, pp. 350–385

Imai, S. and M. Keane (2004), 'Intertemporal Labor Supply and Human Capital Accumulation', *International Economic Review,* Vol. 45, No. 2, pp. 601–641

Jenkins, S. (1992), 'Lone Mothers' Employment and Full Time Work Probabilities', *Economic Journal,* Vol. 102, pp. 310–320

Kaiser, H., P. Spahn and U. van Essen (1992), 'Income Taxation and the Supply of Labour in West Germany', *Jahrbucher fur Nationalokonomie und Statistik*

Keane, M. (2011), 'Labor Supply and Taxes: A Survey', *Journal of Economic Literature,* Vol. 49, No. 4, pp. 961–1075

Keane, M. and R. Moffitt (1998), 'A Structural Model of Multiple Welfare Participation and Labor Supply', *International Economic Review,* Vol. 39, pp. 553–589

Keane, M. and K. Wolpin (2010), 'The Role of Labor and Marriage Markets, Preference Heterogeneity, and the Welfare System in the Life Cycle Decisions of Black, Hispanic and White Women', *International Economic Review,* Vol. 51, No. 3, pp. 851–892

Krueger, A. and B. Meyer (2002), 'Labour Supply Effects of Social Insurance', in A. J. Auerbach and M. Feldstein (eds.), *Handbook of Public Economics* 4, Amsterdam: North-Holland

Labeaga, J., X. Oliver and A. Spadaro (2008), 'Discrete choice models of labour supply, behavioural microsimulation and the Spanish tax reform', *Journal of Economic Inequality,* Vol. 6, No. 3, pp. 247–273

Leigh, A. (2009), 'Who Benefits from the Earned Income Tax Credit? Incidence among Recipients, Coworkers and Firms', IZA Discussion Paper No. 4960, IZA

MaCurdy, T., D. Green and H. Paarsch (1990), 'Assessing Empirical Approaches for Analyzing Taxes and Labor Supply', *Journal of Human Resources*, Vol. 25, No. 3, pp. 415–490

Meghir, C. and D. Phillips (2010), 'Labour supply and taxes', in *The Mirrlees Review: Dimensions of Tax Design*, J. Mirrlees, S. Adam, T. Besley, R. Blundell, S. Bond, R. Chote, M. Gammie, P. Johnson, G. Myles and J. Poterba (eds), Oxford University Press

Pencavel, J. (1986), 'Labor Supply of Men: A Survey', in *Handbook of Labor Economics,* Volume 3, O. Ashenfelter and R. Layard (eds), Elsevier

Pencavel, J. (2002), 'A Cohort Analysis of the Association between Work Hours and Wages among Men', *Jouurnal of Human Resources,* Vol. 37, pp. 251–274

Rothstein, J. (2008), 'The Unintended Consequences of Encouraging Work: Tax Incidence and the EITC', CEPS Working Paper No. 165, CEPS

Shaw, K. (1989), 'Life-Cycle Labor Supply with Human Capital Accumulation', *International Economic Review,* Vol. 30, No. 2, pp. 431–456

Triest, R. (1990), 'The Effect of Income Taxation on Labor Supply in the United States', *Journal of Human Resources,* No. 25, pp. 635–664

van de Klaauw, W. (1996), 'Female Labour Supply and Marital Status Decisions: A Life-Cycle Model', *Review of Economic Studies,* Vol. 63, No. 2, pp. 199–235

van Soest, A., I. B. Woittiez and A. J. Kapteyn (1990), 'Labor Supply, Income Taxes, and Hours Restricts in the Netherlands', *Journal of Human Resources,* Vol. 25, No. 3, pp. 517–558

van Soest, A. (1995), 'Structural Models of Family Labor Supply: A Discrete Choice Approach', *Journal of Human Resources,* Vol. 39, pp. 63–88

van Soest, A. and M. Das (2001), 'Family Labor Supply and the Proposed Tax Reforms in the Netherlands', *De Economist,* Vol. 149, No. 2, pp. 191–218

van Soest, A., M. Das and X. Gong (2001), 'A Structural labor supply model wit non-parametric preferences', *Journal of Econometrics (Annals),* Vol. 107, pp. 345–374

Wales, T. and A. Woodland (1979), 'Labour Supply and Progressive Taxes', *Review of Economic Studies,* Vol. 46, No. 1, pp. 83–95

Walker, I. (1990), 'The Effect of Income Support Measures on the Labour Market Behaviour of Lone Mothers', *Fiscal Studies,* Vol. 11, pp. 55–74

Appendix D. The discrete choice labour supply models

Our review of existing evidence on labour supply responsiveness (Chapter 4) discussed briefly how the benefit and tax system makes estimating the relationship between financial work incentives and labour supply difficult. In particular, it turns out you cannot specify a simple model of hours of work but have to specify the satisfaction (or utility) that individuals obtain from each hours–net income combination. Such a calculation is onerous when you allow individuals to choose from an essentially infinite number of continuous hours options, and this has led to the growing use of models that treat the decision of how many hours to work as a discrete choice (e.g. full time, part time, not work) rather than a continuous one: in that case you need to model only the choice among the small set of allowed options.

In this report we estimate and use two discrete choice models: one for married or cohabiting couples, and another for lone mothers. The basic features of these models are very similar, allowing them to be set out together in the following sub-sections.

The structure of the models and the approach to estimation

One of the key decisions to be taken when developing discrete choice labour supply models is the number of hours options from which individuals can choose: too few, and one might miss much of the impact of changes in financial incentives to work various hours; too many, and the number of individuals or couples choosing particular options are too few to estimate the necessary model parameters. Given that the distribution of working hours for women is much more dispersed than for men (who, if they work, overwhelmingly work full time), in this report we allow women to choose from a greater number of hours options than men. In particular we allow men to choose from two options (not work, work) and women in couples to choose from five options (not work, work 15 or fewer hours, work 16 to 19 hours, work 20 to 29 hours, or work 30 or more hours per week). Couples are assumed to determine their hours of work jointly, based upon the pooled net income they would obtain from the combination of men and women's hours chosen: this means a total of ten hours options for the couple as a whole (two for the man, multiplied by five for the woman). Lone mothers are able to choose from seven options (not work, work 1 to 7 hours, work 8 to 15 hours, work 16 to 19 hours, work 20 to 29 hours, work 30 to 34 hours, or work 35 or more hours per week).

The discrete choice models used in this report involve estimating the relationship between individuals' or couples' demographic characteristics and financial work incentives and the *probability* (or likelihood) that they will choose each hours option. As well as varying with observed characteristics, we also allow the probability of choosing different hours options to depend on unobserved variations in tastes for work by testing for the presence of distinct 'types' of couples or lone mothers. We find evidence that the behaviour of couples is best explained by a model consisting of two types, whilst that of lone mothers is best explained by a model consisting of only one type.

Box D.1 provides information on the technical specification of the models used. However, it is worth highlighting the variables included in the labour supply model. The demographic variables included are: region of residence, birth cohorts (from the 1940s through to the 1980s), financial year of observation, the number of children by age (0, 1–10, 11–15, 16–17, 18–19), and education level (ceasing full-time education age 16 or less, age 17 or 18, or age 19 and above). Financial work incentives are measured by the real-terms (i.e. adjusted for inflation) net income of a couple or lone parent under each positive hours choice and when not working.

Box D.1: The technical specification of the models

Suppose that there are j = 0 to J possible hours options. The probability that each lone mother or couple (which we denote as h) will choose each hours option j is a function of the satisfaction (or utility) that they obtain from that option relative to not working, or choosing another hours option. The utility obtained from option j relative to having no one in work (option 0) depends upon the unobserved type (k) of the lone parent or couple, and is defined as:

$$U_{h,j,k} - U_{h,0,k} = X'_h(b_j - b_0) + Inc_{h,j}\beta_j + Inc_{h,0}\beta_0 + Wales*Inc_{h,j}\beta_{Wales,j} + Wales*Inc_{h,0}\beta_{Wales,0} + (\lambda_j - \lambda_0)\alpha_k + \varepsilon_j$$

where X'_h stands for the demographic characteristics of h, $Inc_{h,j}$ is the net income of h obtained in state j, and Wales is a dummy indicating whether h is found in Wales. b_j, β_{jj}, $\beta_{Wales,j}$ are parameters to be estimated which explain the effects of the observed demographic variables and in- and out-of-work incomes on utility. α_k is a term that picks up the impact of h being of unobserved type k on the utility obtained under option j = 1. λ_j is a loading factor which weights the impact of unobserved type differently depending upon hours option j = 2 to J. In essence, the alpha and lambda terms allow the intercepts to vary by type k. ε_j is an error term which is uncorrelated with the explanatory variables.

Identification of the model requires that

$b_0 = 0$

$\lambda_0 = 0$ and

$\lambda_1 = 1$

If ε_j is distributed using an extreme value distribution, this generates separate multinomial logit models for each unobserved type k:

$$P_h(j = 1 \mid k) = \frac{\exp(X'_h(b_j) + Inc_{h,j}\beta_j + Inc_{h,0}\beta_0 + Wales*Inc_{h,j}\beta_{Wales,j} + Wales*Inc_{h,0}\beta_{Wales,0} + (\lambda_j)\alpha_k)}{1 + \sum_{j=1}^{J}(\exp(X'_h(b_j) + Inc_{h,j}\beta_j + Inc_{h,0}\beta_0 + Wales*Inc_{h,j}\beta_{Wales,j} + Wales*Inc_{h,0}\beta_{Wales,0} + (\lambda_j)\alpha_k)}$$

The probability of being type k is also estimated, let this be P_k. Hence:

$$P_h(j = 1) = \sum_{k=1}^{K}(P_h(j = 1 \mid k) * P_k)$$

The model is estimated using the method of maximum likelihood: this means parameters are chosen to maximise the likelihood that the observed pattern of behaviour would be predicted by the model.

The IFS's tax and benefit micro-simulation model TAXBEN is used to convert estimated pre-tax income under each hours option into net income using the rules of the tax and benefit system. Pre-tax income is calculated as the sum of unearned income (such as income from savings), and gross earnings, calculated as the average number of hours of work for that hours option multiplied by the hourly wage. For those in work in the data, we observe their hourly wage: this is calculated as actual gross earnings divided by actual hours. For those not actually working in the data, we draw eight possible wages from the distribution of wages implied by a set of wage equations that are designed to predict the wages of non-workers based on their characteristics and the relationship between the wages and characteristics of those in work. This is done in a way that accounts for the fact that those working may be a 'selected sample' (for instance, conditional on observable characteristics, they may have higher wages than those not working).[31] The hourly wages (whether actual or predicted) are then treated as being exogenous to the labour supply decision. In other words, the hours of work chosen are not allowed to affect the hourly

[31] This is done using a standard 'Heckman correction' approach, using an adjusted measure of the income one would receive out of work as the factor that affects the probability of working, but not the hourly wage one would receive if working.

wage; and the hourly wage is assumed to be uncorrelated with unobserved factors affecting the probability of choosing particular hours options, with the exception of the unobserved 'type' variable. This allows us to treat the relationship between net income in each hours option and the probability of choosing that state as a causal relationship.

Data and sample selection

The models described above are empirically estimated using data from 14 waves of the Family Resources Survey (FRS) covering the period 1996–97 to 2009–10. The FRS contains detailed demographic and socio-economic information (including on income and labour supply) for approximately 25,000 households per year across the UK, of which approximately 1,100 to 1,300 are in Wales. Starting from the full survey samples, we use a number of conditions to restrict the set of households used for the estimation of the models.

First we *exclude* from the estimation sample all adults aged 21 or less or who report being students; those aged 60 or over; and those who are registered as disabled or who are in receipt of a disability benefit. In the model for couples, this means our sample includes only those couples where *both* partners are aged between 22 and 59 and are non-disabled. We exclude those aged 21 or under or are students as we model labour supply *conditional* upon education, rather than modelling the choice between work and education, which might not be appropriate for an age group with many people still in full-time education. We exclude those aged 60 or over because of the complexities of dealing with work incentives around retirement. For instance, when estimating the net income someone would receive if not working, we are unable to take into account income they would have from private pensions if they took early retirement (the FRS does not contain such information), which may have a significant bearing on their labour supply decision. We exclude disabled people because we are unable to model the interactions between labour supply, health status and financial work incentives (a joint model of health status and labour supply is beyond the scope of this project and, in any case, the data is not rich enough to properly model health status). In other words, the young, the old and the disabled are groups for which we think the factors affecting labour supply decisions are significantly different from the rest of the population. Excluding these groups should make the estimated model better suited for analysing the behaviour of the rest of the population, albeit at the cost of some reduction in the coverage of the model.

Next, we *exclude* those adults who report that they are self-employed or who report earnings or losses from self-employment from the analysis (meaning we exclude couples where this applies to one or both partners). There are three reasons for this. First, the behaviour of self-employed individuals may differ significantly from employed individuals: they may have more flexibility to change how much they work in response to changes in financial work incentives, or to change how much they *report* they work (for instance to take best advantage of hours rules). This means one might want to allow many parameters of the models to vary for self-employed individuals, which may be difficult given relatively small sample sizes for the self-employed. Second, one would need to consider an additional decision: not only whether one works and for how long, but whether one is employed or self-employed. Third, TAXBEN, the tax and benefit micro-simulation model used to calculate the net incomes at the different hours options, does not currently allow one to change the hours or hourly 'wages' received from self-employment. Given the other difficulties involved in including self-employment in the model, it would not be feasible to extend TAXBEN for this project.

Finally, we exclude those lone mothers or couples with very high actual or predicted net incomes (more than about £4,800 per week in 2012 prices). This is done because the small number of observations with very high incomes can 'skew' the results, and at least for the purposes of analysing the labour supply impact of welfare reforms, are not a group we wish to focus on.

After applying these sample selection criteria, our estimation samples consist of 22,857 lone parents (of whom 1,073 are in Wales), and 70,077 couples (of whom 3,006 are in Wales). When simulating the impact of reforms, we make use of only the last 3 years of data (covering 2007–08 to 2009–10). The simulation sample consists of 4,719 lone parents (of whom 200 are in Wales), and 13,644 couples (of whom 532 are in Wales).

The estimated models and labour supply 'elasticities'

As discussed in Box D.1, the model parameters tell us how demographic characteristics and net income impact on the utility an individual or couple obtains from a particular hours option *relative to the option where no one works*. This is not the same as the impact of characteristics and net income on the probability of an individual or couple choosing that hours option: this probability depends on not only utility under the hours options under consideration but also the other hours options. The parameters of the estimated models are available from the authors on request, but it is worthwhile to highlight some key findings. For lone parents:

- Having more children aged 15 and under, and especially aged 10 and under, reduces the utility that lone mothers obtain from working, which makes sense given the additional costs of working having more children will entail.
- Higher levels of education are associated with a stronger taste for work, and especially full-time work.
- The utility obtained from any positive hours option is strongly positively affected by the net income obtained under that option, and negatively affected by the net income that would be obtained when not working. This means that financial work incentives seem to have a strong impact on lone mothers' work decisions.
- The impact of financial work incentives appears to be similar in Wales as for the UK as a whole, except for the utility lone mothers obtain from working 16 to 19 hours per week, which appears to be less affected in Wales by the amount of net income one would obtain from such work.

For couples:

- The utility from options where the female partner works full time is lower for families with children aged 15 and under, and especially those aged 10 and under, which makes sense given the additional costs to work women in such couples are likely to face.
- Conversely, the utility from options where the female partner works part time and the male partner works is higher for those with children aged 1 or above than those without children or with babies. Again, this seems plausible.
- Compared to couples where the female partner has only the statutory level of education or less (i.e. they left full-time education aged 16 or younger), those couples including more educated women get greater utility from hours options where the woman works more than 20 hours per week. In other words, greater female education appears to correlate with a greater taste for women's work.
- The utility obtained from an hours option is strongly positively affected by the net income the couple would obtain under that option, and negatively affected by the net income the couple would obtain if neither partner worked. This means that financial work incentives seem to have a strong impact on a couple's work decisions.
- The impact of financial work incentives appears to be particularly strong in Wales.

We can summarise the effect of financial work incentives on labour supply behaviour in our model for lone parents by calculating 'elasticities' of participation and hours with respect to the net income obtained when working. To do this we simulate the impact on employment and average hours of work of a 10% increase in the net income in each positive hours option. We find:

- an elasticity of employment with respect to net in-work income of 1.16
- an elasticity of total hours of work with respect to net in-work income of 1.13

which are well within the range of elasticities of employment and total hours of work for lone parents in studies in the UK and overseas.

A similar measure is not easily calculable for couples, but the coefficients on in-work and out-of-work income look plausible.

The limitations of the models

These models are representative of high-quality canonical labour supply models that examine the link between financial work incentives and labour supply, but it is worth noting their limitations in the context of this project.

First, and most obviously, the models allow us to simulate the impact of the changes in financial work incentives only. In the context of the welfare reforms, this allows us to simulate the impact of changes in maximum entitlements, earnings disregards and taper rates, but not the impact of things like the ease of transition between in-work and out-of-work benefits or the changes in what one must do to receive the benefit (such as attend work-focused meetings, or take part in unpaid work experience).The issue of non-monetary work incentives is closely linked to the issue of non-take-up of benefits. Universal Credit is expected to lead to an increase in benefits take-up, particularly by those in work. As TAXBEN is a model of benefit entitlement, our estimates implicitly assume full take-up of benefits.

Second, it is important to note that the models estimated consider the supply of labour by lone parents and couples, and not the demand for labour. If demand is constrained so that there is voluntary unemployment, the labour supply elasticity may be lower than implied by standard models of labour supply (see for instance Blundell et al. (1987) and Bargain et al. (2010)). We discuss these issues qualitatively in Chapter 7 when considering how the broader economic context may affect and be affected by the welfare reforms. The use of the 'calibration and simulation' approach also allows us to see how selecting lower elasticities affects results.

Finally, because so few lone mothers in particular work jobs of 1–15 hours, the model's predictions of the impact of changes in financial work incentives at such hours of work may not be as reliable as one would wish (in effect, the issue is akin to using the model to 'predict out of sample'). Under the present welfare system, the financial incentives for low-skilled single adults (and especially single mothers) to work in low-paid work of less than 16 hours per week are very weak (due to the £1 for £1 tapering of Income Support and/or Jobseeker's Allowance after a small disregard). But it is not clear whether this is the reason so few lone mothers work in such 'mini jobs' or whether they are unattractive for lone mothers or employers for some other reason. Hence, it is unclear just how responsive they are likely to be to the improvement in financial incentives to work in such jobs under Universal Credit.

Appendix E. Methodology and assumptions for Chapter 6

The formal model[32]

Let us assume that individual i has earnings $z_i^0 > 0$ under the baseline tax and benefit system and faces an EMTR τ_i^0 and a PTR t_i^0. After the welfare reforms, individual *i* faces new PTRs and EMTRs t_i^1 and τ_i^1. We assume that individual i has an elasticity of employment with respect to $(1 - t_i)$ of η_i and an elasticity of hours of work with respect to $(1 - \tau_i)$ of e_i.[33] The intensive response changes earnings to z_i^1 such that:

$$z_i^1 = z_i^0 \cdot \left(\frac{1 - \tau_i^1}{1 - \tau_i^0}\right)^{e_i}$$

The participation response transforms individual *i* into a weighted average of a working individual (earning z_i^1) with weight p_i such that:

$$p_i = \left(\frac{1 - t_i^1}{1 - t_i^0}\right)^{\eta_i}$$

and a non-working individual (earning 0) with weight $1 - p_i$.

The weight p_i is above 1 when the PTR is reduced, meaning that the reform induces some non-working individuals to start working.

We then recompute total employment, hours of work and earnings after the reform where each individual has earnings z_i^1 with weight p_i and zero earnings with weight $1–p_i$, and we sum across all working individuals. Note that none of the calculation involves individuals not working before the reform: entry effects are captured by looking only at individuals working before the reform. This is discussed further below.

In those computations, we take the short-cut that post-reform tax rates are computed based on initial earnings z_i^0 and the new EMTR τ_i^1. In principle, they should be based on post-reform earnings z_i^1 . However, the presence of non-convexities in the budget constraint would make actual computation more complex (a fully rigorous computation would most likely have a minor impact to our first-pass computations presented here, because we assume modest elasticities).

The interpretation of employment elasticities

The results of this model are driven purely by the elasticities that are assumed, in combination with the estimated PTRs and EMTRs that were presented in Chapter 3. The choice of elasticities is therefore critical. In that context, it is important to be clear about exactly what the elasticities mean and what they are capturing. Two aspects of participation elasticities are particularly worth highlighting.[34]

The first issue to note is that η_i is defined above as the elasticity of employment with respect to 1 minus the PTR. That is equivalent to an elasticity with respect to the cash gain-to-work (i.e. in-work income

[32] This is based on the online appendix to Brewer, Saez and Shephard (2010), available from http://www.ifs.org.uk/mirrleesReview/dimensions.

[33] These elasticities are equivalent to the elasticity of employment with respect to the (cash) gain-to-work (i.e. in-work income minus out-of-work income) and the elasticity of hours with respect to the net wage rate, respectively.

[34] For a broader discussion of the properties of this model see Immervol et al. (2007) and Adam (2005).

minus out-of-work income).[35] It answers the question 'what is the percentage change in employment probability from a 1% change in the gain-to-work (or equivalently from a 1% change in (1-PTR))?' However, as discussed in Chapter 4, elasticities are never reported in this form in the labour supply literature: the literature reports elasticities with respect to in-work income (or sometime gross earnings), rather than with respect to the *difference* between in-work and out-of-work income. They answer the question 'what is the percentage change in employment probability from a 1% change in in-work income?' As long as out-of-work income is not zero, these two elasticities will be different from one another. Often they will be dramatically different: if someone's in-work income is £100 and out-of-work income is £90, then the participation effect of increasing their in-work income £100 to £101 is the effect of a 1% increase in their in-work income, but of a 10% increase in their gain-to-work: the two elasticities will differ by a factor of 10! It is therefore vital that elasticities with respect to in-work income, taken from the literature, are not simply plugged into the formulae above as if they were elasticities with respect to the gain-to-work.[36]

How, then, can we choose what elasticities to assume when the literature does not give us any estimates of elasticities defined in the appropriate way? Unfortunately there is no good answer to this. However, one possibility does present itself. This model already assumes no income effects: employment decisions are assumed to depend only on PTRs, which are invariant to changes in income that are unrelated to work status (adding £100 to both in-work and out-of-work income does not change the PTR), so whether reforms make you richer or poorer (changing the *need* to work rather than the *reward* from work) is not, by itself, allowed to affect whether or how much you work. Under the assumption of no income effects, a given cash change in out-of-work income should have the same effect as the same cash change in in-work income (but with the opposite sign, of course). That implies that there is a single elasticity with respect to the gain-to-work. This elasticity with respect to the gain-to-work can be derived by multiplying the elasticity with respect to in-work income by 1 minus the replacement rate (where 'replacement rate' is defined as out-of-work income as a fraction of in-work income). So if, for lone parents, say, the literature suggests an employment elasticity with respect to in-work income of 0.8 and the replacement rate for lone parents is 65%, the elasticity with respect to the gain-to-work is 0.35 x 0.8 = 0.28 (that is, a 1% rise in the cash gain-to-work leads to a 0.28% rise in the employment probability). This procedure is somewhat questionable since – aside from ignoring income effects – we don't know what out-of-work incomes and replacement rates really were in the original studies: converting elasticities with respect to in-work income into elasticities with respect to the gain-to-work should really be done in the context of the original study, which may be different from the current context: at the very least, using replacement rates that applied at that time, not the replacement rates calculated now. But in the absence of such information in the original studies, we can see no better alternative than using this method.

The second feature of the participation elasticity worth highlighting is that it is not an intrinsic preference parameter, an unvarying constant for each individual or group. The answer to what percentage increase in employment of a particular group would follow from a 1% increase in their gain-to-work depends partly on how responsive the individuals in question are; but it is also an arithmetical function of the number of existing workers and non-workers in that group. If only one person of a particular type is currently in work, one more person of that type joining them would constitute a 100% increase in employment of that type of person (whereas one more person joining a group of 1,000 workers would be a 0.1% increase); and getting an extra person (or an extra hundred people) of a particular type moving into work is more likely if there is a large number of non-workers of that type to start with.

[35] $(1 - t_i)$ is the gain-to-work as a fraction of gross earnings, so when calculating the percentage change in $(1 - t_i)$, the (unchanged) gross earnings figures in numerator and denominator cancel. A one percent change in the gain-to-work thus implies a one percent change in $(1 - t_i)$.

[36] This is a mistake that all previous research using this methodology seems to have made.

The key to appreciating this is to realise that the participation elasticity is a measure of the percentage change in employment, not the percentage point change. In a group of 100 people, an increase from 50 workers to 60 and an increase from 80 to 90 would both represent a 10 percentage point increase in employment (and we might think of them as being in some sense 'equally responsive' in the two cases); but a rise from 50 to 60 is a 20% increase in employment while a rise from 80 to 90 is a 12.5% increase: the former group has a higher elasticity. Other things equal, groups with lower employment rates will have higher elasticities just for that reason.

This helps to explain certain findings in the literature, which are reflected in our choice of elasticities below. Employment elasticities tend to be higher at low levels of earnings than at high levels of earnings, in part because those with low potential earnings have a lower employment rate. Similarly, although parents of older children may be more able to adjust their work patterns in response to financial incentives than parents with younger children, they also have higher employment rates to start with: it is typical to see (e.g. Blundell and Shephard (2012)) that a reform generates a bigger absolute and percentage point increase in employment of those with older children, but a bigger percentage increase in employment of those with younger children, implying a higher elasticity for parents of 3–4 year olds than 11–18 year olds.

Indeed, the number and responsiveness of different kinds of non-workers enters the model *entirely* through the choice of extensive elasticities. Non-workers are not used in the calibration and simulation approach at all: the PTRs we estimated for them in Chapter 3 play no part and they are not allocated elasticities. In effect, the approach of the model is to look at existing workers and ask: given the change in this person's PTR and their assumed elasticity, what percentage increase or decrease in people like this would we expect to see in the labour market? The answer is given by:[37]

$$Percentage\ change = \left(\frac{1 - prereform\ PTR}{1 - postreform\ PTR}\right)^{participation\ elasticity}$$

All information about non-workers is implicit in the participation elasticity: for example, what non-workers would earn if they worked is built into the judgement of which existing workers they are 'like' and therefore how many non-workers there are of each worker's 'type' who might move into work in response to a reform.

Assumed elasticities: central scenario

The calibration approach used in Chapter 6 requires us to take the general conclusions of Chapter 4's literature review on the size of responses, and who is most responsive, and translate this into precise assumed elasticities. This is difficult, not least because of the significant variation in results across different papers, and for this reason we examine high- and low-responsiveness scenarios in the sensitivity analysis of Section 6.2.

Table E.1 shows the intensive (hours of work) elasticities used in our central scenario, based on our reading of the magnitudes and patterns found in the literature. We assume a low degree of responsiveness for the bulk of men and single women without children, drawing on a wide body of evidence from the UK, Europe and the US. For women in couples without children, we assume a slightly higher elasticity, reflecting the fact that earnings and hours for this group are likely to be lower, and this tends to be associated with higher elasticities. Intensive elasticities are highest for women whose youngest child is around nursery and school-starting age, reflecting the fact that such working women are

[37] This simply rewrites in words the equation for p given above. Similarly, the equation for z says that the percentage change in hours of work among existing workers is given by

$$Percentage\ change = \left(\frac{1 - prereform\ EMTR}{1 - postreform\ EMTR}\right)^{hours\ elasticity}$$

often working few hours and face fewer barriers to increasing their hours of work than those with the youngest children for whom such free 'childcare' is less available. Elasticities then fall as the age of the youngest child increases, reflecting the fact that hours of work are likely to be higher. In coming to these conclusions we have been strongly influenced by the findings of Blundell, Duncan and Meghir (1992, 1998) who find similar results for both lone parents and women in couples.

Those at the top of the earnings distribution are also assumed to be highly responsive, although this should be interpreted as their taxable income rather than their hours of work being responsive. This reflects high taxable income elasticities found in the literature (the precise estimates used for the top 1% are taken from Brewer, Saez and Shephard (2010)). In practice, however, this is largely irrelevant as this group is too rich to be affected by benefit reforms.

Table E.1 Intensive elasticities used: central scenario

Those in top 1% of UK earnings distribution	0.46
Those in next 4% of UK earnings distribution	0.35
Otherwise:	
Men	0.12
Single women without children	0.12
Women in couples without children	0.17
Women with a child aged 0–2	0.20
Women whose youngest child is aged 3–5	0.40
Women whose youngest child is aged 6–10	0.30
Women whose youngest child is aged 11+	0.20
Average	**0.16**

As discussed above, the choice of extensive (employment) elasticities is complicated by the need to transform the elasticities with respect to in-work income reported in the literature into the elasticities with respect to the gain-to-work required by our model. To do this, we first choose and report elasticities with respect to in-work income, expressed in a metric comparable to those in the literature; we then report what these numbers imply for elasticities with respect to the gain-to-work.

Tables E.2 and E.3 show the employment elasticities with respect to in-work income used in our central scenario. Overall, studies indicate that employment decisions are more responsive than hours-of-work decisions, especially for groups facing high fixed costs of work such as lone parents and low earners. For those aged under 55 the average employment elasticity works out at 0.26 and taking those aged 55 or over into account (who we assume have higher elasticities due to the potential to retire), the average employment elasticity is assumed to be 0.317 (versus 0.16 at the intensive margin).

Although the evidence on whether employment elasticities are higher for low-earning or high-earning groups is unclear, both economic reasoning and recent UK research suggest that low-skilled (and therefore likely low-wage) individuals have considerably higher elasticities than high-skilled individuals. This leads us to assume a strong earnings gradient whereby elasticities are five times as high for those in the bottom fifth of the earnings distribution than those in the top fifth. Following the findings of the literature, we assume relatively low elasticities for men, single women, and women in couples with a non-working partner, and higher elasticities for women in couples with children, especially if they have a working partner, and lone parents, where high elasticities are often found. In line with the pattern found by Blundell and Shephard (2012), we again assume that the elasticity is highest for women with children of nursery and school-starting age, with a decline for those with older children reflecting much higher employment rates (which almost mechanically implies a lower elasticity).

Table E.2 Extensive elasticities with respect to in-work income used for those aged 19–54: central scenario

		Position in the UK earnings distribution					Average
		Lowest-earning 20%	Next 20%	Middle-earning 20%	Next 20%	Highest-earning 20%	
Men (except lone fathers)		0.227	0.182	0.136	0.091	0.045	**0.129**
Single women without children		0.216	0.173	0.130	0.086	0.043	**0.153**
Women without children, non-working partner		0.216	0.173	0.130	0.086	0.043	**0.144**
Women without children, working partner		0.432	0.345	0.259	0.173	0.086	**0.284**
Lone parents, youngest child aged:	0–2	1.195	0.956	0.717	0.478	0.239	**0.946**
	3–5	1.554	1.243	0.932	*	*	**1.366**
	6–10	1.195	0.956	0.717	0.478	0.239	**0.950**
	11+	0.797	0.637	0.478	0.319	0.159	**0.599**
Women with non-working partner, youngest child aged:	0–2	0.324	*	0.194	*	*	**0.294**
	3–5	0.421	*	0.253	0.168	*	**0.304**
	6–10	0.324	0.259	0.194	0.130	0.065	**0.225**
	11+	0.216	0.173	0.130	0.086	*	**0.193**
Women with working partner, youngest child aged:	0–2	0.755	0.604	0.453	0.302	0.151	**0.563**
	3–5	0.982	0.786	0.589	0.393	0.196	**0.725**
	6–10	0.755	0.604	0.453	0.302	0.151	**0.546**
	11+	0.504	0.403	0.302	0.201	0.101	**0.351**
Average		**0.503**	**0.309**	**0.209**	**0.138**	**0.063**	0.260

* = Nobody of this type in the sample.

Table E.3 Extensive elasticities with respect to in-work income used for those aged 55–SPA: central scenario

Position in the UK earnings distribution					**Average**
Lowest-earning 20%	Next 20%	Middle-earning 20%	Next 20%	Highest-earning 20%	
0.75	0.7	0.6	0.5	0.4	**0.605**

These employment elasticities with respect to in-work income must then be converted into employment elasticities with respect to the gain-to-work. We do this by multiplying the figure in each of the cells above by one minus the cell-average replacement rate.[38] The results are shown in Tables E.4 and E.5. Since some groups have higher average replacement rates than others, this slightly changes the relativities between

[38] We use the cell-average replacement rate rather than using each individual's replacement rate. This is because we are doubtful that, where replacement rates vary within a group, there is truly a single employment elasticity with respect to in-work income for all individuals within the group, implying a within-group distribution of elasticities with respect to the gain-to-work that mirrors the within-group distribution of replacement rates. It seems to us that the elasticity with respect to the gain-to-work is a more fundamental economic concept than the elasticity with respect to in-work income (in the sense that economic theory suggests that people's labour supply decisions will depend on something closer to the gain-to-work than to in-work income) and that, if anything, it is more likely to be the elasticity with respect to the gain-to-work that is constant within a group. Thus we use cell-average replacement rates to yield a single elasticity with respect to the gain-to-work for everyone in the cell, in effect treating the elasticities with respect to in-work income reported above as being averaged across a distribution that mirrors the within-group distribution of replacement rates. For those aged 55 or over, we use the average replacement rate for the whole group, rather than each quintile.

groups. However, what is most striking is just how much lower elasticities are on this definition. For under-55s the average elasticity with respect to the gain-to-work is only 0.096, compared with 0.260 for the elasticity with respect to in-work income; for those aged 55 or over it is 0.292 rather than 0.605. Across the whole population, the average elasticity is 0.127 rather than 0.317.

Table E.4 Extensive elasticities with respect to the gain-to-work used for those aged 19–54: central scenario

		Position in the UK earnings distribution					Average
		Lowest-earning 20%	Next 20%	Middle-earning 20%	Next 20%	Highest-earning 20%	
Men (except lone fathers)		0.080	0.090	0.073	0.053	0.031	**0.065**
Single women without children		0.107	0.118	0.096	0.071	0.038	**0.097**
Women without children, non-working partner		0.049	0.076	0.072	0.056	0.034	**0.061**
Women without children, working partner		0.100	0.131	0.112	0.085	0.047	**0.104**
Lone parents, youngest child aged:	0–2	0.360	0.439	0.345	0.274	0.163	**0.349**
	3–5	0.455	0.529	0.477	*	*	**0.483**
	6–10	0.322	0.379	0.325	0.285	0.162	**0.319**
	11+	0.244	0.253	0.231	0.182	0.117	**0.225**
Women with non-working partner, youngest child aged:	0–2	0.069	*	*	0.073	*	**0.070**
	3–5	0.096	*	0.088	0.078	*	**0.089**
	6–10	0.070	0.079	0.070	0.063	0.047	**0.068**
	11+	0.049	0.054	0.056	0.041	*	**0.050**
Women with working partner, youngest child aged:	0–2	0.121	0.175	0.162	0.128	0.076	**0.139**
	3–5	0.152	0.215	0.207	0.167	0.103	**0.174**
	6–10	0.115	0.161	0.157	0.126	0.077	**0.128**
	11+	0.087	0.113	0.110	0.086	0.050	**0.094**
Average		**0.123**	**0.124**	**0.098**	**0.074**	**0.040**	**0.096**

* = Nobody of this type in the sample.

Table E.5 Extensive elasticities with respect to the gain-to-work used for those aged 55–SPA: central scenario

Position in the UK earnings distribution					**Average**
Lowest-earning 20%	Next 20%	Middle-earning 20%	Next 20%	Highest-earning 20%	
0.353	0.330	0.283	0.235	0.188	**0.292**

Assumed elasticities: low-responsiveness scenario

The importance of the assumed elasticities in this methodology, together with the significant uncertainty about them, makes it essential to conduct a sensitivity analysis.

In our 'low-responsiveness' scenario, we reduce the assumed elasticities on the intensive margin by 90% (i.e. to almost zero) for men and for single women without children, and reduce them by two-thirds for

other women, as shown in Table E.6.[39] The overall average intensive elasticity is reduced by almost three-quarters, from 0.16 to 0.038. This reflects findings from several papers (for instance Bargain et al. (2011)) that very little response occurs on this dimension and that nearly all labour supply response takes place on the employment margin.

Table E.6 Intensive elasticities used: low scenario

Those in top 1% of UK earnings distribution	0.2
Those in next 4% of UK earnings distribution	0.1
Otherwise:	
Men	0.012
Single women without children	0.012
Women in couples without children	0.057
Women with a child aged 0–2	0.067
Women whose youngest child is aged 3–5	0.133
Women whose youngest child is aged 6–10	0.100
Women whose youngest child is aged 11+	0.067
Average	**0.038**

Extensive (employment) elasticities are simply halved across the board, maintaining the relative pattern of responsiveness across the population. Again, note that the elasticities with respect to in-work income (Tables E.7 and E.8) must be altered to yield elasticities with respect to the gain-to-work (Tables E.9 and E.10) before they can be used in the calibration exercise. Across the whole of the population we analyse, our low-responsiveness scenario is for an overall average extensive elasticity with respect to in-work income of 0.159, and with respect to the gain-to-work 0.064.

[39] Except for the top 5% of earners, where we assume elasticities of 0.2 for the top 1% and 0.1 for the other 4%. But, again, the intensive elasticity for this group is essentially irrelevant.

Table E.7 Extensive elasticities with respect to in-work income used for those aged 19–54: low scenario

		Position in the UK earnings distribution					Average
		Lowest-earning 20%	Next 20%	Middle-earning 20%	Next 20%	Highest-earning 20%	
Men (except lone fathers)		0.114	0.091	0.068	0.045	0.023	**0.064**
Single women without children		0.108	0.086	0.065	0.043	0.022	**0.076**
Women without children, non-working partner		0.108	0.086	0.065	0.043	0.022	**0.072**
Women without children, working partner		0.216	0.173	0.130	0.086	0.043	**0.142**
Lone parents, youngest child aged:	0–2	0.598	0.478	0.359	0.239	0.120	**0.473**
	3–5	0.777	0.621	0.466	*	*	**0.683**
	6–10	0.598	0.478	0.359	0.239	0.120	**0.475**
	11+	0.398	0.319	0.239	0.159	0.080	**0.300**
Women with non-working partner, youngest child aged:	0–2	0.162	*	0.097	*	*	**0.147**
	3–5	0.210	*	0.126	0.084	*	**0.152**
	6–10	0.162	0.130	0.097	0.065	0.032	**0.112**
	11+	0.108	0.086	0.065	0.043	*	**0.097**
Women with working partner, youngest child aged:	0–2	0.378	0.302	0.227	0.151	0.076	**0.281**
	3–5	0.491	0.393	0.295	0.196	0.098	**0.363**
	6–10	0.378	0.302	0.227	0.151	0.076	**0.273**
	11+	0.252	0.201	0.151	0.101	0.050	**0.176**
Average		**0.252**	**0.154**	**0.104**	**0.069**	**0.032**	0.130

* = Nobody of this type in the sample.

Table E.8 Extensive elasticities with respect to in-work income used for those aged 55–SPA: low scenario

Position in the UK earnings distribution					**Average**
Lowest-earning 20%	Next 20%	Middle-earning 20%	Next 20%	Highest-earning 20%	
0.375	0.35	0.3	0.25	0.24	**0.3**

Table E.9 Extensive elasticities with respect to the gain-to-work used for those aged 19–54: low scenario

		Position in the UK earnings distribution					Average
		Lowest-earning 20%	Next 20%	Middle-earning 20%	Next 20%	Highest-earning 20%	
Men (except lone fathers)		0.040	0.045	0.037	0.027	0.015	0.032
Single women without children		0.053	0.059	0.048	0.035	0.019	0.049
Women without children, non-working partner		0.025	0.038	0.036	0.028	0.017	0.031
Women without children, working partner		0.050	0.065	0.056	0.042	0.024	0.052
Lone parents, youngest child aged:	0–2	0.180	0.219	0.172	0.137	0.081	0.175
	3–5	0.228	0.265	0.239	*	*	0.242
	6–10	0.161	0.190	0.163	0.142	0.081	0.159
	11+	0.122	0.126	0.116	0.091	0.058	0.112
Women with non-working partner, youngest child aged:	0–2	0.034	*	0.036	*	*	0.035
	3–5	0.048	*	0.044	0.039	*	0.045
	6–10	0.035	0.039	0.035	0.031	0.023	0.034
	11+	0.027	0.028	0.021	*	*	0.025
Women with working partner, youngest child aged:	0–2	0.060	0.087	0.081	0.064	0.038	0.069
	3–5	0.076	0.107	0.104	0.084	0.052	0.087
	6–10	0.058	0.081	0.078	0.063	0.038	0.064
	11+	0.044	0.056	0.055	0.043	0.025	0.047
Average		**0.061**	**0.062**	**0.049**	**0.037**	**0.020**	**0.048**

* = Nobody of this type in the sample.

Table E.10 Extensive elasticities with respect to the gain-to-work used for those aged 55–SPA: low scenario

Position in the UK earnings distribution					Average
Lowest-earning 20%	Next 20%	Middle-earning 20%	Next 20%	Highest-earning 20%	
0.177	0.165	0.141	0.118	0.094	**0.146**

High-responsiveness scenario

In our 'high-responsiveness' scenario, we preserve the relative patterns of intensive elasticities assumed in the central scenario, but double them[40] (Table E.11). This reflects a concern highlighted in Keane (2011) that the consensus that hours-of-work responses are small is somewhat artificial. Furthermore, as highlighted in Chapter 4, compensated elasticities that control for the effect of the change in income when a tax rate or wage rate changes are somewhat larger than uncompensated elasticities. As discussed at the start of Chapter 6, our calibration method assumes that there are no income effects, so it is not clear whether one should use elasticities that include or exclude the income effects.

Relative to our central scenario, extensive (employment) elasticities are increased by 40% for men, and for women in couples without children, who are under 55, and increased by 75% for other women and

[40] Except for the top 5% of earners.

for those aged 55 or over (Tables E.12 to E.15). The larger increases for single women (including lone parents), mothers in couples and those aged 55 or over reflects a number of papers that find such groups to be very responsive to financial work incentives (for instance, Blundell and Shephard (2012) in the case of lone parents). On the other hand, the increase for men and for women in couples without children is smaller than average (40%), reflecting a smaller range of participation elasticities for these groups.

Taking both those over and under age 55 into account, the overall average extensive elasticity we assume is 0.63 (with respect to in-work income) or 0.208 (with respect to the gain-to-work).

Table E.11 Intensive elasticities used: high scenario

Those in top 1% of UK earnings distribution	0.7
Those in next 4% of UK earnings distribution	0.5
Otherwise:	
Men	0.24
Single women without children	0.24
Women in couples without children	0.34
Women with a child aged 0–2	0.4
Women whose youngest child is aged 3–5	0.8
Women whose youngest child is aged 6–10	0.6
Women whose youngest child is aged 11+	0.4
Average	**0.32**

Table E.12 Extensive elasticities with respect to in-work income used for those aged 19–54: high scenario

		Position in the UK earnings distribution					Average
		Lowest-earning 20%	Next 20%	Middle-earning 20%	Next 20%	Highest-earning 20%	
Men (except lone fathers)		0.318	0.254	0.191	0.127	0.064	0.180
Single women without children		0.378	0.302	0.227	0.151	0.076	0.267
Women without children, non-working partner		0.302	0.242	0.181	0.121	0.060	0.202
Women without children, working partner		0.604	0.483	0.363	0.242	0.121	0.397
Lone parents, youngest child aged:	0–2	2.091	1.673	1.255	0.837	0.418	1.655
	3–5	2.719	2.175	1.631	*	*	2.390
	6–10	2.091	1.673	1.255	0.837	0.418	1.663
	11+	1.367	1.100	0.821	0.514	0.264	1.022
Women with non-working partner, youngest child aged:	0–2	0.567	*	*	0.340	*	0.515
	3–5	0.737	*	0.442	0.295	*	0.533
	6–10	0.567	0.453	0.340	0.227	0.113	0.394
	11+	0.378	0.302	0.227	0.151	*	0.338
Women with working partner, youngest child aged:	0–2	1.322	1.058	0.793	0.529	0.264	0.985
	3–5	1.719	1.375	1.031	0.687	0.344	1.269
	6–10	1.322	1.058	0.793	0.529	0.264	0.956
	11+	0.881	0.705	0.529	0.353	0.176	0.614
Average		0.834	0.486	0.323	0.213	0.096	0.415

* = Nobody of this type in the sample.

Table E.13 Extensive elasticities with respect to in-work income used for those aged 55–SPA: high scenario

Position in the UK earnings distribution					**Average**
Lowest-earning 20%	Next 20%	Middle-earning 20%	Next 20%	Highest-earning 20%	
1.31	1.23	1.05	0.88	0.7	**1.09**

Table E.14 Extensive elasticities with respect to the gain-to-work used for those aged 19–54: high scenario

		Position in the UK earnings distribution					Average
		Lowest-earning 20%	Next 20%	Middle-earning 20%	Next 20%	Highest-earning 20%	
Men (except lone fathers)		0.112	0.127	0.102	0.075	0.043	0.091
Single women without children		0.187	0.207	0.168	0.123	0.067	0.170
Women without children, non-working partner		0.069	0.106	0.101	0.078	0.047	0.086
Women without children, working partner		0.140	0.183	0.157	0.119	0.066	0.145
Lone parents, youngest child aged:	0–2	0.630	0.768	0.604	0.480	0.285	0.611
	3–5	0.797	0.926	0.835			0.846
	6–10	0.563	0.664	0.569	0.499	0.284	0.558
	11+	0.419	0.436	0.397	0.293	0.193	0.382
Women with non-working partner, youngest child aged:	0–2	0.120			0.127		0.122
	3–5	0.169		0.155	0.137		0.156
	6–10	0.123	0.138	0.123	0.110	0.082	0.119
	11+	0.086	0.094	0.098	0.072		0.087
Women with working partner, youngest child aged:	0–2	0.211	0.306	0.284	0.223	0.133	0.243
	3–5	0.267	0.376	0.362	0.293	0.181	0.305
	6–10	0.201	0.282	0.274	0.221	0.134	0.224
	11+	0.152	0.198	0.192	0.151	0.088	0.165
Average		**0.201**	**0.192**	**0.150**	**0.113**	**0.060**	**0.151**

* = Nobody of this type in the sample.

Table E.15 Extensive elasticities with respect to the gain-to-work used for those aged 55–SPA: high scenario

Position in the UK earnings distribution					**Average**
Lowest-earning 20%	Next 20%	Middle-earning 20%	Next 20%	Highest-earning 20%	
0.618	0.577	0.494	0.412	0.330	**0.512**