Optimal Household Labor Income Tax and Transfer Programs:  
An Application to the UK*

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Abstract  

This paper proposes an overview of the lessons that have been learned over the last 30 years in the economics literature for the optimal design of household tax and transfer programs, and offers an application to the United Kingdom. We review the tax and transfer system in the United Kingdom and its effects on labour supply. In particular, we investigate the link between top incomes and top marginal income tax rates since the 1960s. We derive simple optimal tax rate formulas in the context of the Mirrlees optimal income tax model, and propose simulations based on the actual UK earnings distribution and empirically estimated labor supply elasticities. We analyze the effects of introducing participation labour supply responses, migration effects, and discuss the optimal tax treatment of families and children. In each case, we discuss the empirical evidence and the consequences for optimal tax and transfer design. Finally, we propose a comprehensive plan for reforming the UK household tax and transfer system based on the lessons from the analysis.

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1 Introduction

There have been three major developments in the tax and transfer policies for households in industrialized countries over the last century. First, most industrialized countries have adopted progressive individual income taxation, whereby each slice of income is taxed at progressively higher rates. The UK adopted a progressive super-tax on comprehensive income in 1908 (Atkinson, 2007), and today, income tax raises about 30% of all government revenue (see Adam et al, this volume). Second, since the end of World War II, industrialized countries have set up social insurance programmes, primarily for health, disability and unemployment, as well as retirement benefits. Those programmes are generally financed with specific social security contributions on earnings. In the UK, there are payroll taxes on employees and employers, with an average tax rate of around 16% on labour income, and those taxes collect about 20% of all government revenue (see Adam et al). Finally, industrialized countries have developed income support programmes, traditionally structured to provide support for families with little income but with a means-test.

The setting of income tax rates and the generosity and structure of income support programmes generate substantial controversy among policy-makers and economists. At the centre is an equity-efficiency trade-off: governments value redistribution and so want to transfer resources from the rich to the poor, usually by taxing the incomes of the rich and subsidising the incomes of the poor; on the other hand, such transfers are generally costly in terms of economic efficiency. The costs arise for two reasons: first, raising taxes to finance the income transfer programmes may weaken the labour supply and entrepreneurship incentives of the middle and high income individuals who face the taxes. Second, income transfer programmes may weaken the labour supply incentives of their recipients. These two adverse labour supply effects may substantially raise the cost of improving the living standards of low income families. This equity-efficiency trade-off can be reflected in the political debate: left-of-centre political parties emphasize the redistributive benefits of income support programmes and their important role in raising the well-being of the most needy individuals; right-of-centre political parties emphasize the efficiency costs, blaming the income support programmes for creating dependence and loss of economic self-sufficiency, and high income tax rates for blunting work and entrepreneurship incentives.
The goal of this chapter is to provide an overview of the problem of designing taxes and transfer programmes affecting households from an economic perspective, and to apply the lessons from this to the design of the UK tax and transfer system. In economics research, the problem of designing taxes and transfer programmes is tackled in two steps. The first step is a positive analysis, where economists develop models of individual behavior to understand how individuals’ work decisions respond to taxes and transfer programmes. The central part of the positive analysis is the empirical estimation of models of individual behavior, and there is a very broad literature that tries to estimate the size of the behavioral responses to taxes and transfer programmes. The second step is the normative analysis, or optimal policy analysis. Using models developed in the positive analysis, the normative analysis investigates what structure and size of the tax and transfer system would maximize social welfare. Following Mirrlees (1971), economists call this line of research “optimal tax theory”. The criterion of social welfare adopted by a government defines its redistributive tastes: presumably, a left-of-centre government would use a more redistributive criterion than a right-of-centre government. The normative analysis is crucial for policy-making because it shows how programmes should be set or reformed in order to best attain the goals of the policy-maker. In particular, the normative analysis allows one to assess separately how changes in the redistributive criterion of the government, and how changes in the size of the behavioural responses to taxes and transfers, affect the optimal tax and transfer programme.¹ Conversely, the normative analysis makes it explicit that one cannot hope to say how best to design taxes and transfers without both knowing how individuals will respond, and without specifying what one is trying to achieve overall. Often, these two elements are often confused in actual policy debates: right-of-centre policy-makers rarely state explicitly that they have little taste for redistribution, but instead justify their lack of taste for redistribution because they believe that the adverse behavioral responses to transfer programs are large. Conversely, left-of-centre policy-makers emphasize the redistributive virtues of transfer programmes and assume that adverse behavioural effects to these or high tax rates are negligible.

We provide this overview as follows: section 2 introduces the standard optimal income tax

¹In actual policy debates, these two elements, which are conceptually distinct, are often confused. Right-of-centre policy makers rarely state explicitly that they have little taste for redistribution but rather justify their lack of taste for redistribution because they believe negative behavioral responses to redistributive programs are large. Conversely, left-of-centre policy makers emphasize the redistributive virtues of transfer programs and often assume that negative incentive effects are negligible.
model of Mirrlees (1971). This shows directly how the optimal tax and transfer system is determined by both the social welfare criterion used by the government and the size of behavioural responses to taxation. Despite the simplicity of this model, we are able to use it to analyse the optimal tax rate that should apply to top incomes, where we present new, albeit tentative, evidence on the response of top incomes to the large changes in top marginal tax rates that have taken place in the UK over the last 40 years. Section 3 extends the optimal tax model to allow for labour supply participation effects, and shows that allowing for such responses can drastically change the optimal tax system affecting low income individuals: instead of traditional welfare programmes with high withdrawal rates, large in-work benefits such as the Earned Income Tax Credit from the US or the Working Tax Credit in the UK, which can have very low, or even negative, withdrawal rates, can be optimal. We also discuss the issue of migration and tax design, which can be dealt with in optimal tax models in a similar manner to the issue of labour market participation. Throughout Sections 2 and 3, we make use of the summary of the literature on the behavioural response to taxation provided in Meghir and Phillips, this volume. In Section 4, we analyze a set of additional issues relevant to the design of the tax and transfer system affecting households. First, we discuss how the family should be taxed: the models considered in sections 2 and 3 abstract from family issues, but a majority of adults in reality live in couples, and so can be assumed to pool income to some extent. We also discuss how the presence of children should affect the optimal tax design. Lastly, we discuss administrative and operational issues concerning transfer programmes.

The second goal of this chapter is to apply lessons to the design of the UK tax and transfer system. Of course, much has changed to the personal tax and transfer system in the UK since the first Meade report in 1978 (Adam et al, this volume), and we would highlight three particularly important developments: first, statutory rates of tax have fallen at the top, but effective marginal tax rates (EMTRs) have not necessarily fallen. In 1978, the highest marginal tax rate paid on earned income was 83%; a decade later, it had fallen to 40% and is now 41% (but with extensions of payroll tax paid by employers, the true marginal tax rate on top earnings is now 47.6%). But this tells us only about the change in the marginal tax rate facing the very richest in the UK. In fact, income tax rates are generally lower

\footnote{The marginal effective tax rate is a concept used through this chapter. It measures how much of a small rise in earnings is lost to taxes and reduced transfer payments.}

\footnote{Between 1974 and 1978, the mean income of the richest 1% of adults in the UK was not high enough for
than in 1978, but marginal effective tax rates (METRs) across the whole distribution are
not necessarily lower now than in 1978, partly because of the expansion of income-related
in-work programmes. As we show later in this chapter, despite the falls in income tax rates,
the mean METR facing prime-age workers rose from 35.7% to 37.7% between 1979 and 2005.
In particular, only 10% of workers had METRs above 36.5% in 1979; by 2005, 10% had
METRs above 68%. 4 Second, income tax is now assessed at the individual level, rather
than jointly, but many married or cohabiting couples in the UK still face some form of joint
assessment of their incomes, thanks to the expansion of income-related in-work programmes,
and of means-tested benefits for those aged 60. Income tax became individualised in 1990, and
there have been few political pressures to reverse this reform. Instead, there has been a trend
of increasing use of means-tested transfer programmes that depend upon the joint income
of a co-resident couple, whether legally married or not (see Hoynes, this volume, for further
discussion). Finally, traditional transfer programmes administered have declined in favour of
refundable tax credits, some conditional on work. In fact, the UK has had a programme to
support low-income working families since before the first Meade report (since 1972, before
the EITC was introduced in the US), but the importance of transfer programmes to families
who are working is significantly greater now than at the time of the Meade report.

We expand on all these points in Section 5, which describes the current UK tax and trans-
fer system with a particular emphasis on the incentive effects it creates on labour supply
decisions. In Section 6, we provide a critique of that system. First, we set out the direction
of reform suggested by the insights from optimal tax theory, and the latest evidence on the
behavioural response to taxation. To crystallise ideas, we propose specific changes that could
be implemented in the short-run. But most optimal tax theory uses simplified models which
leave aside a number of important practical issues such as administrative burden for the gov-
ernment and employers, and ease of use for families.5 Those issues have always been important
in practice, and the recent “behavioral economics” literature is starting to incorporate them
in the analysis. Therefore, we go further and propose a longer-term reform that builds on
the short-run changes to incentives by addressing the main practical issues with the current
the highest marginal rate to be applicable, but the mean income in the top 0.1% was.
4Unfortunately, all these numbers exclude the payroll tax incident on employers, which saw rises in the main
rate and the coverage over this period.
5A number of those issues are discussed in more detail in the chapter by Shaw et al, this volume.
transfer programmes in the UK. Our plan replaces the piece-meal transfer programmes for low-income families (income support, working and child tax credits, housing benefit and council tax benefit) into a single Integrated Family Support programme which provides stronger and simpler incentives for work at the bottom, reduces compliance costs for families, and is provided “as-you-earn” and administered in the same way as social contributions through the PAYE withholding system. We show how this can be done in a revenue-neutral fashion, and estimate the behavioural responses to such a reform.

2 The standard optimal income tax model with intensive responses

This section presents the standard model of optimal income taxation, based on Mirrlees (1971), in which individuals respond to the tax and transfer system by choosing only how much to work, and then applies this to the UK. We offer two applications: first, we can use the theory to derive an expression for the optimal top marginal tax rate (the marginal tax rate facing the highest income individuals), and we implement this using new, albeit tentative, evidence on the responsiveness of top incomes in the UK to changes in tax rates over the last 40 years. Second, we simulate the entire optimal marginal rate schedule for the UK, given various simplifying assumptions, in order to show directly how the optimal tax and transfer system is determined by both the social welfare criterion used by the government, and the size of behavioural responses to taxation.

2.1 The model

- Labour supply responses to taxation

Taxes on income, and means-tested or income-related transfers, together create marginal effective tax rates (METRs) which reduce the net reward from working at the margin. A more useful concept is the net-of-tax rate, defined as one minus the METR: this measures how much work pays at the margin, and is potentially an important determinant of labour supply and pre-tax earnings. The impact of the METR on labour supply is called the substitution effect, as increasing the price of work may lead individuals to work less, or to substitute some leisure for work. Economists measure this effect using the elasticity of earnings with respect to the
net-of-tax rate. This elasticity measures the percentage increase in earnings following a one percent increase in the net-of-tax rate (see Box 1).

**Box 1. The elasticity of earnings**

We denote the marginal effective tax rate by $\tau$ so that the net-of-tax rate is given by $1 - \tau$. The elasticity of earnings $z$ with respect to the net-of-tax rate $1 - \tau$ is defined as:

$$e = \frac{1 - \tau}{z} \cdot \frac{\partial z}{\partial (1 - \tau)}.$$

This elasticity $e$ is always positive. The higher is $e$, the more responsive are earnings to the net-of-tax rate.

In addition to the net-of-tax rate effect, taxes and transfers may also affect labour supply through income effects: higher taxes reduce the income available to individuals, and so may induce individuals to work more. Equally, more generous transfer programmes increase income, and hence may induce individuals to work less. Because the derivation of optimal income tax models is much simpler when there are no income effects (Diamond, 1998 and Saez, 2001), we will assume no income effects in the formal analysis, and discuss later informally how the main results change when there are income effects.

• The optimal top marginal tax rate

Before discussing how to determine the optimal METR at any point in the income distribution, we outline how to derive the optimal METR for high-income individuals. We assume that this top rate applies to earnings above a given level, and we will refer to this level as the top bracket.\(^6\)

To determine the optimal top METR, we will consider the different ways in which a small increase in the top METR has on social welfare. As we will see, some of these effects will be positive, and others negative, but at the optimum they must be exactly offsetting, so that no small change in the tax rate can better achieve the goals of the government. With no behavioural response, increasing the top METR will increase government revenue. This is known as the mechanical effect on tax revenue, and this is a benefit to society (the revenue can be used for government spending or higher transfers). However, increasing the top METR

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\(^6\)In the UK, the current top rate of income tax is 40% and applies to annual earnings greater than £41,435 (in 2008-9). When including National insurance contributions, the real marginal tax rate is 47.7% for top income earners.
may also induce top bracket taxpayers to reduce their earnings because of the substitution effect described above, and this will reduce tax revenue. This is known as the behavioural response on tax revenue, and this is a cost to society. Finally, any increase in the top METR will also reduce the welfare of top bracket taxpayers. This is the welfare effect, and it is a loss to society. How large is this loss depends on the redistributive tastes of the government: if the government values redistribution, then, for incomes above a certain level, it will consider that the marginal value of income for top-bracket tax-payers is small relative to the average person in the economy. In that case, the welfare effect will be negligible relative to the mechanical effect on tax revenue.

For an optimal top METR, the marginal costs and benefits of increasing it further must be balanced. If the welfare effect is negligible, then the government should increase the top METR up to the point where the mechanical increase in tax revenue is equal to the loss in tax revenue from the behavioral response. This effectively amounts to setting the top METR so as to maximize the tax revenue collected from top bracket taxpayers; this can therefore be considered as an upper bound to the top METR above which the government should not go.\textsuperscript{7}

A precise formula for this optimum top METR is provided in Box 2. The more responsive are earnings to the net-of-tax rate, and the thinner is the income distribution at the top, then the lower should be the top METR (in section 2.2, we provide estimates for both these parameters for the UK).

\textbf{Box 2. Determining the top rate of income tax}

Here we present the optimal marginal tax rate $\tau$ for high earners that maximizes tax revenue. We denote by $z$ the \textit{average} income reported by taxpayers in the top bracket (incomes above $\bar{z}$). By balancing the mechanical and behavioural effects, the optimal rate $\tau^{*}$ can be shown to be given by:

$$\tau^{*} = \frac{1}{1 + \frac{a}{e}}$$

where $a$ denotes the ratio $z/(z - \bar{z})$ and is a measure of the thinness of the top of the income distribution. The optimal rate is decreasing in both the elasticity $e$ and the shape parameter $a$. See Appendix for derivation.

- \textbf{Optimal marginal tax schedule}

\textsuperscript{7}It is straightforward to extend the theory to the case where the government has less redistributive tastes and hence the welfare effect is not negligible. See e.g. Saez (2001) and our discussion below.
Using a similar methodology to the derivation of the optimal METR in the top bracket, we can also derive the optimal METR at any point of the income distribution. As before, the optimal METR at any point is set so as to balance the costs and benefits from changing the METR by a very small amount. For example, an increase in the METR over a very small band of income has three effects on government tax receipts and welfare. First, the reform increases taxes paid by every taxpayer with incomes above the small band we consider. Second, these extra taxes generate a welfare cost that will depend upon the extent to which the government values redistribution. Third, the rise in the METR will reduce earnings for taxpayers in the small band through the substitution effect, and so generates a loss in tax revenue. For an optimal METR, these effects must exactly offset, so that no change in the tax schedule can increase social welfare. An exact expression is presented in Box 3.

**Box 3. Determining the optimal marginal tax schedule**

We assume that the government imposes a tax schedule \( T(z) \) that depends on earnings \( z \). Let us denote by \( H(z) \) the cumulative distribution of individuals (i.e., the fraction of taxpayers with income less than \( z \)) and by \( h(z) \) the density of taxpayers. The optimal tax system is characterized by a grant to those with no earnings (equal to \( -T(0) \)) combined with a schedule of marginal tax rates \( T'(z) \) which define first how the grant should be reduced as earnings increase, and then how additional earnings should be taxed once the grant has been fully tapered away. The government’s preferences for redistribution are given by \( G(z) \) which measures the social marginal value of consumption for individuals with earnings above \( z \). The optimal marginal tax rate \( T'(z) \) is set so as to balance costs and benefits at the margin, and is given by the following formula (see Appendix for derivation):

\[
\frac{T'(z)}{1 - T'(z)} = \frac{1}{e} \cdot \frac{1 - H(z)}{zh(z)} \cdot (1 - G(z))
\]

The optimal tax rate \( T'(z) \) is decreasing with the elasticity \( e \), and decreasing in \( G(z) \), and increasing in the income distribution ratio \( (1 - H(z))/(zh(z)) \) which measures the thinness of the earnings distribution.

The formula in Box 3 shows how the optimal METR depends upon the size of the behavioral response, the government’s preferences for redistribution, and the underlying shape on the earnings distribution. In particular, the more responsive are individuals to the net-of-tax rate, the lower should be METRs. On the other hand, the more value that is placed on redistribution, the higher will be METRs across the income distribution. Finally, optimal METRs depend on the shape of the earnings distribution: the government should apply high
METRs at points in the earnings distribution where the number of individuals located there is small relative to the number of taxpayers who have earnings exceeding this amount. This is because the tax revenue gain from increasing marginal rates at a given earnings level will be proportional to the number of individuals who will be affected by this increase (the precise way that we summarise this shape of the income distribution is discussed in Box X).

**Box 4. Summarising the shape of the income distribution**

The shape of the income distribution is an important determinant of the optimal structure of METRs. We summarise this shape by the income distribution ratio:

\[
\frac{1 - H(z)}{zh(z)}
\]

which appeared in the optimal taxation formula presented in Box X. The optimal formula shows that the government should apply high marginal tax rates at levels where the density of tax payers is low compared to the number of taxpayers with higher income.

To anticipate the discussion in section 3, it is worth noting that negative METRs are never optimal. If the METR were negative in some range, then increasing it a little bit in that range would lower the earnings of taxpayers in that range, but the behavioural response would increase tax receipts because the marginal tax rate is *negative* in that range. Therefore, this small tax reform would unambiguously increase social welfare.

Saez (2001) shows how the analysis changes when income effects are introduced. Income effects encourage work for middle and upper income earners because taxes reduce disposable income, but income effects discourage work for low-income earners, because transfers increase disposable income. Hence income effects make taxing less costly, but make transfers more costly. Therefore, holding other things constant, income effects lead to higher METRs at the upper end, allowing the government to redistribute more, but make redistribution at the low end more costly, and so the net effect on the level of transfers is ambiguous. If income effects are concentrated at the bottom, then they are likely to reduce the size of the optimal transfers at the bottom. If income effects are spread evenly throughout the distribution, then numerical simulations by Saez (2001) show that income effects allow the government to increase the level of transfers paid for by higher METRs across the distribution.
2.2 Empirical evidence on intensive elasticities, and applications to the UK

This section presents two applications of the results shown earlier to the UK tax system. We first derive the optimal top METR, using new, albeit tentative, evidence on the responsiveness of top incomes in the UK to changes in tax rates, based on the response of top incomes to the large changes in METRs applying to top incomes that have taken place in the UK over the last 40 years. We then derive the entire optimum tax schedule in the standard intensive-responsive Mirrlees model, given assumptions for the labour supply elasticity and the government’s preferences for redistribution.

- Top Incomes and the Optimal Top Tax Rate in the UK

Although there is a large literature analyzing the effects of changes in METRs on reported incomes using tax return data in the US (see e.g., Saez, 2004 for a recent survey; some are cited in Meghir and Phillips, this volume), there has been hardly any study of the British case. This is especially surprising given that the UK experienced a dramatic drop in top METRs. Up to 1978, the top METR on earnings was 83%. Under the Thatcher administrations, the top rate dropped to 60% in 1979, and then dropped further to 40% in 1988. Dilnot and Kell (1988) try to analyze this issue, but have only access to a single year of micro-tax returns, and rely on aggregate numbers for their time-series analysis. More recently, Blow and Preston (2002) have used micro tax data for 1985 and 1995 to analyze responses to tax rates, but they focus exclusively on the self-employed, and do not look specifically at top incomes. Atkinson and Leigh (2004) have analyzed the link between top income shares and the top statutory marginal tax rate in five English speaking countries including the UK but their study does not estimate effective marginal tax rates and does not focus specifically on the UK case.

In this section, we propose a very preliminary analysis of the link between top METRs and top incomes, building on the top income share series constructed recently by Atkinson (2007). Those series estimate the share of total personal income accruing to various upper income...

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8The top rate on capital income was even higher and reached the extraordinary level of 98% from 1974 to 1978, although, as with the top rate on earned income of 83%, very few number had taxable incomes high enough to face this rate at the margin.

9The elasticity of taxable income is most likely not a behavioural parameter that is constant across income tax regimes: some of the ways in which taxable income responds will depend on the scope to make use of allowances and variations in the tax treatment of different sorts of income. For this reason, we might expect the taxable income elasticity to be higher in the US, for example, than in the UK.
groups such as the top decile, or the top percentile, and so they measure how top incomes evolve relative to the average.\textsuperscript{10} We have computed the average METR faced by various upper income groups from 1962 to present (in fact, there are two METR series, one including income tax and employer payroll tax (employee payroll tax is never relevant for the top 1% over this period), and one that also includes consumption tax (the rate is assumed to be uniform, and estimated using total consumption tax receipts).\textsuperscript{11}

Panel A in Figure 1 displays the METRs (excluding and including consumption taxes) on earnings faced by the top 1% (on the left axis), and the top 1% income share (on the right axis) from 1962 to 2003. It shows an increase in the METR from 1962 to 1978 followed by a dramatic decline in the two key reforms of 1979 and 1988. The top income share series shows an erosion of the top 1% income share up to 1978, followed by sharp upturn starting exactly when the top METR was reduced in 1979, suggesting that top income shares did respond to the lower METR. From a long-term perspective, the top 1% income share doubled from 6% in 1978 to 12.6% in 2003 while the net-of-tax rate (one minus the METR) doubled from $1 - .79 = 21\%$ in 1978 to $1 - .53 = 47\%$ in 2003. If all the increase in top incomes (relative to the average) can be attributed to the reduction in the MTR, this would imply a substantial elasticity almost equal to one.\textsuperscript{12}

\textless INSERT FIGURE 1 HERE \textgreater

Panel A: display top 1\% income share (left axis) and top 1\% MTR (with and without consumption tax) (right axis) from 1962 to 2003.

Panel B: display top 5\%-1\% income share (left axis) and top 5\%-1\% MTR (with and without consumption tax) (right axis) from 1962 to 2003.

\textsuperscript{10}The definition of income used by Atkinson (2007) is close to the broad income definition used in Gruber and Saez (2000), as it excludes capital gains and certain remuneration in kind. However, there are some inconsistencies over time: the most important is that the data represents families before 1990 and individuals after 1990, and we make an adjustment to the pre-1990 data to correct for that (see Appendix). Atkinson (2007, p89) also says that the series omits employees’ superannuation contributions before 1985, and before 1975-76, the series is net of retirement annuity premiums, alimony and maintenance payments, and allowable interest payments.

\textsuperscript{11}Our computations are described in an appendix. The METR is an average of the METR on earned and unearned income weighted by the share of earned and unearned income in each group. Our METRs are also weighted by income within each group, as larger incomes have a proportionately larger contribution to the total behavioral response of the income group (indeed, in the optimal top tax rate formula (2), one needs to use the elasticity weighted by income).

\textsuperscript{12}The elasticity is estimated as: $\log(12.6/6.0) / \log((1 - .79)/(1 - .53)) = .93$. 

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Panel B displays the METR and income share of the next 4% (income earners between the 95th and the 99th percentile). In contrast to the top 1%, the METR in 1978 is virtually identical to the current METR. This illustrates the fact that the Thatcher tax reforms cut the progressivity of the income tax only within the top 1%, but had relatively small effects in the rest of the distribution. However, the next 4% income share also shows a break in 1979: the income share is roughly constant at around 12% before 1979, and then increases steadily from 12% to 15% from 1979 to 2003.

Two interpretations are possible. First, it could be argued that the change in high incomes was not entirely due to the cuts in the METR, and may have been caused by other reforms enacted by the Thatcher administration that were favourable to high incomes. In that case, our previous estimate of 0.93 is biased upward. Second, it is conceivable that income earners in the next 4% group were also motivated to work harder by the prospect of facing much lower rates should they succeed in getting promoted and become part of the top 1% in coming years. In that case, our estimate of 0.93 would understate the effects of tax rate cuts, because a tax cut on the top 1% would stimulate incomes below the top 1% as well.

We explore in more detail how such data could be used to estimate the elasticity of broad income with respect to the net-of-tax rate in Table 1. The first 2 rows of Table 1 focus on the 2 key tax cuts of 1979 and 1988, and compare 1978 with 1981 and 1986 with 1989, respectively. Column (1) estimates the elasticity of top 1% incomes by calculating how the share of income received by the richest 1% of individuals changes relative to the change in the METR that this group was subject to. It shows positive, but not very large, elasticities of 0.34 and 0.26. However, as we discussed above, the longer-run perspective suggests higher elasticities. Indeed, rows 3 and 4 compare years 1962 to 1978 (when METRs for the top 1% increased) and years 1978 to 2003 (as we discussed above). Those comparisons generates substantially higher elasticities of 0.61 and 0.93. Finally, row 5 presents the coefficient of a simple time series regression of the income share on the marginal tax rate. Rather than

13 Gentry and Hubbard (2004) have tried to estimate such effects in a model of entrepreneurship with US data.
14 We do not use 1990 because of the change from couple to individual tax filing which creates a small discontinuity in the Atkinson series.
15 These elasticities are calculated by computing $\hat{e} = (\log S_1 - \log S_0) / (\log(1 - \tau_1) - \log(1 - \tau_0))$ where $S_0$ the top 1% income share before the reform, $S_1$ the share before the reform, $\tau_0$ the marginal tax rate of the top 1% before the reform, and $\tau_1$ the rate after the reform.
just comparing the changes between two different years, this approach uses data over the entire 1978 to 2003 period, and suggests an elasticity of 0.73 (which is statistically significant). In Column (2) we again calculate the elasticity estimates of top earners, but we exclude consumption taxes from our measure of METR: this hardly changes the elasticity estimates (because average consumption tax rates have changed by much less than the marginal rate of income tax applying to top incomes).

The elasticities reported in columns (1) and (2) are unbiased estimates only if, absent the tax change, the top 1% income share would have remained constant. As we explained above, this assumption seems contradicted by the fact that the top 5-1% income share increased from 1978 to 2003 in spite of no change in METRs. If we assume that, absent the tax change, the top 1% share would have increased as much as the top 5-1% share, we can calculate what is referred to as a difference-in-differences estimate, which is presented in column (3) of the table. These difference-in-differences (DiD) estimates are smaller for the long-term 1978-2003 comparison, and for the full time-series regression, although they remain substantial at 0.64 and 0.46 respectively. It is conceivable that, absent the tax change, the top 1% share would still have increased more than the top 5-1% share, perhaps because the Thatcher administration implemented other policy changes favorable to top incomes.

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<td>2003 vs. 1978</td>
<td>0.93</td>
<td>0.89</td>
<td>0.64</td>
</tr>
<tr>
<td>Full time series</td>
<td>0.73</td>
<td>0.69</td>
<td>0.46</td>
</tr>
<tr>
<td>regression</td>
<td>(0.13)</td>
<td>(0.12)</td>
<td>(0.13)</td>
</tr>
</tbody>
</table>

The second parameter in formula (2) is $a$, the measure of the thinness of the income

---

16 Those elasticity estimates are $\hat{e} = \frac{\log S_1 - \log S_0}{\log(1 - \tau_1) - \log(1 - \tau_0)}$ where $S^c$ and $\tau^c$ are the income share and marginal tax rate for the “control group” Top 5-1%.
distribution at the top. Figure 3 shows how our measure of the shape of the income distribution (discussed in Box X) varies with earnings in the UK: the hazard ratio is very high at the bottom, falls as income increases, and then rises slightly until it becomes flat around 0.6, implying a value of $a$ of $1/0.6 = 1.67$.

Plots hazard ratio $(1 - H(z))/(zh(z))$ using UK survey and tax data from $z = £0$ to $z = £400,000$

What do these estimates mean for the optimal top rate in the UK? With $a = 1.67$ and an estimate of $e = 0.46$, the optimal top rate is 56.6%, only a little higher than the the actual total top METR in 2008/9 (around 53% including consumption taxes)\textsuperscript{17}. But we would stress that, as our estimate of $e$ is tentative, so is the estimated optimal top rate. Taking values of $e$ 1 standard deviation either side of the central estimate gives a range for the optimal top rate of 50.4% to 64.5%. But our analysis is also consistent with the current top METR being too high: using the value of $e$ from the simple difference over the period 1978 - 2003 would give an optimal top rate of 40.2%, and using the difference-in-difference estimate of $e$ from the same period would imply an optimal top rate of 49.4%, slightly lower than the actual top rate. Indeed, both these estimates imply that cuts in the METR facing the richest 1% in the UK would actually increase tax revenues\textsuperscript{18}.

This first-pass analysis shows that identifying the elasticity of top incomes, a key ingredient in the optimal tax rate formulas derived above, is not simple. The evidence is consistent with significant behavioral responses to top taxpayers to METRs, certainly suggesting that the key elasticity is not zero. As the formula (2) shows that the upper bound on METRs depends

\textsuperscript{17}This comparison is not entirely valid. One would want to use a taxable income elasticity to estimate the impact of raising the METR that applies to the top 1% of earners in the UK given all other aspects of the UK tax regime. But the income measure used in our analysis was close to a broad income measure, not taxable income measure. For optimal tax design, the the right concept to use is a broad income elasticity, because the difference between broad income and taxable income is a function of the tax system and enforcement efforts, and therefore to a large extent depends on the choices made by governments. For the same reason, the taxable income elasticity is unlikely to be constant across income tax regimes. For example, we might expect the taxable income elasticity to be higher in the US, than in the UK, because there are more opportunities to reduce taxable income in the US tax code than in the UK. In the UK, the main ways in which one can reduce taxable income would be through higher contributions to private pensions (which to some extent represent only deferred taxation), and through charitable giving (for which they may be externalities).

\textsuperscript{18}In 2004/5, the richest 1% of adults, or 470,000 individuals, had incomes in excess of £100,000, with a mean of £156,000: see Brewer et al (2008).
critically on the level of this elasticity, it would be very valuable to explore this issue in more detail using the rich UK tax return micro-data (the Survey of Personal Incomes) that have now become available to researchers. Unfortunately, there has been no large change in METRs since 1988, and so we do not have elasticity estimates based on recent data, and it is conceivable that these behavioural responses change over time (see, for example, the discussion of migration effects below).

Note also that these calculations have only derived the optimal rate for the richest 1% of the population. For many years, the highest rate of income tax in the UK has applied to a much greater proportion: in 1991/2, 3.5% of adults paid income tax at the highest rate, and this has risen to 6.1% in 2003/4 [update]. This means that the conclusions in this section should not be seen as implying that the existing higher-rate of income tax with its existing thresholds should be changed: as the section below suggests, the optimal METR that applies to, say, people in the top 6% of income earners but outside the top 1% could be lower or higher than the optimal METR at the top.

• Simulations of the whole optimal tax system in the UK

Having estimate the optimal top METR, we below simulate the whole optimal tax structure using the Mirrlees model set out in the previous section, and based on the actual UK earnings distribution, and various assumptions about the intensive labour supply elasticity (full details are in an appendix).

The simulations attempt to show the optimal tax schedule which provides total net tax revenues (ie taxes net of transfers) equal to the current tax system (including revenue from individual income tax, payroll taxes, and consumption taxes) net of existing transfers.\footnote{Using aggregate expenditure figures from the Department of Work and Pensions we calculate the total annual amount spent on contributory and non-contributory Job Seekers Allowance, income tax credits and reliefs, child benefit, housing benefit, council tax benefit, and income support. These expenditure figures apply to the working age population, regardless of actual labour market participation.} To focus specifically on income tax, we have computed the optimal income tax schedule when we keep consumption taxes (VAT and excise taxes) at their current level, and assumed equivalent to a flat tax of 17%. The simulations assume that the tax and transfer system is at an individual level, and that there are no transfers specifically earmarked for families with children or those with disabilities.
Figure 4 shows the optimal income tax schedule (both inclusive and exclusive of the current average consumption tax) assuming an elasticity of 0.25 and with the government valuing redistribution (we define this more precisely in Box 4). For very low levels of earnings, individuals face a METR of around 70%. This decreases relatively quickly with income, reaching 36% as incomes approach £30,000 per year. As incomes increase further, so too does the METR, eventually settling at around 64% for incomes above £200,000. The U-shape pattern of optimal marginal tax rates is not surprising in light of our theoretical discussion: it is driven by the U-shape of the hazard ratio \((1 - H)/(zh)\) as well as the decreasing shape for \(1 - G(z)\) (the main contributor to the increasing METRs at the top) and the assumption that the elasticity does not vary with earnings.

<INSERT FIGURE 4 HERE>

Optimal tax schedule, \(\gamma = 1, e=0.25\), with and without consumption tax

We now consider how our views regarding the optimal schedule depend on the labour supply elasticity. Meghir and Phillips (this volume) survey the elasticity of hours worked with respect to the wage. For men, they say that “although one can start discussing the relative merits of the approaches taken, existing research will lead to the conclusion that the wage elasticity is zero.” For women, they conclude that “weekly hours respond much less to changes in wages, with elasticities in the range of approximately 0.0 to 0.3”. Their preferred estimate is a value of 0.13 for all married women except those with young children (for those with children aged 3-4, the value is 0.37). They also say that “the results of annual labour supply show greater responsiveness to wages”, but this is probably because variations in annual hours worked are a combination of participation responses and changes in the hours worked per week.

But hours worked are not the only way in which taxable income can respond to tax changes. For many individuals, the idea that the hourly wage cannot be affected by the amount of effort expended by the individual is too simplistic, and so earnings could respond to tax changes through changes in the hourly wage as well as hours worked. Taxable income reported to the revenue authorities, though, is not the same as gross earnings, and can vary in response to tax changes through changes in the form of compensation, the response of non-labour income, and changes in the amount of income reported to the tax authorities, whether through avoidance
or evasion.

[Revise?: Saez (2002) argues that “elasticities of earnings with respect to the tax rate [at the bottom end] are ... perhaps around 0.25”, and that: “there is little consensus about the magnitude of intensive elasticities of earnings for middle income earners, although this elasticity is likely to be of modest size for middle income earners and higher for high income earners. Gruber and Saez [2000] summarize this literature and display empirical estimates between 0.25 and 0.5 for middle and high income earners.” (p. 1057, Saez (2002)).]

Panel A of Figure 5 displays an optimal schedule, exclusive of consumption tax and assuming that individuals labour supply is more responsive to changes in income (an elasticity of 0.5). The figure demonstrates that this would produce lower METRs across the earnings distribution, falling as low as 20%, with a top rate of 45% (slightly below the existing rate). The intuition for the difference here and in Figure 4 is simple: when individuals are more responsive to tax changes, they will react more adversely to high METRs by reducing their labour supply and this places a limit on how high METRs can go. Correspondingly, and as shown in Table 2, the transfer programme is less generous when the elasticity is higher.

<INSERT FIGURE 5 HERE>

Panel A: show optimal MTR for elasticity 0.25 vs 0.5 (γ = 1)

Panel B: show optimal MTR for γ = 1 versus Rawlsian case

Finally, we consider how the government’s preferences for redistribution affect the optimal schedule (see Box X for more detail). An interesting case to consider is known as the Rawlsian case, which seeks to maximise the welfare of the least well-off member of society. The Rawlsian criteria can therefore be seen as a bound on the maximum level of redistribution that the government wishes to do. As Panel B of Figure 5 and Table 3 show, under this criteria, we would have a higher lump-sum grant and higher METRs across the entire distribution of earnings. Hence, rates are higher at the bottom, and are the same as the utilitarian case at the top. Therefore, with a Rawlsian criterion, the optimal shape becomes closer to an L than U-shape.
Box 5. Expressing the preference for equality

[change "equality" to "redistribution"] In calculating social welfare we first transform (money metric) utilities so that we allow for the possibility that the government attaches more weight on the welfare gains of individuals whose level of utility is initially low. A convenient and simple way of capturing this concern for inequality is to transform original utilities $u$ as follows:

$$
\begin{align*}
\frac{u^{1-\gamma}}{1-\gamma} & \quad \text{if } \gamma \neq 1 \\
\log(u) & \quad \text{if } \gamma = 1
\end{align*}
$$

Social welfare is then obtained by summing these transformed utilities across individuals. Whenever $\gamma$ is positive, any increase in utility translates into a less than proportional increase in social welfare. When $\gamma = 1$, which is the case that we consider here, the government is placing twice as much weight on the utility gains of an individual relative to another individual whose utility is twice as high. If concerns for inequality were even stronger, represented by say $\gamma = 2$, then they would be placing four times as much weight on the utility gains of the less well off individual. When $\gamma = 0$, there is no concern for inequality: when $\gamma$ gets very large, only the worst-off individual in society determines social welfare (the Rawlsian case discussed further below).

Table 3: Optimal Tax Rates and Lump-sum grants

<table>
<thead>
<tr>
<th>Redistribution strength</th>
<th>Elasticity</th>
<th>Average MTR</th>
<th>Lump-sum grant (per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\gamma = 1$ Rawlsian</td>
<td>0.25</td>
<td>45%</td>
<td>£5,580</td>
</tr>
<tr>
<td>$\gamma = 1$ Rawlsian</td>
<td>0.50</td>
<td>31%</td>
<td>£4,270</td>
</tr>
<tr>
<td>$\gamma = 0$ Rawlsian</td>
<td>0.50</td>
<td>58%</td>
<td>£6,760</td>
</tr>
</tbody>
</table>

3 Optimal taxes and transfers when there are participation effects

The model described in the previous section assumes that individuals respond to taxation only by varying their earnings as a function of the net-of-tax rate they face (known as the intensive margin/response). However, changes in whether people participate in the labour market at all (known as participation or extensive responses) are poorly captured within such a framework (see Blundell and MaCurdy, 1999). Indeed, following a small increase in the net gain of work, people tend to enter employment at, say, twenty or forty hours a week, rather than one or two
hours. Such extensive labour supply responses are particularly important at the bottom of the income distribution, and can be incorporated into a model of labour supply using fixed costs of work (Heim and Meyer, 2004). As shown in Diamond (1980) and Saez (2002), introducing participation effects modifies radically the structure of optimal taxes for low income families from the one obtained above. In this chapter, we outline the key theoretical results, and then discuss recent applications using UK data.

3.1 Theory

The decision about whether to work or not depends on the relative rewards to working and not working. We assume that skills vary across the population, and that an individual with a given earnings potential (or skills level) who chooses to work would find a job that pays a wage fully reflecting this. The government implements an income tax schedule that determines the disposable income of individuals both in and out of work. An individual chooses to work if the net return to work exceeds her costs of working. Since individuals of a given ability level may differ in their costs of working, for any given tax system some of these individuals may choose to work and others not.

To derive an optimal tax formula, let us consider a small increase in the METR at a given level of earnings. As there are only extensive responses, this reform affects only individuals with this earnings potential. As in this previous section, this reform has three effects on government tax receipts and welfare. First, the reform increases taxes for every taxpayer at the given level of earnings who works. Second, those extra taxes reduce the welfare of the workers who pay this extra tax, with the value that the government places upon this dependant upon its redistributive preferences. Third, the tax rise induces some of the workers at this earnings level to drop out of work, and this has a cost.

As shown in Box 5, and in a similar way to the derivations in the previous section, we can derive an optimal tax rate by balancing the costs and benefits of a small rise in tax at the margin.
An individual with skill $z$ who decides to work will get $z - T(z)$ in disposable income. If the individual decides not to work, she will get $-T(0)$ in disposable income. We assume that individual utility is simply $u = c - q$ where $c$ is disposable income and $q$ are costs of work. Hence, the individual will work if the net return to work $z - T(z) + T(0)$ exceeds her costs of working which we denote by $q$. If we assume that costs of work $q$ are distributed with a (cumulated) distribution $P(q|z)$ among individuals with skill $z$, the number of individuals of skill $z$ who work is simply $P(z - T(z) + T(0)|z)$. We can define the elasticity of participation with respect to the net return to work as:

$$\eta(z) = \frac{z - T(z) + T(0)}{P} \cdot \frac{\partial P}{\partial q}.$$

We denote by $g(z)$ the value the government places on increasing income of individuals with income $z$. If the government values redistribution, then $g(z)$ will be decreasing in $z$. The “no income effect” assumption implies that the average $g(z)$ across the full population is equal to one. Defining the average tax rate as $t(z) = (T(z) - T(0))/z$, we can derive the optimal tax rate as:

$$\frac{t(z)}{1 - t(z)} = \frac{1}{\eta} \cdot (1 - g(z)).$$

This formula is a simple inverse elasticity tax rule for the average tax rate on work. The average tax rate decreases with the elasticity $\eta$ and also decreases with $g(z)$, the social value of marginal consumption for individuals earning $z$.

As described above, if the government values redistribution, $g(z)$ should be decreasing in $z$ and should average one across the full distribution. This implies that $g(z)$ should be above one for low incomes and below one for high incomes. The above formula therefore implies that the tax rate on work $t(z)$ will be negative where $g(z) > 1$.

The optimal tax rate can be shown to depend upon the redistributive preferences of the government, together with the participation elasticity and the average tax rate. The participation elasticity is a measure of how responsive are individuals’ decisions to work or not to the gain to work. The average tax rate (or participation tax rate) is a measure of the extent to which the tax and transfer system weakens the reward from working. The optimal average tax rate at any given earnings level will be lower the higher is the participation elasticity (since it is not desirable to tax individuals who adversely respond to reductions in their incomes) and also be lower the more highly the government values consumption at that earnings level.

\footnote{It is defined as 1 minus the gain to work divided by gross earnings.}
A clear implication is that, if the government values redistribution, then the average tax rate should be negative for low earnings - in other words, low income workers should receive a subsidy for working. Hence, in sharp contrast to the intensive model, the extensive model implies that subsidy schemes such as the earned income tax credit should be part of an optimal tax system (this result is robust to introducing income effects, as formula (4) remains valid with income effects: see Saez, 2002). The intuition for this result can be understood as follows. Starting from a transfer system with a positive tax rate at the bottom, suppose the government contemplates strengthening incentives for low skilled workers by reducing the taxes that they would pay when working. Ignoring behavioral responses, this is a desirable reform since a government that values redistribution would have a social marginal value of consumption for this group that is above one. In the extensive model, the behavioural response is only on the participation margin and thus decreasing taxes here induces low skilled individuals to start working and become tax payers. This labour supply response does increase government revenue because the transfer system has a positive tax rate. Hence, this reform is unambiguously desirable, which implies that positive tax rates at the bottom are sub-optimal in the extensive model.

The arguments above are about a model where the only response is along the extensive margin. A model which allows for both intensive and extensive effects is presented in Saez (2002). To summarise the implications of such a model, consider the situation outlined above, where the government lowers taxes (which are currently greater than zero) for low-skilled workers. If there are both intensive responses and extensive responses, then cutting taxes here would induce some higher skilled workers to reduce their labour supply, so as to benefit from the tax cut, as well as inducing some non-workers to work. Although the latter response is a benefit to society, the former is a cost, and so cutting taxes has ambiguous effects on labour supply and therefore overall social welfare. A government contemplating strengthening incentives by cutting taxes facing low-income workers must therefore weigh precisely the positive participation effect and the negative intensive labour supply effect, and the model in Saez (2002) gives a precise formula for that trade-off.

• Interpreting the participation response

The extension of the optimal tax model to allow for non-participation has other applica-
tions. Two of those are tax evasion and migration.

To apply the model to the informal economy, our earlier concept of earnings could be interpreted as earnings reported to the government agency administering taxes and transfers. Suppose that low income earners can decide to either work in the formal sector, where we assume full compliance with the tax and transfer rules, or in the informal sector, where we assume full non-compliance. In that case, the decision to work or not work can be replaced by the decision to work and pay taxes or to work informally and not pay taxes. In that case, for a given level of tax enforcement efforts, our earlier analysis (and the formula presented in box 5) remains valid. However, in such a model, the government might recognize that some of all individuals reporting no earnings are in reality working informally, and so might actually be better off than low-income workers in the formal sector. This may lead the government to place a lower value on the consumption of individuals with no reported earnings than they do on workers with low reported earnings, and this would make subsidies for work more likely to be optimal.21

Second, taxes and transfers might affect migration in or out of the country. For example, high tax rates on skilled workers in continental Europe might induce some of them to move to the UK or the US where the burden of tax on high-income individuals may be lower, and generous benefits for lower income individuals in certain countries might encourage migration of low skilled workers toward those countries.22 In Box X we discuss how the migration decision can be incorporated into optimal taxation models.

21However, subsidies for low income individuals might induce individuals to over-report self-employment income. In the US, Saez (2002b) shows that there is evidence of bunching at the maximum of the EITC for the self-employed (and not for wage earners) strongly suggesting that self-employed individuals manipulate their reported earnings to take advantage of the EITC.

22Clearly, governments can use other tools to affect immigration, and such policies are taken here as given. In the EU, emigration and immigration across EU countries is almost completely deregulated, and so our analysis is particularly relevant in this context.
Box 7. The impact of migration on optimal taxes

For simplicity, suppose that the only behavioral response to taxes is migration. In the model presented above, one simply needs to replace not working (and collecting transfers) by being out of the country (and hence neither receiving transfers or paying taxes in the domestic economy). In such a setting, we can define an elasticity of migration with respect to disposable income as follows:

\[ \eta_m = \frac{(z - T(z)) \frac{\partial P}{\partial c}}{P(c|z)} \]

where \( P(c|z) \) the fraction of individuals with potential earnings \( z \) which decide to remain domestic residents when disposable domestic income is \( c = z - T(z) \). By balancing the costs and benefits of a small tax reform at the margin, and assuming that the government cares equally about a person whether he or she is a domestic resident or not, we can obtain the simple formula:

\[ \frac{T(z)}{z - T(z)} = \frac{1}{\eta_m} \cdot (1 - g(z)) \]

Which states that the government should impose lower taxes when an individuals migration decision is more responsive to changes in taxes (i.e. the migration elasticity \( \eta_m \) is high).

\( ^a \)Mirrlees (1982) proposed such a model of optimal taxes with migration. Simula and Tranoy (2006) propose a recent extensive theoretical analysis of the problem.

In the EU context, the most interesting application of the tax-induced migration model is perhaps at the high income end. If high income individuals are able to respond to high METRs both by reducing their effort when working, and by completely withdrawing their labour from a given country, then the migration threat might decrease significantly the ability of European countries to tax high incomes (we give a precise formula for the optimal top METR allowing for migration in Box X). As is well known, in the presence of migration, single countries do not recognize the external cost they might impose on others by cutting their top tax rates.\(^{23}\) In that case, some form of coordination and harmonization across countries can in principle be beneficial.

\( ^{23} \)As the example of Irish economic miracle over the last 15 years has shown, this issue of tax competition is even more important in the case of corporate taxation. See also Griffith and Klemm (2004).
Box 8. The impact of migration on the top rate of income tax

We assume that high income earners respond both along the intensive margin as in Section 3 with elasticity $e$, and along the migration margin with elasticity $\eta_m$. It is then possible to show that the optimal top rate maximizing tax revenue becomes:

$$
\tau^* = \frac{1}{1 + a \cdot e + \eta_m}.
$$

(1)

For example if $a = 2$, $e = 0.25$, the Laffer rate with no migration is $\tau^* = 1/(1 + 2 \cdot 0.25) = 2/3$. If there is migration with elasticity $\eta_m = 0.5$, then the Laffer rate decreases to $\tau^* = 1/(1 + 2 \cdot 0.25 + 0.5) = 1/2$. Thus, the migration threat can decrease significantly the ability of European countries to tax high incomes.

Unfortunately, there are few empirical studies estimating the effects of tax differentials between countries on migration. As a first step, we have examined the basic trends in the fraction of high income earners in the United Kingdom who are foreign-born among, and the extent to which those trends are related to trends in the top METR. Figure 6 displays the fraction of foreign-born workers in the top 1% and the bottom 99% from 1972 to 2004.24 Interestingly, the fraction foreign born increases sharply during the 1980s when METRs were falling, and only at the top of the distribution: the fraction foreign-born in the top 1% doubles from 8% in the early 1970s to about 16% in mid-1990s, while the fraction foreign-born in the bottom 99% stays about constant at 6-7% during the period. Since 1995, the fraction foreign-born has increased both in the top 1% and the bottom 99%.

If we are willing to assume that the sharp increase in foreign born from 8% to 16% at the top from the 1970s to 1995 was entirely due to the drop in top tax rates, then we can provide an illustrative estimate of the migration elasticity. According to Piketty and Saez (2007), the average income tax rate (including income and payroll taxes) for the top 1% fell from about 56% in 1970 to around 40% in 2000, so the net-of-tax rate increased from 0.44 to 0.6, i.e., by

\[24\text{Data from the General Household Survey (since the early 1970s) and Labour Force Survey (since 1992) records the country of birth and Nationality of survey participants. Before 1992, our estimates are based on the GHS which is a smaller sample than LFS. As a result, the year to year results for the top 1% are fairly noisy and we average across 3 years.}\]
36%. The statistics from GHS and LFS suggest that the net flow of foreigners was around 8% (an increase from 8% to 16%), and this implies a migration elasticity of 0.22. Clearly, the flow of foreigners might have been accompanied by a flow of wealthy UK nationals back into the UK following the tax cuts (that we cannot measure). If that flow is comparable to the flow of foreigners, then that would double the elasticity to 0.44. However, this analysis is extremely tentative: the assumption that the increase in foreigners was entirely tax-driven is highly questionable, and was made for illustrative purposes only. It is also important to note that the elasticity estimated from our top income share analysis in Section 2.2 incorporated such migration effects, as migration to the UK of highly-skilled foreign workers will lead to a rise in top income shares.

3.2 Evidence on extensive elasticities and empirical applications

- Empirical Extensive Elasticities

Meghir and Phillips (this volume) show that there is a wide range of participation elasticities for women in the literature: “Aaberge et al. (1999), Arrufat and Zabalza (1986) and Pencavel (1986) find results of 0.65, 1.41 and 0.77-0.89 respectively using cross-sectional datasets from Italy, the UK and the US, and using significantly different modelling and estimation strategies...Devereux (2004), however, finds a lower degree of responsiveness with the elasticity at the median family income equal to 0.17.” There is consensus, though, that participation is more elastic amongst women from poorer families so that “participation is likely to be the key margin of adjustment for poorer women”.

A structural model of lone mothers’ labour supply is presented in Brewer, Duncan, Shephard and Suarez (2006) [BDSS] (and in Blundell and Shephard (2008)). These estimates strongly suggest that the participation response to changes in financial incentives for lone mothers in the UK is strong, and arguably more important that the intensive response. BDSS calculate that the response to the WFTC reform amongst lone mothers is equivalent to a labour force participation elasticity of almost 1, and an elasticity with respect to the gain to work of 0.28; for comparison, the range of equivalent labour force participation elasticity estimates for lone parents in the US is 0.69 to 1.16 (Hotz and Scholz (2003)). One might expect that extensive responses are so important for this group as the presence of children (especially
young children) can mean that home production becomes a much closer substitute for general consumption.

For men, the two studies of static labour supply cited by Meghir and Phillips (this volume) suggest an elasticity close to zero, but they highlight that a separate literature on the effect of unemployment benefits on the duration of unemployment has consistently found that higher benefits lead to a longer period out of work. Even including these effects, though, they suggest the overall participation elasticity for men is very close to zero, at 0.04. A dynamic model for young men in Germany (Adda et al (2007)) gives a similarly low participation elasticity (0.06). But Meghir and Phillips also provide their own, new empirical evidence. This very clearly shows the heterogeneity of responses: for highly educated men, it is hard to reject the idea that the participation elasticity is zero, but the estimate for men with low educational qualifications is 0.23 for single men, and 0.43 for men in couples.

• Numerical Simulations Incorporating Extensive and Intensive Margins

There are very few empirical studies of optimal tax systems that incorporate intensive and extensive responses: Saez (2002) is an example for the US.

Using UK data, Adam (2005) uses similar methods to examine the marginal efficiency cost of redistribution (MECR) over time and across different groups in society. Adam uses methods developed in Immervoll et al. (2007) to estimate the MECR in the UK, and uses calibrated labour supply elasticities and detailed information on the METRs and average tax rates facing a large sample of individuals in the UK between 1979 and the present day.

Adam (2005) made use of the wide heterogeneity in METRs and ATRs that arise through the interactions of means-tested benefits and tax credits, but used fairly homogeneous (and calibrated) elasticities. Blundell and Shephard (2008) allow for preference heterogeneity, together with intensive and extensive responses, by using a discrete choice model of labour supply to examine issues related to the optimality of the tax and transfer system. Their analysis focuses exclusively on lone mothers, and begins by estimating the implicit trade off between income and hours of work, and how this varies across individuals. With estimates of these behavioural responses, the labour responses of individuals can be simulated as the tax and transfer system is varied. This then allows them to solve for the tax and transfer system that maximises social welfare subject to a government budget constraint. Their empirical analysis suggests that
lone parents with very young children are much less responsive to changes in financial work incentives than are lone parents with children of school age. In the former case - where the marginal value of leisure is high - it is better to offer high levels of income support together with high METRs when in work. In the latter case, where leisure is valued less highly, it is more desirable to have a lower level of income support and lower METRs to encourage them to work. Heterogeneity therefore appears to be very important, and Blundell and Shephard argue that it may appear desirable from an optimality perspective to reflect variations in individuals’ responsiveness to changes in financial work incentives in the design of the tax and transfer system.

Of course, one approach to the second goal of this chapter - where we seek to apply the lessons from optimal tax theory to make recommendations for the UK tax and transfer system - would have been to use an optimal tax model that allowed for intensive and extensive responses to solve for the optimal schedule. We have not taken this approach, though, primarily because we needed to reflect that the current tax system in the UK has different tax schedules for single people and couples, and schedules that vary by the number of children, but also because we also consider the impact of the tax and transfer system on family formation and fertility, and administrative issues, and it is to these we turn in the next section.

4 Other household tax rate topics

In this section, we discuss further extensions to the theory of optimal tax design.

First, we discuss how the family should be taxed: the models considered in the earlier sections are based on individuals, and so abstract from family issues, but a majority of individual adults live in couples, and can be assumed to pool income to some extent. We also discuss how the presence of children should affect the optimal tax design.

Second, we discuss briefly whether and how a transfer system for low-income individuals should be complemented by active labour market policies such as training programmes, help and encouragement for finding jobs, and requirements (backed up with sanctions) for failing to accept suitable jobs and/or work sufficient number of hours.

Third, we discuss administrative and operational issues concerning income transfer programmes or in-work credits. Most optimal tax theory uses simplified models which leave aside
a practical issues such as the administrative burden for the government and employers, and the ease of use (or compliance costs) for families. Those issues have always been important in practice, and the recent “behavioral economics” literature is starting to incorporate them in the analysis (see also Shaw et al., this volume). Although we do not present a model that incorporates them, we instead look to learn the lessons from that literature, and from other studies of the consequence for families of particular administrative designs.

4.1 Treatment of the family

The models we have considered thus far were based on individuals and so abstracted from family issues. In reality, a majority of adults live in couples, and can be assumed to pool income to some extent for consumption purposes. However, over the past three decades, there has been an international trend from joint to individual taxation of husbands and wives, and today the majority of OECD countries use the individual as the basic unit of taxation (income tax in the UK moved from being family-based to individual-based in April 1990).

Under a pure individual-based taxation, tax liability is assessed separately for each family member and is therefore independent of the presence or income of other individuals living in the family or household. At the other extremem, in a system of fully joint taxation of couples, tax liability is assessed at the family level, and depends on total family income (this is how income tax works in the US, for example).25 But tax credits and transfers for low-income families in the UK are based on total family income, as are thr equivalent welfare benefits in most other OECD countries, and there has been much less impetus to move to an individually-based system for assessing transfers.

The fact that individuals may share resources within families or households has three important considerations for designing tax and transfers. First, if there is any income-pooling or consumption-sharing within a family, a person with a low income living with a high-income spouse is better off than an otherwise-equivalent person living with a low-income spouse. Therefore, if the government values redistribution, two women (for example) with the same labour income ought not to be taxed identically if their partners’ incomes are very different.

This redistributive principle is achieved to a limited extent by having a progressive income tax

25Of course, there are intermediate steps between a fully individual tax system and a fully joint system, and many EU countries with individual tax systems have some form of recognition of marriage or the presence of a partner (see Di Tommaso et al. 1999).
system based on family income, since it imposes higher average tax rates on women with high-income spouses than on otherwise-identical women with low-income spouses. By contrast, an individual-based income tax does not meet this redistributive criterion: it imposes the same tax burden on individuals irrespective of their partner’s earnings.

Second, family-based income tax systems are highly likely to create a marriage (or cohabitation) subsidy or penalty, as the income tax collectively owed by the two adults might change if they decide to cohabit or marry. This is well-documented in the US, where the income tax system is family-based for married couples, but not for cohabiting couples [correct?]. Because the US tax system is progressive, couples with very unequal incomes, such as single-earner couples, benefit from a marriage subsidy, while couples with similar incomes, such as two earner couples, face a marriage penalty (see Eissa and Hoynes (2000)); we discuss the implications of the tax and transfer system in the UK in Section 5.

Although the marriage penalty/subsidy attracts substantial public attention, it becomes relevant for optimal taxation only if the decision to marry is sensitive to those fiscal incentives. Hoynes (this volume) concludes that “overall, the research [mostly using US data] finds tax effects on marriage that are consistent with the theoretical predictions but are small in size” (see studies cited in Eissa and Hoynes (2003)); a related literature finds that marriage is also sensitive to the financial incentives inherent in welfare systems (almost always anti-marriage incentives), but that the elasticities are small (see Hoynes (1997)). Overall, then, Hoynes concludes that “the estimated elasticities with respect to the tax-induced financial incentives to marry (and divorce) are small”.

Of course, even if marriage or partnership decisions are relatively insensitive to fiscal consequences, we might expect that how individuals report their family circumstances to the government authorities would be affected by sufficiently large cohabitation penalties or subsidies. In the UK, Her Majesty’s Revenue and Customs and the Department for Work and Pensions both estimate the extent of money lost to such fraud or error relating to the presence of a partner: these estimate that £67m was overpaid in IS, JSA and PC, £30m in HB (both in in 2005/6) and £320m overpaid in tax credits (in 2004/5) (DWP, 2007 and HMRC, 2007b). Powerful circumstantial evidence that such fraud exists comes from the fact that the UK government is paying child-contingent support to between 5 and 10 per cent more lone parent families than are thought to live in the UK (Brewer et al, forthcoming; Brewer and
Third, as discussed in section 3, the empirical literature has shown that the labour supply of secondary earners is more responsive to taxes than that of primary earners (see Meghir and Phillips, this volume, or Blundell and MaCurdy, 1999). Therefore, following the traditional Ramsey principle of optimal taxation that commodities with relatively more elastic demands should have relatively lower tax rates (see Crawford and Keen, this volume), the earnings of secondary earners should be taxed at a lower rate than the earnings of primary earners for efficiency reasons (see also Boskin and Sheshinski, 1983, Alesina and Ichino, 2007). This goal is achieved to some extent by a progressive individual-based income tax, since primary earners have higher incomes and hence tend to face higher METRs than secondary earners. By contrast, a family-based tax and transfer system generates identical METRs across members of the same family, and thus does not meet this efficiency principle.

Kleven et al (2006) consider a simple model of couples where the primary earner responds along the intensive margin only (as in the models outlined in Section 2) and the secondary earner responds along the extensive margin only (as in the models outlined in Section 3). In contrast to the separable and linear tax system in Boskin and Sheshinski, 1983, they consider the fully general joint taxation. Naive intuition based on (4) suggests that, for redistributive reasons, the tax on the secondary earner should be higher when the earnings of the primary earner are larger (as the social value of marginal consumption decreases with total family income). Kleven et al. (2006) show that the reverse is actually true: the (average) tax rate on the secondary earner should be decreasing with the earnings of the primary earner and, symmetrically, the primary earner should face a lower METR if his spouse works.

The correct intuition is the following: conditional on the earnings of the primary earner, two-earner couples are always better off than one-earner couples. Hence, the government would like to redistribute from two-earner couples to one-earner couples. The value of such redistribution is larger for couples with low primary earnings because the contribution of the secondary earner to household utility is then more important. Therefore, the redistributive virtue of taxing secondary earnings is actually higher at the bottom of the primary earnings distribution, explaining why the tax rate on secondary earner is decreasing with the primary earner income. If the tax schedule for two-earner couples is seen as the base schedule, the
optimal schedule for one-earner couples is obtained from that base schedule by introducing a
tax allowance for non-working spouses that is larger for couples with low primary earnings than
for couples with high primary earnings. This shrinking tax allowance generates an implicit
tax on secondary earners which decreases with primary earnings.

This result suggest that a progressive joint income tax system goes in the wrong direction,
and that neutral individual taxation is closer to the optimum. However, it is important to
note that, in practice, transfer programmes for low-income families are almost always based
on joint family income, and the phasing-out of those programmes creates implicit taxes on
secondary earners which are decreasing with primary earnings. For example, and as we show
in the next section, a secondary earner in the UK with modest earnings would face a relatively
high (average and marginal) tax rate when her partner’s earnings are low, because the second
adult’s earnings reduce the family’s tax credit entitlements as well as being subject to the
individual income tax and payroll tax, and would face a relatively low (average and marginal)
tax if her partner’s earnings are high, because the secondary earnings are subject only to the
individual income tax and payroll tax. Hence, the results in Kleven et al. suggest that the
actual tax and transfer systems of many OECD countries, and of the UK in particular, are
consistent with optimal tax results.

• **Collective labour supply model**

How disposable income is allocated among family members raise interesting issues. Empirical findings by Lundberg et al. (1997) show that giving an allowance for children directly
to the mother instead of giving it to the main earner through a reduction in taxes increased
spending on children significantly. This shows that families do not fit the unitary model,
whereby a family acts as if it cares about the same things. Chiappori (1988, 1992) has developed a collective labour supply where consumption is allocated within family members in an
efficient way (so that it is not possible to make one member in the family better off without
making another worse off), but that the weights that each family member has in the decision
making process depend on their relative incomes or on whom is entitled to the government
transfers.

How does this affect our analysis? Suppose, for example, that husbands have too much
power within a couple, and therefore get a larger fraction of consumption than their spouses,
and suppose that the government would like to achieve a fairer distribution of consumption within families. The findings by Lundberg et al. (1997) show that the government can modify within-family allocations of consumption at no fiscal cost simply by transferring (for example) child allowances from husband to wife. For example, if the government wants to increase the consumption spent on children, Blundell, Chiappori, and Meghir (2005) show that what matters is how the marginal willingness to spend on children differs across parents. If mothers have a higher marginal willingness to spend, then it is valuable to transfer resources from husband to wife. The empirical analysis of Lundberg et al. (1997) suggests that this can be done at no fiscal cost simply by switching who is the nominal recipient of the transfer in the family (and without altering the total disposable income of the family). Therefore, in sharp contrast to the previous models we have considered so far, this within-family redistribution is first best (it does not create any efficiency costs) as long as the within family bargaining is efficient (as assumed in the theory of Chiappori 1988, 1992). These results suggest that within-family distributional issues could be addressed by transfers from wallet to purse but leaving unchanged the total level of transfers going to low income families. The issue of transferring between high and low income families is not fundamentally affected by bargaining issues within the family.

- The treatment of children

There are various arguments why the optimal tax schedule should depend upon the presence of children. First, the presence of children could be used as a tag (Akerlof [year]), if the presence of children in a family is correlated with the parents’ ability to pay taxes, or because it is correlated with the labour supply elasticity (we cited evidence in support of the latter in section X)\(^\text{26}\). Second, to the extent that children represent a net cost, so that a family with children needs more disposable income than one without to reach a given standard of well-being, then there is an argument that this should be reflected in the optimal tax schedule (so that for a given family income level, the presence of children should reduce the family’s tax liability or increase the transfers received). But this is not a universally-held viewpoint: certainly children do cost money, but given that there is a degree of choice in having children, there must be

\(^{26}\text{Note that this argument does not say whether, for a given level of income, a family with children should face a lower average tax burden or METR than a family without in an optimal tax system, merely that they could be different.}\)
some benefits to families too, it can be questioned why society should compensate families for a particular lifestyle choice; given the benefits that arise from having children, compensating families for the extra cost of having children cannot be justified as easily as compensating families for the extra costs imposed by long-term sickness or disability, for example. Third, a society may feel a responsibility for children’s well-being directly because they are unable to affect their parents’ income, and there is therefore an argument for an optimal tax system to provide a means of insuring children against growing up in a household with a low income (this argument is strengthened if there are costs to society as a whole from having children grow up in a household with low income).

However, it is also possible that the presence of children in a family is affected by the generosity of child-contingent transfers, and this introduces another aspect of behaviour which can be distorted by the design of the tax system, potentially leading to efficiency costs. Surveying recent evidence, Brewer, Ratcliffe and Smith (2007) conclude that fertility can be responsive to financial considerations, but the implied elasticity is low. In the US, there is little conclusive evidence that welfare benefits or the EITC have any effect on fertility (see Hoynes, 1997 and Baughman and Dickert-Conlin, 2006) but studies of specific programmes in other countries have shown there to be small responses of fertility to child-contingent transfers (see Laroque and Salanié (2005) and Milligan (2005)). They also provide new evidence from the UK showing that the recent increase in the value of benefits for low-income families that are conditional on children has led to a rise in fertility amongst couples likely to be eligible for such programmes. If fertility does respond to financial incentives, then this introduces another dimension to the optimal tax problem.

4.2 The role of conditionality and active labour market policies in optimal tax design

A general trend throughout many OECD countries in the 1990s was the adoption of active labour market policies in order to encourage work among welfare recipients and the unemployed. Such policies range from training programmes, assistance in finding jobs, or require-

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27 This argument was made forcibly by Dilnot, Kay and Morris (1984).

28 Clearly if there are benefits (or costs) to society as a whole from the presence of children which parents do not take account of when making fertility decisions, and if fertility decisions are affected by the generosity of the tax and transfer system, then this may provide a rationale for using the tax system to subsidise (or tax) children (this is a standard argument for using the tax system to correct for externalities: see [environmental tax chapter, this volume]).
ments, backed up with sanctions, for welfare recipients to exert a given amount of effort looking for work and to accept reasonable job offers. A very large empirical literature analyzes such programmes, and Kluve et al. 2007 proposes a comprehensive survey of this literature and meta-analysis for policies in European countries.

If participation tax rates for low-skilled workers are high, then the tax and transfer system clearly discourages low-skilled work. In that context, it would be socially desirable to induce those who are just indifferent between working and not working to start working, as the welfare cost of working is second order but the fiscal savings are first order. Obviously, providing in-work financial incentives is a way to achieve this goal, as we discussed in Section 3. However, conditionality or active labour market policies can provide alternative tools that the government can use to induce work. If the direct cost of providing ALMPs or enforcing job-search requirements plus the welfare cost of forcing individuals to make choices they would not have made on their own is smaller than the fiscal savings obtained from having beneficiaries work, then such policies are socially desirable. The general principle follows the theory of quotas and rationing developed by Guesnerie and Roberts (1984): goods that are subsidized by the optimal tax system should be rationed. In a system where participation tax rates for low-skilled workers are high, then being out of work is effectively subsidized, and should be rationed.

Two points should be noted. First, in a world with heterogeneity along dimensions other than the wage, the welfare costs of forcing some individuals to work is higher than it is for others; in practice, it might be difficult for the government to target precisely the beneficiaries who do face low costs of working (and for whom requirements to seek and accept job offers are most likely to be welfare-improving), and those active labour market policies might generate substantial welfare costs if they require beneficiaries with very high costs of working to start working. A crude but common way to achieve such targeting is to use family and disability status.

\[29\] NAO (2007) [or HC 609 Session 2006-7 not sure how to reference?] gives this calculation for the different New Deal programmes in the UK in 2005/6, most of which fail this test, although this calculation does not look at the welfare costs on individuals, and takes only a short-run view of the fiscal savings.

\[30\] For example, after the 1996 welfare reform in the US, welfare recipients were required to enroll in training programs or work part-time unless they had very young children. In the UK, the conditions that apply to claimants of out-of-work benefits are different for lone parents, those who have a long-term sickness or a disability, and other individuals (although the current Government has proposed changes to reduce these differences). See Section 5 for more information or DWP (2007) for the UK government’s current strategy.
Second, if the optimal tax system is such that the participation tax rate among low skilled individuals (and even more so if it is negative as our previous analysis suggested), then the desirability of using such active labor market policies is weakened as the tax savings from inducing people to work are small (or even negative). In the optimal tax model developed in Section 3, it is desirable to induce out-of-work high skilled individuals to start working, but in reality, active labor market policies rarely target high-skilled individuals.

This discussion (like previous sections) assumes the government maximizes a social welfare function that depends only on individual utilities; the Mirrlees’ approach to optimal taxation is considered “welfarist” in the sense that it disregards any information not related to individuals’ well-being or welfare. In contrast, a non-welfarist approach to optimal taxation allows for the government to use criterion for evaluating social welfare other than the preferences of the individuals. Clearly, departures from the welfarist approach to optimal non-linear income taxation may lead to different implications for taxation design. Kanbur, Keen and Tuomala (1994) consider a Mirrleesian problem where the objective of the government is represented by a standard income-based poverty index - in this setting the optimal marginal income taxes for low earnings is negative [check]. Moffitt (2006) argues that the history of redistributional policy in the U.S. suggests that the government values work per se and given this, considers a optimal taxation problem where “work” directly enters the objective function of the government. In this setting, earnings subsidies are often optimal, and work requirements emerge as an instrument for improving (the government’s view of) social welfare.

4.3 The assessment period and timing of taxes and transfers

In most countries, individual income taxes are assessed on annual income, and transfers often assessed on a monthly basis (in the UK, weekly). Standard economic models of inter-temporal choice predict that families should budget over long time periods. If families have fluctuating incomes but are able to smooth consumption over time using credit markets, then income assessed over a longer period of time is a better measure of economic welfare or well-being than income assessed over a short period of time (indeed, Banks et al. (this volume) discuss whether income tax should be assessed over periods longer than a year [check]).

In reality, fixed costs of using financial services and other credit market failures, and low levels of literacy, numeracy and financial education and self-control problems with savings
all create significant departures from the standard model. These departures are likely to be more prevalent amongst low income families, and tend to lead to such families budgeting consumption over short periods of time, such as a month or fortnight. It therefore seems desirable to operate transfers for low-income families on a high-frequency basis, and operate taxes on higher incomes on a lower frequency, such as annual.

Another important aspect is the timing of tax payment or transfer receipt relative to the period of earnings assessment. Because of imperfect credit markets and imperfect inter-temporal maximization as described above, many families would be unable to pay a significant level of tax if it is not withheld at the time they receive the earnings: this is why setting up tax withholding systems operated by employers is key to implementing broad-based taxes (or social insurance contributions) on wages and salaries.\(^\text{31}\) In this way, income tax can be withheld throughout the year at levels which are approximately correct, and a small adjustment made once a year if the amount withheld does not correspond to the actual tax liability. A similar argument applies to the design of transfer programmes: the closer is the timing of payment to the period of assessment, the better targeted is the transfer; paying credits through a single annual payment (as happens with the EITC) can be very inefficient if families are credit constrained.\(^\text{32}\)

One way of aligning the timing of payment to assessment is to administer transfer programmes for workers through the main income tax system (such a scheme can also have lower administrative and compliance costs relative to traditional welfare programmes and relative to the child and working tax credits in the UK, discussed further below). For example, a (refundable) tax credit could be administered through a system of “negative withholding”, where the revenue authorities fund employers to top-up earnings instead of withholding taxes. Having an automatic system of transfer payments would also likely reduced stigma costs for recipients.\(^\text{33}\) However, the experience of the first two years of the working and child tax credits

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\(^\text{31}\) Before such withholding systems were in place, income taxes were most often limited to upper income groups.

\(^\text{32}\) It is possible that the prospect of a large annual lumpsum tax refund induces families to borrow against the forthcoming tax refund with high interest costs. Indeed, surveys show that US tax refunds received by low and moderate income families are used primarily for paying down debts. Alternatively, one-off tax refunds can be seen as forced savings devices which allow low income families with self-control problems to save for purchasing consumer durables or investing in human capital. Empirical work has not yet been able to distinguish those two scenarios. It is striking to note, however, that there is little demand for such forced savings devices in the UK where transfers are paid monthly or fortnightly.

\(^\text{33}\) Exactly as taxpayers disliked interactions with the tax collector in past centuries, welfare recipients today
in the UK (see section 5), the Advance EITC in the US, or Prime à l’Emploi in France, all show that such a system will cause difficulties if there is a significant risk that families incur an overpayment which they have to repay to the government. This fear leads the vast majority of EITC recipients in US to opt to receive it annually in arrears, and the UK government changed the way tax credits depend on income in 2005 so that they are predominately based on the previous tax year’s income (except where income falls), meaning that most rises in income should not lead to over-payments. But such a design makes tax credits rather like a retrospective transfer scheme based on annual income, and this means the credits are then not as well targeted as they could be.

5 The current household tax and transfer system in the UK

This section briefly describes the main taxes and transfers in the UK affecting working-age households (individual income tax, employer and employee national insurance (a payroll tax), the means-tested working and child tax credits, and other welfare transfers). We show how they combine to form a single net schedule, and describe the inherent work incentives.

There two main means-tested transfer programmes for families with no earnings are called Jobseekers’ Allowance (JSA) and Income Support (IS). The key difference between them is that families entitled to IS can receive the benefit unconditionally, but recipients of JSA have to make sufficient efforts to look for work, and can lose entitlement to the benefit if they do not accept reasonable job offers (see discussion later in this section). All families with dependent children will receive child-contingent support through a non-means-tested child benefit, and most will receive more through a means-tested fully-refundable child tax credit. In April 2008, a single adult aged 25 or over would receive £60.50 a week (young adults would receive £52.10 a week). Many of these issues were discussed in detail when the UK government proposed merging WFTC (a 6-monthly retrospective transfer programme) and the children’s tax credit (an annual transfer implemented through PAYE) to form the child and working tax credit: see Brewer et al, 2001, and Whiteford et al (2003) for more discussion. See also Brewer (2006).

There is more detail on individual taxes in Adam and Browne (2007) and on individual transfer programmes in Phillips and Sibieta (2007). We do not show the schedule affecting those over the state pension age, nor do we discuss health- or disability-related transfers: the main differences for those above state pension age are: there is no payroll tax on earned income, there are higher personal allowances for income tax, welfare programmes are more generous, and health-related transfers are more important. There is also a short-term non-means-tested jobseekers’ allowance for those who have paid sufficient national insurance contributions, but only a minority of JSA recipients qualify for this. In the rest of this section, we use children to mean dependent children, which is currently defined as children under 16, or aged 19 or under in full-time education or approved training schemes.
less), and a lone parent and two children with no private income would receive around £186.95 [please remove FSM] of support a week. For families on JSA/IS, a 100% METR applies after a small earnings disregard (£5/wk for single adults, £10/wk for couples, £20/wk for lone parents): families therefore face no direct financial incentive to increase their earnings above the very low disregard unless they earn enough to exhaust fully entitlement to IS/JSA, or they work sufficiently high number of hours to qualify for the working tax credit.

Families who are receiving JSA/IS are automatically entitled to the full amount of housing benefit (HB) and council tax benefit (CTB). Housing benefit is a rental subsidy programme which can potentially cover the full cost of renting (subject to locally-determined rent ceilings), but where actual entitlement depends upon family income and household composition. Council tax benefit is a very similarly structured programme that provides a (potentially 100%) rebate on council tax payments. Hereafter we refer to these programmes together as HB/CTB. Receipt of these benefits also confers entitlement to various benefit-in-kind programmes, the most important of which is entitlement to free school meals (a valuation of this has been included in the analysis in this section).

Welfare benefits in the UK make use of hours rules, as well as conditions on family income: the most important ones are that individuals working 16 or more hours may not claim JSA/IS, and individuals with (without) children working 16 (30) or more hours may instead claim the working tax credit. Figure 7A shows the budget constraint (the relationship between hours of work or gross earnings, and net income after deducting taxes owed and adding transfers) for a lone parent working at the minimum wage: these hours rules lead to a striking discontinuity at 16 hours work a week. The size of this discontinuity - which is critical in determining the gain to working 16 or more hours a week - depends on entitlement to HB/CTB: with liability to CT but no rental housing costs, net income increases by over £50.50/wk at this point for

38 Council tax is the local property tax in Great Britain. There is a different local tax system in Northern Ireland, but an equivalent rebate scheme to CTB. See [IFS BN on local tax].

39 In-work programmes increased in importance during the early to mid 1990s, under a Conservative government, partly as a response to the growing proportion of children living in a lone parent family. But their importance changed beyond recognition in a set of reforms between 1999 and 2003. The working tax credit now supports families with or without children who have a low income but at least one adult in work, and the child tax credit – a programme which evolved from traditional means-tested benefits to families with children – is now received by around 90% of all families with children, and costs the government more than child benefit. Although these tax credits are administered by the tax authority, they have many elements which feel much more like traditional welfare programmes: they are paid regularly directly to recipients’ bank accounts, and never reduce income tax liabilities. [Redundant or misplaced text?]
our example family (see Figure 7A). However, with housing costs of £80 per week, this is reduced to an increase of just £6/wk. There is also a further discontinuity at 30 hours a week (annual earnings of £8,611 for a minimum wage worker) when an additional credit in the WTC is payable.

After entitlement to JSA/IS has been exhausted, although no tax is due and any tax credits have not yet begun to be withdrawn, any increase in earnings does reduce entitlement to HB/CTB, giving an effective METR of 20% if entitled to only CTB, 65% if only HB or 85% if both. There are then two important points at which the METR rises: first, from £104.52 a week (£5,435 a year), income tax and National Insurance contributions become liable: income tax (20%) and employee national insurance (11%) together give an METR of 31% plus 12.8% on the employer, or 38.3% overall. Second, once annual earnings have reached £6,420, entitlement to tax credits begins to fall, increasing the METR by 39 ppts (ie 70% on the individual, plus 12.8% on the employer, or 73.4% overall; these rates reach 77.3% if we include the 17% average consumption tax). However, what complicates - and raises - METRs substantially is the way this combined income tax-payroll tax-tax credit METR interacts with HB/CTB: as the Box explains, to give an example, someone facing a combined income tax-payroll tax-tax credit MTR of 70% and entitled to HB/CTB would lose 85% of the remaining 30%, giving a total MTR of 95.5% (plus 12.8% on the employer side, or 96% overall). Characterising the precise METR schedule is complicated because entitlement to HB/CTB - and thus the level of earnings at which METRs fall - depends on the exact level of rent and council tax.

### Box 9. Calculating METRs when families are entitled to HB/CTB

The withdrawal rates in HB/CTB apply to net income, not gross income, and so the 20%/65%/85% withdrawal rate of HB/CTB is not added to the combined income tax-payroll tax-tax credit METR, but instead applied to whatever earnings are left after this METR. To give an example, someone facing a combined income tax-payroll tax-tax credit MTR of 70% and entitled to both HB and CTB would lose 85% of the remaining 30%, giving a total MTR of 95.5% (plus 12.8% on the employer side, or 96% overall). Someone with a combined income tax-payroll tax-tax credit MTR of 31% and entitled to CTB would lose 20% of the remaining 69%, giving a total MTR of 44.8% (51% with employer NI).

For a family with 2 children and a full-time earner, the 39% withdrawal rate of tax credits will stop once gross annual earnings reaches £28,150, and the METR will then fall, typically
to the most common METR of 38.3% (basic-rate income tax plus employee and employer NI contributions). This increases to 47.7% (41% plus 12.8% on the employer) when earnings are sufficiently high for the higher-rate of income tax to be liable (from April 2008, this will be £41,435 a year, but the Government has already announced a real rise in this threshold from April 2009 which we allow for in our reforms proposals in section 6). When joint family earnings are between £50,000 and £57,783, the family element of the child tax credit is withdrawn at a rate of 6.7%, giving a slightly higher METR of 47.7% plus 12.8% on employer, or 53.6% over this range.

Figure 7A shows how the annual net income of a lone parent with two children varies with the annual employer cost (ie annual earnings plus employer NI). While this is not intended to be a typical family, it does illustrate nicely some of the key features of the UK tax and transfer system (we later discuss how the tax and transfer system varies across different family types). [We have provided you with figures for couples with kids, lone parents and single no kids, and are still thinking which would be best].

Figure 7B and 7C show how the associated participation tax rate (PTR) and marginal tax rate (METR) vary with earnings.

<INSERT FIGURE 7 HERE>

Panel A: Budget constraint as a function of labour cost (CASE WITH NO HB AND CASE WITH HB)

Panel B: Participation tax rate (CASE WITH NO HB AND CASE WITH HB)

Panel C: Marginal tax rate (CASE WITH NO HB AND CASE WITH HB)

Figure 7B and 7C show how the associated participation tax rate (PTR) and METR vary with earnings. The PTR ate is 0% for very low earnings, and then increases as we enter the region where the family is subject to a 100% METR. After reaching a maximum - at the point just before entitlement to JSA/IS is exhausted - the PTR falls with earnings. Once the family becomes entitled to working tax credit, there is a jump downwards in the PTR, but it rises

<40Throughout this section we assume that there are no child-care costs. Due to the hours rules in the tax system, the actual budget constraint will depend upon the wage received. We assume that the wage rate is equal to the minimum wage (as of October 2007) of £5.52 per hour. The benefits system works on a weekly basis, and the tax system on an annual basis, but the Figures have assumed both work on an annual basis.>

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when the family is subject to a withdrawal of tax credits. There is another discontinuity when
the family becomes entitled to the full-time bonus in tax credits, and the PTR falls once tax
credits are no longer tapered with extra earnings, and it approaches the METR of 47.7% as
earnings get very large.

Such descriptions of the marginal rate schedule can be heavily dependent on the choice of
family circumstances, but we can make some general comments about variations across family
types. First, MTRs given earnings would be identical to the schedule shown here for a primary
earner in a couple with children, but PTRs would be higher because such families are entitled
to more JSA/IS than lone parents when they do not work but no more WTC when they
do work. Second, the presence and number of children makes a large impact on the METR
schedule (and a smaller impact on PTRs) for low to middle earners: each additional (fewer)
child would increase (decrease) the point at which the METR falls from 73.4% to 38.8% by
£5,346 a year (personal earnings). Third, families without dependent children are not entitled
to tax credits until they work 30 hours a week, and so METRs would be lower (and PTRs
a lot higher) than those for otherwise-equivalent families with children working between 16
and 29 hours a week. Lastly, because of the various hours rules in the UK tax and transfer
system, assuming higher wages would change the pattern of METRs and PTRs at the very
bottom of the earnings distribution, but not at the top (because income tax, payroll taxes and
child tax credit depend only on weekly or annual earnings). Generalising across other forms
of income is harder: unearned income is treated differently from earned income for families on
IS/JSA, and by the payroll tax, but unearned income is treated identically to earned income
by income tax and tax credits; self-employment profits are treated differently from earnings
from employment by the payroll tax, but not by income tax or transfer programmes.

To summarize, the UK tax and transfer system imposes confiscatory METRs on low-paid or
short-hours jobs through the 100% phase-out rate of JSA/IS. The incentives after that depend
to a very large extent on the size of the family’s entitlement to HB/CTB: with entitlement only
to CTB, the working credit reduces the participation tax rate to 12% for our specimen lone
parent family, and 40% to 45% for other family types for part-time (full-time for families with
no children) workers at the minimum wage. However, with entitlement to HB at reasonable
levels of rent, PTRs become extremely high, exceeding 70% until the employer cost reaches
around £20,000 for a single adult, £33,000 for a lone parent, and over £40,000 for the one-earner couple with children). [Is this a good summary measure?]. A further drawback is the very high METRs of 73.4% that arises through the phasing-out of working and child tax credits combined with income and payroll taxes and that applies over a broad range of earnings (from gross earnings of £6,420 to £28,150 for a 2-child family, the latter figure being higher than median male full-time earnings of [what?]); of course, the METR at the bottom end of this range would be even higher for families entitled to HB/CTB.

5.1 Treatment of the family in the UK tax and transfer system

As discussed earlier, the UK has individual assessment for income tax, but welfare programmes and the child and working tax credit are assessed against the joint income of co-resident couples, where legally married or not.

There are currently very few tax-induced marriage penalties or subsidies in the UK (see Bowler (2007)) although some have argued that there should be more subsidies (see Social Justice Policy Group (2007)). However, there are substantial so-called cohabitiation penalties or subsidies in the UK, and these arise because welfare benefits and tax credits are assessed against the joint income of cohabiting couples, whether legally married or not, and because entitlement to tax credits given joint family earnings for families with children does not vary with the number of adults in the family. Such couple penalties or subsidies are usually shown either by calculating the change in net transfers from the state that two adults would experience if they were to cohabit - a complicated calculation that requires assumptions on how housing costs and labour supply would change upon cohabitation - or by calculating the change in net transfers that a cohabiting couple would experience if they (fraudently) claimed to be living apart. An analysis of the extent to which couples in the UK face penalties and subsidies is Anderberg et al. (2006); see also Kirby (2005) and Draper (2007).

The same structural features that lead to such cohabitiation penalties also give differences between the incentives to work facing the first and second earner in a couple. Typically, the PTR of the second earner will be considerably lower than that of the first earner, but the direction of recent reforms has tended to increase PTRs of second earners as entitlement to tax credits has risen in real terms (see Brewer, 2007).

The UK tax and transfer system varies quite markedly with the presence of and number
of children. At the time of the Meade report, the UK government was replacing child tax allowances and an old programme known as family allowances in favour of child benefit: a universal, non-means-tested, cash payment for children paid direct to the main carer (almost always the child’s mother). But child benefit is no longer the single most important (defined in terms of cost) programme for supporting children thanks to the growth of means-tested tax credits conditional on the presence of children since 1997.41 As a whole, then, child-contingent transfers in the UK are more means-tested than universal, and are higher for the first child than subsequent children (both these features have been accentuated since 1997).

The current UK government is particularly concerned about the high (by international and historical) levels of relative child poverty, and this concern - and the tough quantified targets that accompanied it - has led to very large real increases in entitlements to welfare benefits and tax credits for families with dependent children since 1998 (see Brewer et al, 2008). By contrast, families without dependent children have seen no real rise in the level of out-of-work benefits since at least 1988 (when the current income support was introduced) and, although there has been a working tax credit for low-income working individuals without children since 2003, entitlements are not high, and the take-up rate a mere 20 per cent (25 per cent by value; see HMRC, 2007a).

Because there have been large increases in entitlements to welfare benefits and tax credits for families with dependent children but none for those without, the size of net transfers that is conditional on having children has risen substantially since 1997: the real value of child-contingent transfers per child grew by around 50% between 1997 and 2003 [update], more than it had risen by in the previous 22 years. Brewer, Smith and Ratcliffe (2007) provides new evidence suggesting this increase has led to a rise in fertility amongst couples likely to be eligible for such programmes.

5.2 Administration of the child and working tax credit

The administration of the child and working tax credit has been extensively criticised, particularly but not exclusively in their first 2-3 years, with a cross-party group of Members of Parliament concluding in early 2008 that "there is little evidence that [Her Majesty’s Revenue and Customs] has the scheme under control. Many claimants continue to struggle to under-

stand tax credits and why they are overpaid. There have been many complaints about the process of recovering overpayments and the Ombudsman continues to receive and uphold a large number of complaints”. 42

But these administrative problems mostly derive from policy choices, so it is worth discussing these briefly. One of the programmes that existed before the child and working tax credit was the Working Families’ Tax Credit (WFTC). WFTC awards were retrospective: when applying, claimants provided evidence that they were in work and of their recent earnings and childcare costs. Having determined entitlement to WFTC, this amount was paid for the next 6 months, regardless of any changes in the family’s circumstances; any changes in circumstances, of course, were reflected in the next award if the family re-applied after 6 months. Because awards were based on information verified at the time of claim, there was no need to re-assess awards in the future. But this system means that claimants’ awards were retrospective, and the 6 month gap between assessments meant that payments might not reflect current circumstances.

The government of the time felt both that WFTC was not sufficiently responsive, and that this process of providing verified income details twice a year was onerous for claimants whose circumstances were not changing, and so the design of the child and working tax credit represents an attempt to reconcile these tensions. The principle of the child and working tax credits is that they should now depend on current circumstances, and income in the current year. But neither the tax authorities nor employers automatically know the details on which tax credits depend (the gross earnings of all adults in the family, the number of children, whether any adult is working for 16 or more or 30 or more hours a week, and how much is being spent on formal childcare) so tax credits rely on two things happening. First, there is a responsibility on claimants to tell HMRC when there is a change in their circumstances – such as whether they are living with a partner, how many children they have and also what they are spending on childcare – within a month of it happening.

Second, tax credits are initially assessed on the last verified value of the claimant’s annual income (usually the previous year’s annual income) and are then re-assessed when HMRC knows with certainty the claimant’s income in the current tax year (or when the claimant tells HMRC that their income in the current tax year is likely to be significantly different

42 For example, see HC 300 2006-7, CAB (2007) and Brewer (2006) and references therein.
from the previous verified income level). In the first two years of the operation of tax credits, this end-of-year reconciliation or within-year adjustment led to many more instances than had been expected of people having been over-paid tax credits. The Government responded by changing the rules so that tax credits still depend upon current family circumstances (how many children, whether a lone parent or a couple), but are a little more like a retrospective system because they are now more likely to depend upon the previous year’s income. But there is an asymmetry: claimants whose income is lower than last year can always ask to have tax credits assessed on their (best estimate of their) current annual income, but claimants whose income is higher than the previous year can continue to have their tax credits assessed on the previous year’s income, provided that is within £25,000 of their current annual income.

So tax credits now feel very different from the rest of the personal tax system. For many families, the amount of tax credits received in a given year will not depend upon income in that year. Some aspects of the child and working tax credits are similar to traditional means-tested benefits – changes in family circumstances will have to be reported very quickly – and other parts are similar to previous in-work benefits in the UK such as family credit WFTC, because awards will be fixed with regard to income rises. However, in the final assessment, tax credits are proving expensive to administer (HMRC spent £587m in 2006/7 to administer net spending of £18.7bn, a ratio of 3.13%, compared to a ratio of 2.12% to administer WFTC, its much smaller predecessor (see Cm 6983 2006-7 [HMRC’s Annual report 2005/6] and HC 626 2006-7 [HMRC’s Accounts for 2006/7]), tax credits have the highest rates of fraud and error in central government (£1bn to £1.3bn in 2004/5 out of total spending of around £16bn; HMRC, 2007b), they can often serve to increase (rather than cut) volatility of income (Hills et al, 2006 [Case report]), and there remain concerns about their impact on recipients (see HC 1010 (2006-7) [ombudsman report] and CAB, 2007).

5.3 Conditionality and hours rules

Of the transfer programmes mentioned above, HB/CTB and CTC are paid to all who are income-eligible, and the WTC is paid to all who are income-eligible and where one person in the family works at least 16 hours a week: for these programmes, claimants are not required to do any other activities as a condition of receiving benefit. However, conditions do apply to those claiming IS/JSA. Claimants of JSA have to be available for work, actively seeking work,
and have agreed a jobseeker’s agreement with Jobcentre Plus; furthermore, people may be unable to claim JSA if they left their previous job voluntarily, or were sacked for misconduct. In principle, this means that people who do not make sufficient effort to look for work, or who turn down reasonable offers of work, can lose their entitlement to benefit for between 1 and 26 weeks (with exceptions made for vulnerable groups). [Too much detail?]. Claimants of IS may have to attend periodic meetings at a Jobcentre Plus office, but do not have to look for work as a condition of receiving benefit; however, only some groups are allowed to claim IS, the main ones being people who are sick or disabled, people who are caring, and lone parents whose children are all aged under 7. 43 Adults who are incapable of work through sickness or disability can usually claim incapacity benefits (either incapacity benefit, or income support on the grounds of disability), continued receipt of which is conditional only on attending periodic meetings at a Jobcentre Plus office. New claimants from April 2008 will instead claim the Employment and Support Allowance, which will have greater requirements on claimants, backed up with sanctions for non-compliance. 44

As mentioned above, the UK tax and transfer system makes a great deal of use of hours rules: entitlement to in-work credits is conditional on working a minimum number of hours (16 for families with dependent children or with a disabled adult, 30 otherwise), and entitlement to out-of-work benefits is conditional on working less than some maximum number of hours (16 for the claimant, although some couples may claim IS/JSA even if the partner of the claimant works less than 24 hours a week). If hours are observable, and respond to taxes and transfers, then optimal tax theory suggests that they should be used in the design of tax and transfer programmes. In principle, making the working tax credit means-tested against weekly earnings and conditional on working 16 or more hours a week means it is more closely focused on low-wage workers than would be the case if it were conditional solely on having positive earnings. In practice, there may be very few high wage workers who would wish to work small numbers of hours if there were an earnings-based in-work credit, and so there may be little efficiency gain from having an hours rule. [Argument applies if hours rule is set low - discuss BS WP here?] Furthermore, under the current rules for the working tax credits, hours

43 At the time of writing, lone parents could claim IS until their youngest child reached 16, but the Government has announced plans to reduce that age to 7 by October 2010. See DWP (2007) ["Ready for Work", CM 7290 2006-7].

44 [Need reference?]
of work are self-reported (although potentially verifiable if the revenue agency consults with employers). [Doesn’t really fit here - where should it go?]

5.4 Distribution of work incentives in the UK tax and transfer system

The analysis below shows how these tax and transfer structure for specimen families translates into a distribution of work incentive measures, given the underlying demographic structure, employment patterns, and distribution of earnings. Figures 8A-8D show how (average) PTRs and METRs vary with gross earnings for people in six family types (single or couple families, with or without dependent children, by whether their partner works). Table X shows the univariate distribution of work incentives measures for the same family types. Both analyses are for workers only [because I am not happy with the Adam-Browne numbers that also have non-workers].

The general results are as follows:

• PTRs on very low earnings are very low, but PTRs rise quickly as earnings rise for first earners in families, reflecting the 100% METR in IS/JSA. PTRs rise much more gradually for adults whose partner is in work.

• The relationship between METRs and earnings is broadly U-shaped, except that average METRs are higher for low earners than for the top earners for most groups, and that METRs are very variable amongst the lowest earners (where METRs are usually either 0% or 100%, depending whether the family is affected by the taper in IS/JSA).

• METRs and PTRs are generally higher for families with children than those without with identical incomes (one slight exception is that low-earning lone parents can face lower PTRs than low-earning single adults without children: this is because entitlement to WTC is much more widespread amongst low-earning lone parents than low-earning single adults without children, and because the interaction of child maintenance payments with IS/JSA and WTC means that lone parents receiving child maintenance payments can face very low and negative PTRs.

In the next section, we show how specific reforms would alter these work incentives.

Adam et al (2006) shows the distribution of key work incentive measures has changed over time; their measures of work incentives exclude employer NI, however.
Table X. Distribution of participation tax rates amongst workers, 2008/9 tax and benefit system.

<table>
<thead>
<tr>
<th>Centile of distribution of PTRs</th>
<th>10th</th>
<th>25th</th>
<th>50th</th>
<th>75th</th>
<th>90th</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single, no kids</td>
<td>.31</td>
<td>.40</td>
<td>.42</td>
<td>.47</td>
<td>.63</td>
<td>.44</td>
</tr>
<tr>
<td>Couple, no kids</td>
<td>.28</td>
<td>.35</td>
<td>.45</td>
<td>.55</td>
<td>.67</td>
<td>.45</td>
</tr>
<tr>
<td>Partner not working</td>
<td>.18</td>
<td>.25</td>
<td>.30</td>
<td>.35</td>
<td>.41</td>
<td>.29</td>
</tr>
<tr>
<td>Couple with kids</td>
<td>.01</td>
<td>.25</td>
<td>.44</td>
<td>.55</td>
<td>.66</td>
<td>.36</td>
</tr>
<tr>
<td>Lone Parent</td>
<td>.40</td>
<td>.48</td>
<td>.56</td>
<td>.64</td>
<td>.78</td>
<td>.55</td>
</tr>
<tr>
<td>Partner not working</td>
<td>.15</td>
<td>.29</td>
<td>.39</td>
<td>.50</td>
<td>.57</td>
<td>.37</td>
</tr>
</tbody>
</table>

Notes and sources: [to come. TAXBEN, FRS 2004/5, April 2008 tax and benefit system. Workers only. Adults in families with anyone aged 60+ excluded].

[Figures 7A-7D here, showing PTRs and MTRs by earnings under current system].

6 A plan for reforming taxes and transfers in the UK

In this final section, we first suggest a set of changes to the existing tax and transfer structure that could be made immediately and that address problems we identify with the work incentives inherent in the current system. We then set out a more radical and comprehensive set of structural changes to the tax and transfer system that attempt to deal not only with the work incentive issues, but also the administrative failings that we identify. None of the reforms described below would apply to those aged 60 or more.

As we discussed earlier, one direct way to arrive at an optimal tax and transfer schedule for the UK would be to use an optimal tax model for the UK that reflected extensive and intensive responses. But such a model would most likely miss out on some of the considerable heterogeneity between different sorts of families in the tax and transfer schedules (as the schedule differs by the number of adults and the number of children), and it would be even more complicated to allow for responses other than to taxable income (for example, to reflect that household formation may be sensitive to the tax incentives) and to allow for concerns over administrative and compliance costs. Instead, we have sought in this section to apply the lessons from optimal tax theory combined with the best available evidence on the scale of behavioural responses, and our knowledge of the incentives inherent in the existing UK tax
and transfer system.

In formulating these suggested reforms, we have been guided by the following points or principles, discussed earlier in this paper:

- For certain groups, such as second earners and individuals with low levels of education, extensive responses are likely to be more important than intensive responses (see Section 3.2).

- The responsiveness of hours worked to the tax system is very low for most groups, and perhaps zero. The responsiveness of taxable earnings will be greater, with an elasticity of perhaps 0.25 for low and middle income earners, rising for high income earners (see Section 2.2).

- There may be little or no scope for raising METRs applying to top earners in the UK. The current UK income tax system has modest progressivity in the METRs from income and payroll tax: the combined tax rate on earned income rises, then, from 31% to 41% (from 40.6% to 47.7% including employer NI) when earnings reach £41,435 (April 2008). Section 2 showed that METRs should certainly rise in the upper part of the earnings distribution if the elasticity of taxable income with respect to tax rates is constant across income groups. Our numerical simulations (Figure 4) showed that, if elasticities were constant and modest in size - our numerical example used an elasticity of 0.25 - then increasing tax progressivity of the current UK tax system by adding yet an additional higher tax rate for the richest 1% would be desirable (around 450,000 adults, corresponding roughly to gross incomes above £100,000; note that the current top rate of income tax applies to around 7% of adults in the UK). However, our empirical analysis in section 2 suggests that the relevant elasticity of the richest 1% might well exceed 0.25, in which case it is undesirable to increase top METRs. This, combined with the apparent political implausibility of increasing income tax rates, mean that we do not propose changes to income or payroll tax rates.46

- Rather than specifying a complete social welfare function, we have proposed changes...
which keep the income distribution broadly unchanged. In other words, we have sought to propose tax changes that should lead to efficiency gains without much consideration of their impact on the income distribution.

- We take it for granted that the income tax system will remain individual, reflecting the extremely strong current political consensus in support of individualised income tax, and we conclude that the redistributive benefit of jointly-assessed transfers for lower-income families outweigh any efficiency losses (see Section 4).

We showed in Section 5 that the present UK tax and transfer system suffers from four important defects:

- Participation tax rates for low levels of earnings are high: for most groups, they are close to 100% before individuals are entitled to the working tax credit, and they remain high even with the working tax credit. These PTRs appear much too high in a context where optimal tax theory suggests that the participation tax rate should be low, possibly even negative, at low levels of earnings, so as to encourage people to move into work. And PTRs for families entitled to HB/CTB remain extremely high (over 70%) even at medium and high incomes.

- The phasing-out of the working and child tax credit, which operates on top of the payroll tax and income tax, generates METRs of 73.4% including employer payroll tax contributions (higher if also entitled to HB/CTB) for a large number of low to moderate earners; such a high METR is highly likely to be above the optimum rate even with modest behavioral responses.

- The main means-tested programme to help with housing (housing benefit) has an extremely high withdrawal rate, administrative difficulties and problems of mis-perception which deter low-income working families from claiming it (Turley and Thomas, 2006), and, by its design, predominately affects a minority group in society - tenants of social housing - who we might expect to have low earnings capabilities, a weak labour market attachment, and therefore relatively high labour supply elasticities.

- While the system for administering income tax and payroll tax in the UK is simple and efficient, the systems for administering child and working tax credits, and for housing
benefit and council tax benefit, are administratively burdensome for claimants, relatively expensive for the government, and prone to large amounts of fraud and error: all mean that neither are as well-targeted on the economic situation of beneficiaries as they could be.

We set out reforms that could address these shortcomings in the following two sections.

### 6.1 Immediate changes to household taxes and transfers

There are a number of straightforward steps that could be taken within the current system in order to address the key work dis-incentives in the current tax and benefit system.47

- Increase the level of earnings disregards in all of the means-tested benefits (in order of priority, HB/CTB then JSA/IS) to reduce PTRs on earnings of less than £90 a week for all, and on higher earnings for individuals receiving HB/CTB: these groups currently face very weak incentives to work at all. An increase of HB/CTB disregards to £50/wk would cost £1.7bn a year, to the value of 16 times the minimum wage would cost £4.3bn. Duplicating this in JSA/IS would cost an extra £0.3bn or £0.6bn respectively. After considering behavioural impacts, this policy should lead to an increase in labour market participation. But it would also extend eligibility to HB/CTB to many more families in work, and so this measure should be considered only alongside measures to speed up dramatically processing times for HB/CTB claims, or a move to fixed or retrospective HB/CTB awards (to eliminate the problem of overpayments); hopefully such measures, plus the clear signal sent by a large disregard, would themselves do much to increase the take-up rate of HB/CTB amongst eligible working families. Higher disregards in IS/JSA would also increase the number of people eligible to such benefits both through its immediate effects (because it extends eligibility up the income distribution), and after considering the behavioural response (because it makes working fewer than 16 hours and claiming IS/JSA relatively more appealing than working 16 or more hours and not claiming IS/JSA). Higher disregards in IS/JSA might be less appealing, then,

47 These are not all novel proposals: Bell et al. (2007) analyse large increases in the earnings disregards in transfer programmes affecting lone parents; Adam and Brewer (2006) analyse increases in the working tax credit; Brewer (2007) analyses an extra credit for second earners in the working tax credit, as proposed by Harker (2006) and Cooke and Stanley (2008).
if a government had a direct objective to get people off IS/JSA, which it might do if it had a non-welfarist objective function (see earlier section), or if the cost of administering IS/JSA were much higher than of administering transfers for low-income families in work.

- Introduce an additional earnings disregard in tax credits for second earners (or an additional credit in the working tax credit for families with two earners). This would reduce PTRs for secondary earners, particularly those with children. If each individual had their own earnings disregard of £6,200, then this would cost £1.3bn before any behavioural change. The downside of this policy would be that it merely shifts upwards the range of income over which second earners can expect to face a very high METR through the withdrawal of tax credits alongside payment of income tax and national insurance. However, this seems justifiable given the strong evidence that participation elasticities are relatively high for second earners in couples with children, and that the participation response is more important than the intensive response.

- Reduce the withdrawal rate in child and working tax credits. This would reduce METRs and PTRs for individuals receiving the working or child tax credits, most of whom will be earning more than £90 a week. A cut from 39% to 34% would cost £1.4bn. It would increase the number of individuals who face high METRs through a withdrawal of tax credits on top of income and payroll tax, but this seems acceptable if it permits the combined tax credit-income tax-payroll tax withdrawal rate to fall from its current high level of 73.4% (including employer NI). 48

- Increase the working tax credit for groups other than lone parents (the level of the working tax credit for low-earning lone parents currently exceeds entitlement to IS/JSA if they did not work, leading to low or negative PTRs at low earnings; no increase is needed here on efficiency grounds). This would lower PTRs for low-earning individuals eligible for WTC. Equalising WTC rates with JSA/IS rates would cost £3.2bn; halving

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48 In the UK, most high METRs occur when income and payroll taxes are deducted at the same time as tax credits are withdrawn. One way of solving this problem is to introduce large tax allowances, so that income tax is not deducted until tax credits are fully withdrawn; this change could be accompanied by a rise in the tax credit withdrawal rate. This reform is appealing because it allows well-off families to receive support through tax cuts administered automatically through PAYE, whilst focusing the part of the programme that pays out cash on the families with the lowest incomes. Compared to the current system, though, such a change is expensive, because it effectively grants tax allowances to families previously too rich to receive much or any tax credits. [Delete? Move?]
the gap would cost £1.6bn. Two downsides of this policy are that it increase the number of individuals who face a withdrawal of tax credits on top of income and payroll tax, and that it will reduce the gain to work for some second earners in couples (so directly offsetting the impact of the second policy). However, the rationale for recommending this policy is that these downsides would be outweighed by the increase in the number of adults working, as participation tax rates are cut for eligible families.

Note that all the costs have been estimated assuming no behavioural change, and that only 1 reform at a time is implemented. However, the reforms, and therefore their costs, interact: a £50 disregard in all means-tested benefits plus the three tax credit changes would cost just over £8.8bn). Of course, all of these changes would mean the government paying out considerably more in transfers or tax credits. We do not at this stage propose off-setting changes to increase tax revenue or reduce spending on transfers elsewhere. However, we have suggested these reforms on efficiency (rather than equity) grounds, and so it follows that any widespread tax rise (such as a rise in VAT, income tax or national insurance) to fund these tax cuts should still lead to a reform package that is desirable on efficiency grounds. Furthermore, it might be appropriate to reduce spending on child benefit in order to pay for at least some of these reforms, given that families with children tend to benefit more than families without, and given that these reforms suggested themselves on efficiency grounds, and not from a desire to redistribute more to particular groups.

Table X shows the distributional impact of these policies, and the average gain for different family types, assuming no change in behaviour, and ignoring the impact of any revenue-raising measures. [Do you want summary measures of impact on work incentives? What sort?]

Table Xa: Distributional impact of reforms by vintile group
Table Xb: Distributional impact of reforms by family type

<table>
<thead>
<tr>
<th>Family Type</th>
<th>Reform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singles, no children</td>
<td>0.75</td>
</tr>
<tr>
<td>Couples, no children</td>
<td>0.40</td>
</tr>
<tr>
<td>Couples, with children</td>
<td>1.16</td>
</tr>
<tr>
<td>Singles, with children</td>
<td>1.39</td>
</tr>
</tbody>
</table>

6.2 Radical reform: the Integrated Family Support

The radical reform plan we propose goes one step further. It is designed not only to improve work incentives so that they match closely with the lessons from optimal tax theory, but also to integrate most of the current transfer programmes in the UK into a single system in order to simplify administration and enforcement for the government, and to reduce the compliance costs of employers and claimants.

The centre-piece of our new tax and transfer system is a new programme, called the Integrated Family Support (IFS), which acts as a replacement for child tax credit, working tax credit, income support/JSA, child benefit, housing benefit and council tax benefit. The
IFS would be paid directly by the government to eligible low and moderate income families, but the tapering of the IFS would be achieved, for the vast majority of families, through the existing (and augmented) system of income tax and payroll tax withholding.

We describe below how it would work. At this stage, we do not claim that we have identified, yet alone resolved, all of the operational and administrative difficulties of the IFS.

- **Calculating entitlement to the IFS**

  The maximum entitlement to the IFS would be *family* based, and would be a sum of several components: a family component (different for single adults and couples), a child component (depending on the presence and number of dependent children), and a housing component (depending on whether the family rents or owns, and on the local rental and council tax levels). This maximum IFS allowance would be paid on a regular basis by the government directly to eligible families; there would be a very strong presumption that the child component would be sent to the *mother* (to ensure that its use is more closely directed toward children, following the analysis by Lundberg et al. (1997)) and the family and housing components would be split between the two adults in a couple. The basic entitlement to the IFS would not vary with the adult’s or family’s work status, nor how many hours are worked, except that adults aged under 25 who do not have children will be entitled to the IFS only if they do not work: this mirrors the current situation where such adults may claim JSA/IS if they are out of work but not WTC if they are in work. 49 Receipt of (selected) other government transfers (incapacity benefit, carer’s allowance) would reduce entitlement to the IFS pound for pound, as is currently the case in IS/JSA; we assume that there would be disability additions to the IFS as there are at present to IS/JSA and WTC. The current system for subsidising parents’ spending on formal childcare (the childcare tax credit) would not be part of the IFS to keep the calculation of entitlement to the IFS relatively simple; we assume an equivalent scheme could be designed that operates through childcare providers.50

- **Withdrawing the IFS**

  49Adults in higher education are currently prevented from claiming IS/JSA on grounds of low income. We have assumed that restriction no longer applies, and this may enable the current system of means-tested grants to students to be abolished, saving just over £1bn a year (which has not been taken into account here).

  50Our objection to the childcare element of the working tax credit is not that it provides a means-tested subsidy, but that both the existing tax credits mechanism and our proposed IFS are unsuited to delivering it.
The IFS allowance would be means-tested based on family income with three key features.

First, there would be an individual earnings disregard of £90, or just over 16 hours work at the current minimum wage\(^{51}\). This disregard would apply to each adult individual in the family, so each of the two adults in a couple could earn up to £90 and still keep the maximum IFS allowance. Non-earned income (such as interest income) would reduce the IFS without the £90 disregard (although it might be practical to have a small disregard, as exists under the current tax credit system, to reduce compliance and administrative costs).

Second, the withdrawal of the IFS above this earnings disregard will be administered by employers alongside (or integrated with) PAYE and payroll tax. The IFS will not be an annual system, but instead will be operated on a non-cumulative weekly or monthly basis, like payroll taxes: this will ensure that the IFS reflects the current circumstances of recipient families. Employers of IFS-eligible families will be notified electronically by the government which employees are receiving the IFS, just as they are currently informed about the tax codes and the national insurance categories of their employees, and instructed whether to deduct student loan contributions. There will be two taper rates for the IFS: 30%, if the family is receiving only the child and family elements, or 45% if the family is receiving the housing element. To keep the system simple, employers would apply this taper with no upper limit (a more complicated version would have the government tell employers when to stop applying this extra taper). The earnings disregard for the IFS will only apply to the main job, similar to how PAYE currently treats multiple jobs.

Third, if an IFS family is over-withheld (in other words, if employers with-hold more than the family is receiving in IFS), then the family could notify the government that it no longer wishes to receive the IFS (indeed, the government should be able to deduce that a family has been overwithheld based on information on tax withheld from employers). In that case, IFS payments would stop and the government would notify the employer to revert back to the standard income tax withholding rules, and refund any excess IFS withholding payments to the family. If, for various reasons, a family is under-withheld, the government would not ask for an immediate repayment, but could gradually reduce the balance over time through reasonable reductions in future IFS payments.

\(^{51}\)We describe the reform in 2008/9 prices (ie, as if it were an alternative to the April 2008 tax and transfer system), although we include in the base system for costing the reform the small change to the UEL and higher-rate threshold due in April 2009.
• Administering the IFS

Administering the withdrawal of the IFS alongside the payroll tax means that there is no need for the government to know families’ earnings in real time, but families would need to notify the government when they wished to claim the IFS, or if any factor that determined the maximum entitlement to IFS changed. These factors, plus the absence of hours rules and childcare subsidies in the IFS, should mean lower compliance costs for recipients than for the current system of tax credits. There would need to be periodic reconciliations that the amount of IFS withheld by employers was correct, and this could lead to under- or over-payments. These should be limited, though, to individuals with fluctuating amounts of unearned income, individuals with multiple low-paying jobs, two-earner couples, and individuals whose employers withhold incorrect amounts of IFS.

Our proposed IFS system requires slightly more information to be transmitted between employers and the government than currently happens, and requires employers to vary the marginal rate schedule of their employees, rather than merely the size of the income tax allowance, but the mechanisms for interacting are no different in concept to those that exist now. We further assume that the vast majority of interactions between employers and HMRC would in the future be done electronically, and it is also conceivable that the revenue authorities could offer a basic no-frills payroll service to ease employers’ compliance costs. Employers would not pay out positive entitlements to IFS - all IFS families would have their family’s full entitlements to IFS paid directly to them - but instead operate only the withholding; this would provide positive cash-flow benefits to employers, unlike the tax credits which have been administered by employers in the in the UK’s recent history (Working Families’ Tax Credit between 2000 and 2003, and Working Tax Credit between 2003 and 2006).

Currently, local authorities are responsible for administering housing benefit and council tax benefit. Administration of the housing component of the IFS would move to central government. Reform of housing benefit so that entitlement depends upon family structure and postcode (and not on the level of rent), as is the case under the local housing allowance ([XX reference; check whether government committed to rolling it out]) would be a prerequisite for this reform. The fact that the housing element of the IFS replaces council tax benefit would mean that all council tax bills would be gross of any rebate, and rebates would be sent direct
to families.

Of course, if, in the future, employers were required to make prompt monthly or quarterly returns (rather than annually, as is the case now) to the government giving information on each employees’ earnings, then there would be less need for employers to administer the IFS with-holding, and it would be more realistic for the government to pay families their actual entitlement after the means-test. Indeed, although economically equivalent, it is conceivable that a system where the government pays the actual entitlement to IFS after the means-test would be more favorable to labour supply, as individuals would get larger paychecks from the employer, and the reduction in the IFS would be less saliently connected to earnings.

- Conditionality

Our proposal is that entitlement to the IFS should not depend directly upon the number of hours worked and, indeed, that non-working individuals should also be entitled to the IFS. This is a key step both in providing a comprehensive safety-net, ensuring that participation tax rates for low earners are very low, and in reducing administration and compliance costs. Although removing hours rules in theory makes the tax and transfer system less focused on low-waged workers, it also reduces administration and compliance costs, particularly since there is no simple way for the government to monitor hours worked (it might also legitimize existing behaviour which is currently fraudulent).

Although it is beyond the scope of this chapter to consider what sort of active labour market policy should be adopted in the UK, we do not intend the IFS to act like a universal (family-based) citizen’s income, and so we assume that the sort of job-search conditions (including sanctions for non-compliance) which currently apply (to various degrees) to recipients of IS, JSA and ESA could also apply to recipients of the IFS. However, implementing such conditionality requires rules to distinguish between those recipients of IFS to whom job-search or other conditions apply, and those to whom they do not. One possibility is that IFS recipients would be subject to job-search and other conditions unless they provided details of suitable self-employment, or of an employer who was paying at least £90 a week (who could then withhold the IFS), or receipt of certain other benefits (for disability or caring, for example), or of the presence of a co-resident partner. In this way, people earning less than £90 could either forego entitlement, or claim additional support, but with a requirement to look for jobs with
(say) higher earnings. If the government wished to make the job-search and other requirements vary by family status and sickness or disability, then that would be possible under an IFS just as it is now under the various out-of-work benefits that currently exist in the UK.

- **Financing the IFS, and its effect on household incomes**

The substantial increase in the earnings disregard of the IFS relative to the current system for IS/JSA, HB/CTB and in the working tax credit for second earners, the effective cut in the withdrawal rates in HB/CTB and tax credits, and the extension of the IFS to groups currently eligible for neither IS/JSA nor tax credits all cost a significant amount.

For the reform to be revenue neutral before behavioral responses, there need to be net tax rises elsewhere. An obvious choice would be an across-the-board rise in income tax or the payroll tax. But given the current political impediment to higher income tax rates, the proposal here is to finance the reform with cuts in generosity for some groups. This has been achieved by: subsuming child benefit and the family element of the child tax credit within the IFS, and thereby tapering both away from better-off families; lowering the income tax personal allowance, and the point at which payroll tax starts to be due from £104.50 a week so that they are aligned with the IFS threshold of £90 a week; lowering the point at which the higher-rate of income tax is liable by £5,000 a year, and setting entitlements to the IFS that are below the current rates of JSA/IS, but greater than the current rates of working tax credit (except for lone parents). (this last change leads to losses for some low-income families with no private income. The key parameters are shown in Table X.

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52 There would then be no difference in the net taxes paid by well-off families with children and those without children, which makes sense if children are not seen as imposing extra costs. If there is a concern that abolishing child benefit removes an independent source of income for mothers with children, then such mothers could be paid the IFS with their partners subject to an exactly-offsetting extra withholding.

53 A version of the IFS where the the family and child elements of the IFS are set at the existing rates of IS/JSA costs some £12 billion a year [update please], and this would imply considerable gains for low-earning adults without children, and most couples with children.

54 Estimates of the cost of the IFS have been made assuming no behavioural change, and that all benefits and tax credits are taken up. The second of these assumptions may understestate the cost of the IFS; if the IFS succeeds in having lower compliance burden for families, then some currently not claiming tax credits or HB/CTB when in work may be induced to do so.
### Table X: Total net transfers under the IFS compared to the current UK tax and benefit system

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single adult</td>
<td>£50</td>
</tr>
<tr>
<td>Couple</td>
<td>£80</td>
</tr>
<tr>
<td>Amount per child</td>
<td>£50</td>
</tr>
<tr>
<td>Supplement for first child</td>
<td></td>
</tr>
<tr>
<td>Lone parent family</td>
<td>£30</td>
</tr>
<tr>
<td>Couple family</td>
<td>£20</td>
</tr>
<tr>
<td>Earnings disregard (for each adult)</td>
<td>£90</td>
</tr>
<tr>
<td>Withdrawal rates†</td>
<td></td>
</tr>
<tr>
<td>IFS</td>
<td>30%</td>
</tr>
<tr>
<td>HB/CTB</td>
<td>15%</td>
</tr>
<tr>
<td>Income tax and National insurance thresholds</td>
<td></td>
</tr>
<tr>
<td>Personal allowance/primary threshold</td>
<td>£4,680/yr (£90/wk)</td>
</tr>
<tr>
<td>Higher-rate threshold/UEL</td>
<td>£36,400/yr (£700/wk)</td>
</tr>
</tbody>
</table>

†Rates applied to gross income after disregard.

§Weekly values unless stated otherwise.

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**The effect of the IFS on household incomes**

The Tables below show how net transfers for several low-income families would change under the IFS. Given the focus on strengthening the very weak work incentives for those on HB and CTB, there is a substantial shift in resources between those not entitled to HB and CTB to those who are. In practice, the vast majority of households are liable to CT (and therefore entitled to CTB), but only renters are liable for HB. Whether the IFS reform implies an unacceptable distortion to the housing market - by increasing rent subsidies, and doing nothing for home-owners - depends on one’s view on housing policy in the UK. Addressing this issue would require either reducing the generosity of housing benefit, or extending it so that it is tenure-neutral (with an accompanying general rise in tax to pay for this). Similarly, it was beyond the scope of this chapter to consider whether council tax itself should be reformed; if it were made less regressive, then it might be possible to do without an explicit council tax benefit or rebate.
Table X: Total net transfers under the IFS compared to the current UK tax and benefit system

<table>
<thead>
<tr>
<th></th>
<th>37.5 hrs/wk at</th>
<th>37.5 hrs/wk at</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>minimum wage</td>
<td>twice minimum wage</td>
</tr>
<tr>
<td></td>
<td>Current</td>
<td>IFS</td>
</tr>
<tr>
<td>No HB/CTB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single, no children</td>
<td>£15.15</td>
<td>£21.40</td>
</tr>
<tr>
<td>Couple, no children</td>
<td>£18.49</td>
<td>£9.03</td>
</tr>
<tr>
<td>Lone parent, 1 child</td>
<td>£87.87</td>
<td>£58.63</td>
</tr>
<tr>
<td>Couple, 2 children</td>
<td>£140.51</td>
<td>£128.62</td>
</tr>
<tr>
<td>With HB/CTB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single, no children</td>
<td>£15.15</td>
<td>£64.52</td>
</tr>
<tr>
<td>Couple, no children</td>
<td>£20.14</td>
<td>£94.05</td>
</tr>
<tr>
<td>Lone parent, 1 child</td>
<td>£87.87</td>
<td>£138.30</td>
</tr>
<tr>
<td>Couple, 2 children</td>
<td>£142.10</td>
<td>£214.10</td>
</tr>
</tbody>
</table>

Notes: Assumes £80/wk rent and £22.97/wk council tax (on which the single adults will get a 25% discount). Net transfers do not deduct CT payments.

Table 3a & b show the impact of the IFS on net incomes of working-age adults, by family type, and decile of equivalised income of working-age adults before any consideration of behavioural effects. The main impacts of the IFS reform on net incomes are as follows.

- The maximum entitlements to the IFS are a little higher than current tax credit entitlements but lower than current IS/JSA rates (except for lone parents), and this leads
to losses for such families with no other sources of income. However, the fact that the IFS is made available without any hours rules means that some low-income individuals (particularly single adults with no children aged 25 or over) currently entitled to neither IS/JSA nor tax credits gain substantially.

- Low-income families entitled to HB/CTB tend to gain because the equivalent support is tapered away more slowly under the IFS.

- Better-off families with children tend to lose as support currently provided through the non-means-tested child benefit is now tapered away as part of the IFS.

- All taxpayers lose out slightly as the income tax personal allowance has been cut slightly.

- All taxpayers with incomes above £35,000 lose as the point at which higher-rate tax is payable has been cut.

Across the whole population, the bottom half of the distribution tend to be better off, and the top half to be worse off, but the changes are not entirely progressive: the largest gains are in the middle of the bottom half of the distribution, and the largest losses are in the middle of the top half.

Table X: Distributional impact of IFS: percentage income gain
<table>
<thead>
<tr>
<th>Vintile group</th>
<th>overall population</th>
<th>singles no children</th>
<th>couples no children</th>
<th>couples with children</th>
<th>lone parents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.55%</td>
<td>-0.04%</td>
<td>12.21%</td>
<td>26.74%</td>
<td>-28.87%</td>
</tr>
<tr>
<td>2</td>
<td>5.85%</td>
<td>7.26%</td>
<td>11.99%</td>
<td>0.18%</td>
<td>3.82%</td>
</tr>
<tr>
<td>3</td>
<td>4.38%</td>
<td>8.04%</td>
<td>8.00%</td>
<td>1.89%</td>
<td>2.54%</td>
</tr>
<tr>
<td>4</td>
<td>4.56%</td>
<td>4.70%</td>
<td>6.58%</td>
<td>5.26%</td>
<td>2.39%</td>
</tr>
<tr>
<td>5</td>
<td>5.17%</td>
<td>3.16%</td>
<td>6.84%</td>
<td>6.34%</td>
<td>3.20%</td>
</tr>
<tr>
<td>6</td>
<td>5.38%</td>
<td>2.61%</td>
<td>4.85%</td>
<td>6.99%</td>
<td>5.16%</td>
</tr>
<tr>
<td>7</td>
<td>5.19%</td>
<td>3.77%</td>
<td>3.57%</td>
<td>6.83%</td>
<td>3.64%</td>
</tr>
<tr>
<td>8</td>
<td>4.16%</td>
<td>3.65%</td>
<td>5.03%</td>
<td>4.74%</td>
<td>2.47%</td>
</tr>
<tr>
<td>9</td>
<td>2.26%</td>
<td>2.67%</td>
<td>1.57%</td>
<td>2.54%</td>
<td>1.67%</td>
</tr>
<tr>
<td>10</td>
<td>0.99%</td>
<td>2.99%</td>
<td>1.76%</td>
<td>-0.72%</td>
<td>1.53%</td>
</tr>
<tr>
<td>11</td>
<td>-0.19%</td>
<td>2.18%</td>
<td>1.64%</td>
<td>-2.78%</td>
<td>1.30%</td>
</tr>
<tr>
<td>12</td>
<td>-1.65%</td>
<td>1.98%</td>
<td>0.07%</td>
<td>-4.87%</td>
<td>0.34%</td>
</tr>
<tr>
<td>13</td>
<td>-1.62%</td>
<td>1.76%</td>
<td>0.49%</td>
<td>-5.77%</td>
<td>1.07%</td>
</tr>
<tr>
<td>14</td>
<td>-1.82%</td>
<td>1.07%</td>
<td>0.52%</td>
<td>-5.70%</td>
<td>-0.58%</td>
</tr>
<tr>
<td>15</td>
<td>-1.52%</td>
<td>3.20%</td>
<td>-0.24%</td>
<td>-5.35%</td>
<td>-4.18%</td>
</tr>
<tr>
<td>16</td>
<td>-1.60%</td>
<td>1.69%</td>
<td>-0.52%</td>
<td>-4.88%</td>
<td>0.10%</td>
</tr>
<tr>
<td>17</td>
<td>-1.14%</td>
<td>1.90%</td>
<td>-0.46%</td>
<td>-4.17%</td>
<td>-2.46%</td>
</tr>
<tr>
<td>18</td>
<td>-1.17%</td>
<td>1.95%</td>
<td>-0.79%</td>
<td>-3.65%</td>
<td>-6.05%</td>
</tr>
<tr>
<td>19</td>
<td>-1.71%</td>
<td>-1.05%</td>
<td>-1.27%</td>
<td>-3.15%</td>
<td>-2.42%</td>
</tr>
<tr>
<td>20</td>
<td>-1.40%</td>
<td>-0.88%</td>
<td>-1.30%</td>
<td>-1.99%</td>
<td>-2.20%</td>
</tr>
</tbody>
</table>

Figures 9A to 9H show the impact of the IFS on (mean) participation tax rates and marginal tax rates for the same four family types.\textsuperscript{56} In general, PTRs are lowered for all adults with low earnings, reflecting the universal £90 earnings disregard. For some adults in families with children, the IFS increases PTRs on higher earnings, reflecting that support currently provided through the non-means-tested child benefit is now tapered away as part of the IFS.

\textless{INSERT FIGURE 9 HERE}\textgreater

The impact on MTRs is more complex. All family types see a fall in MTRs on earnings below £90, reflecting that the £90 earnings disregard in the IFS is much higher than in current means-tested benefits. Above this, there are different patterns for the different family types. Lone parents and primary earners in couples with children tend to see MTRs fall slightly at low earnings (that are above £90) but rise at higher earnings: this directly reflects that the IFS taper is lower than the current tax credit taper, and that the IFS taper extends further up

\textsuperscript{56}These Figures are based on estimates of the MTR and PTR of each working adult in the 2004/5 FRS made using TAXBEN. All Figures plot individual earnings on the horizontal axis.
the earnings distribution than the tax credit taper does currently. However, the other family types tend to see rises in MTRs because more of these adults are affected by the withdrawal of the IFS than are currently affected by a withdrawal of tax credits (for single adults without children, this is predominately because many more are entitled to the IFS as it has no age nor hours of work limits; for second earners in couples with children, it is predominately because the lower IFS taper rate means that its withdrawal extends further up the (family) earnings distribution).

The Appendix explains how simple estimates of the behavioural response to the IFS affect the cost to the Exchequer, as well as how employment and total hours worked (or total earnings) might change as a result. These show that, given reasonable assumptions on the size of behavioural responses, the impact of the IFS reform on the Exchequer is small but negative. The IFS reform is expected to lead to more people participating in the labour market, but average earnings conditional on participation falls, with the overall effect on total earnings being negative. The overall impact of the IFS, then, is that it manages to redistribute income with minimal impact on total earnings and total net tax revenue, by targeting net tax cuts where incentives to work are currently at their weakest.

6.3 Conclusion
Appendix

- Determining the top rate of income tax

This section provides a more formal discussion regarding the derivation of optimal income tax rates. We will first show how to determine the optimal marginal tax rate for high earners, and then how to derive optimal tax rates for tax payers more generally. In the former case, let us consider a reform that changes the top tax rate $\tau$ by a small amount $d\tau$ (with no change in the tax schedule for incomes below the top bracket $\bar{z}$). Here, let us denote by $z$ the average income reported by taxpayers in the top bracket and let us assume that there are $N$ taxpayers in the top bracket. As mentioned in the main text, this small tax reform has two effects on tax revenue:

1. There is a mechanical increase in tax revenue because taxpayers face a higher MTR on incomes above $\bar{z}$. Hence, the total mechanical effect is $dM = N[z - \bar{z}]d\tau > 0$. This mechanical effect is the projected increase in tax revenue if there were no behavioral response.

2. The increase in the tax rate triggers a behavioral response which reduces the average reported income in the top bracket by $dz = -e \cdot z \cdot d\tau / (1 - \tau)$ on average (by definition of the elasticity $e$ - see Box X in Section Y) and hence produces a loss in tax revenue equal to $dB = -N \cdot e \cdot z \cdot d\tau \cdot \tau / (1 - \tau) < 0$.

Summing the mechanical and the behavioral tax revenue effect, we obtain the net effect of the reform on tax revenue:

$$dM + dB = N d\tau (z - \bar{z}) \cdot \left[ 1 - e \cdot \frac{z}{z - \bar{z}} \cdot \frac{\tau}{1 - \tau} \right].$$

At the optimum, this expression must be zero. Let us denote by $a$ the ratio $z / (z - \bar{z})$, which measures the thinness of the top of the income distribution. Note that $a \geq 1$. As shown in box X, the optimum $\tau$ can then be expressed as:

$$\tau^* = \frac{1}{1 + a \cdot e}. \quad (2)$$
which is decreasing in both the elasticity $e$ and the shape parameter $a$. It is well known that top tails of income distributions are closely approximated by Pareto distributions,\(^57\), in which case the parameter $a$ does not vary with $\bar{z}$ and is exactly equal to the Pareto parameter.\(^58\)

- **Determining the optimal marginal tax schedules**

We can extend the above analysis to consider how the optimal tax rate varies more generally across the income distribution. Here, we let $T(z)$ denote the (possibly non-linear) tax schedule that the government imposes, where $z$ denotes a given level of earnings. This tax schedule incorporates both transfers (when $T(z)$ is negative) and taxes (when $T(z)$ is positive). Let us denote by $H(z)$ the cumulative distribution of individuals (fraction of taxpayers with income less than $z$) and by $h(z)$ the density distribution of taxpayers. The optimal tax system is characterized by a lumpsum grant received by those with no earnings (equal to $-T(0)$) combined with a schedule of marginal tax rates $T'(z)$ which define how the lumpsum grant should be reduced at earnings increase and how additional earnings should be taxed once the lumpsum grant is fully tapered out. Again, the optimal marginal tax rate $T'(z)$ is set so as to balance costs and benefits at the margin.

Suppose that the government increases the marginal tax rate $T'(z)$ by $d\tau$ in a small band of income $(z, z + dz)$. As above, this reform has three effects on government tax receipts and welfare:

1. The reform increases taxes by $d\tau dz$ for every taxpayer above the small band, and hence collects extra taxes $dM = (1 - H(z))d\tau dz$.

2. Those extra taxes generate a welfare cost to taxpayers. If we denote by $G(z)$ the average social value for the government of distributing £1 uniformly among taxpayers with income above $z$, the welfare cost is simply $dW = dM \cdot G(z)$.\(^59\) If the government values redistribution, $G(z)$ will be decreasing in $z$. As we have assumed away income effects,

---

\(^{57}\) A Pareto distribution has a density function of the form $f(z) = C/z^{1+\alpha}$ where $C$ and $\alpha$ are constant parameters. $\alpha$ is called the Pareto parameter.

\(^{58}\) When $\bar{z}$ reaches the level of the very highest income earner, $z = \bar{z}$ and $a$ is infinite and the optimal tax rate is zero, which is the famous Sadka-Seade zero top result. However, this zero top result is a very misleading result for practical tax policy as the empirical $a$ does not go to infinity except for the very highest income earner.

\(^{59}\) This is a consequence of the envelope theorem as each individual maximizes utility.
$G(0) = 1$, and we assumed above that $G(z)$ goes to zero when $z$ is large (i.e. in the top tax bracket). The more redistributive the tastes of the government, the smaller $G(z)$.

3. The marginal tax rate increase $d\tau$ in the small band reduces earnings by $-e \cdot z \cdot d\tau / (1 - T'(z))$ for taxpayers in the small band due to the substitution effect. There are $h(z)dz$ such taxpayers in the small band, and so this produces a loss in tax revenue equal to $dB = -e \cdot z \cdot [T'(z)/(1 - T'(z))]d\tau \cdot h(z)dz$.

At the optimum, $dM + dW + dB = 0$, which generates the following optimal tax rate formula (as shown in Box X earlier):

$$\frac{T'(z)}{1 - T'(z)} = \frac{1}{e} \cdot \frac{1 - H(z)}{zh(z)} \cdot (1 - G(z))$$

The optimal tax rate $T'(z)$ is decreasing with the elasticity $e$. It is also decreasing in $G(z)$ which measures the social marginal value of consumption for individuals with earnings above $z$, and decreasing in the hazard ratio $(1 - H(z)) / (zh(z))$ which measures the thinness of the distribution.

- Optimal tax rates with participation responses

In section X we discussed how the structure of marginal tax rates may change once we allow for participation responses. We will now show how the optimal tax rates in such a model can be derived. Here, an individual with skill $z$ who decides to work will get $z - T(z)$ in disposable income. If the individual decides not to work, she will get $-T(0)$ in disposable income. We assume that individual utility is simply $u = c - q$ where $c$ is disposable income and $q$ are costs of work. Hence, the individual will work if the net return to work $z - T(z) + T(0)$ exceeds her costs of working which we denote by $q$. If we assume that costs of work $q$ are distributed with a (cumulated) distribution $P(q|z)$ among individuals with skill $z$, the number of individuals of skill $z$ who work is simply $P(z - T(z) + T(0)|z)$. We can define the elasticity of participation with respect to the net return to work as:

---

60 Distributing 1 pound uniformly among all individuals does not generate behavioral responses and hence has a cost of exactly 1 pound for the government.

61 This formula is not exactly accurate but very close for discussion and intuition purposes. In the exact formula, $h(z)$ should be replaced with the “virtual” density $h^*(z)$, which is the density of earnings at $z$ that would arise if the tax system were replaced by the linearized tax system at $z$. See Saez (2001) for complete details.
η(z) = \frac{z - T(z) + T(0)}{P} \cdot \frac{\partial P}{\partial q} \quad (3)

To derive an optimal tax formula, let us consider a small increase in \(dT\) in \(T(z)\) but only at skill level \(z\). As there are only extensive responses, this reform affects only individuals with skill \(z\). As above, this reform has three effects on government tax receipts and welfare:

1. The reform increases taxes by \(dT\) for every taxpayer with skill \(z\) who works and hence collects extra taxes \(dM = P(q|z)dT\).

2. The extra taxes that are now collected generate a welfare cost to workers with skill \(z\). If we denote by \(g(z)\) the social value for the government of distributing 1 pound among taxpayers with income \(z\), the welfare cost is simply \(dW = dM \cdot g(z) = P(q|z)g(z)dT\). If the government values redistribution, \(g(z)\) will be decreasing in \(z\). The “no income effect” assumption implies that the average \(g(z)\) across the full population is equal to one.\(^62\)

3. The tax increase \(dT\) at income level \(z\) induces some of the workers at \(z\) to drop out of work. All those with fixed cost of work \(q\) between \(z - T(z) + T(0) - dT\) and \(z - T(z) + T(0)\) drop out. There are \(dT\frac{\partial P}{\partial q} = \frac{dT\eta P}{z - T(z) + T(0)}\) such workers. The fiscal cost of this behavioral response is \(dB = \left[\frac{T(z) - T(0)}{z - T(z) + T(0)}\right] \cdot \eta \cdot P(q|z)dT\).\(^63\)

To proceed, it is useful to introduce the participation tax rate, a measure of the extent to which the tax and transfer system weakens the reward from working \(t(z) = (T(z) - T(0))/z\). As discussed above, \(1 - t(z)\) measures the increase in disposable income (relative to earnings) when an individual decides to work. Using this definition, and noting that at the optimum we again must have \(dM + dW + dB = 0\), we generate the following optimal tax rate formula:

\[
\frac{t(z)}{1 - t(z)} = \frac{1}{\eta} \cdot (1 - g(z)) \quad (4)
\]

---

\(^62\)The \(g(z)\) of this section and the \(G(z)\) of previous section are related by the formula \(G(z)(1 - H(z)) = \int_0^\infty g(z)h(z)dz\).

\(^63\)Note that those dropping out of the labor force are indifferent (within \(dT\)) between working and not working and there is only an infinitesimal number of switchers. Hence the welfare effect on movers is second order relative to the welfare effect on those who work and can be neglected. This is directly equivalent to the situation from Section 2 where behavioral responses do not create a first order welfare effect.
This formula is a simple inverse elasticity tax rule for the average tax rate on work. The average tax rate decreases with the elasticity $\eta$ and also decreases with $g(z)$, the social value of marginal consumption for individuals earning $z$.

- **Tax Rate Computations**

  The series on top income levels was taken from Atkinson (2007) and updated by the authors to include 2001/2 - 2004/5 using the Survey of Personal Incomes, and with total adult population in those years taken from Population Trends. It did not prove possible to replicate the series for total income given in Atkinson (2007) for years up to 2000, and so total income in 2001/2 to 2003/4 was assumed to grow at the same rate as SPI income grew for those years, and these used to estimate top income shares. The Atkinson series display a discontinuity from 1989 to 1990 due to the shift from family-based income taxation to individual-based income taxation. In order to smooth the series, we have uniformly increased all the top share series by 5% for years 1962 to 1989. This increase approximately smoothes the income share series around the 1989-1990 change.

  METRs applying to top incomes over time were calculated by the authors. For years 1975/6 - 2004/5, the calculation used TAXBEN, the IFS’ tax and benefit microsimulation model. For previous years, they were based on the authors’ understanding of the tax system drawing on an unpublished document, A Guide to the Tax and Benefit System. Data from Atkinson (2007) and updated by the authors to include 2001/2 - 2004/5 using the Survey of Personal Incomes were used to estimate what share of top incomes were from earnings, self-employment, investment and other sources, and it was assumed that the marginal pound was split between these sources identically to the average pound. All individuals are assumed to be a single-earner couple with two children (family status and the presence of and number of dependent children affects tax liability in some but not all years under consideration). For years after 1984, METRs on earned income include employer NI (the levels of earnings shown in the Figures are always too high for employee NI to be liable at the margin).

  [Authors to editors: we propose to write a supporting document detailing these rather complicated calculations in full that could be made available before the final Mirrlees report].

- **Numerical Simulations**
The optimal Mirrlees tax simulations proceed as follows. We assume that individuals differ in their ability \( n \) only. The utility function takes the following quasi-linear and iso-elastic form:

\[
u(c, z, n) = c - \frac{n}{1 + 1/e} \cdot \left( \frac{z}{n} \right)^{1+1/e},
\]

where \( c \) is disposable after tax and transfer income available for consumption, \( z \) is earnings, and \( e \) is a positive constant parameter. \( u \) is increasing in \( c \) and decreasing in \( z \) as earnings requires labour supply. With a nonlinear income tax, \( c = z - T(z) \) and each individual chooses \( z \) to maximize \( u(z - T(z), z, n) \). The first order condition for \( z \) is

\[1 - T'(z) = \left( \frac{z}{n} \right)^k,
\]

which can be rewritten as:

\[z = n \cdot (1 - T')^e.
\]

Hence \( e \) is the elasticity of reported earnings with respect to the net-of-tax rate \( 1 - T' \). As there are no income effects, this elasticity is both the compensated and uncompensated elasticity. Note that with no marginal tax, \( z = n \) so that ability \( n \) represents undistorted potential earnings. We assume that \( n \) has a distribution \( F(n) \) with density \( f(n) \). We normalize the total population to one.

We estimate \( f(n) \) based on the actual earnings distribution as follows. We denote by \( H_0(z_0) \) the actual distribution of annual earnings among all individuals in the UK of working age. This distribution is obtained from merging the Family Resources Survey data (for those with earnings below 60,000 Pounds) and the individual income tax returns (from the Survey of Personal Incomes for those with earnings above 60,000). We assume that the distribution of earnings above 300,000 follows a Pareto distribution with parameter \( a = 1.6 \). Earnings are defined as the sum of wages (inclusive of employee and employer payroll taxes) and self employment earnings. For each individual, we estimate the corresponding marginal tax rate using the TAXBEN microsimulation model, where we include in the marginal tax computation the individual income tax, the payroll taxes (both employee and employer), the main transfers for low income earners (including housing benefit, council tax benefit, income support and in-work tax credits), and a flat value added tax (equal to 17.2%, this is computed as the ratio of VAT collected divided by total consumption from National Accounts).

We then estimate potential earnings \( n \) for an individual with earnings \( z \) and facing an
actual marginal tax rate $T'$ as $n = z/(1 - T')^e$ (using the equation above). This allows us to obtain a distribution of potential earnings $n$. We smooth the distribution of potential earnings $f(n)$ to obtain a smooth schedule of optimal tax rates.

We assume that the government maximizes:

$$\int \frac{u^{1-\gamma}}{1-\gamma} \cdot f(n) dn,$$

subject to the budget constraint

$$\int T(z)f(n)dn \geq E,$$

where $E$ is government spending (excluding redistributive transfers). $\gamma$ measures the strength of the redistributive tastes of the government. In the simulations, we assume that $E$ is equal to average tax revenue net of transfers. Specifically, the revenue requirement is calculated by adding together total household income tax receipts, total (employees’, employers’, and self-employed persons’) national insurance contributions, and consumption tax revenue. Consumption tax revenue is calculated by aggregating all product taxes from National Accounts and scaling by the proportion of non-pensioners in the total population. From this we deduct, contributory and non-contributory Job Seekers Allowance Expenditure, income tax credits and reliefs, and child benefit. We also deduct the amount of housing benefit, council tax benefit and income support that are received by the working age population using expenditure figures from the Department of Work and Pensions. We then divide by the total working age population to calculate the revenue requirement $E$. Hence our optimal tax system keeps government spending (outside of direct redistribution) constant.

In our simple model, the optimal Mirrlees formula takes the following form:

$$\frac{T'}{1-T'} = \frac{1}{e} \cdot \frac{1}{n \cdot f(n)} \cdot \int_{n}^{\infty} \left(1 - \frac{u(m)^{-\gamma}}{\lambda}\right) f(m) dm,$$

where $\lambda$ is the multiplier of the budget constraint. The transversality condition implies that:

$$\lambda = \int_{0}^{\infty} u(n)^{-\gamma} f(n) dn.$$
We select a (log) grid for \( n \), from \( n = 1 \) to \( \hat{n} = 10^6 \) with 2000 elements: \((n_k)_k\). Integration along the \( n \) variable is carried out using the trapezoidal approximation in Matlab.

We start with given \( T' \) vector, derive all the vector variables \( z, u, T, \lambda, etc. \) which satisfy the government budget constraint and the transversality conditions. We then use the first order condition \( (??) \) to compute a new vector \( T' \). We then repeat the algorithm.

This procedure converges to a fixed point in most circumstances. The fixed point satisfies all the constraints and the first order conditions. We check that the resulting \( z \) is non-decreasing so that the fixed point is implementable. So the fixed point is expected to be the optimum.

In the paper, we present simulations for two cases: \( e = 0.25 \) and \( e = 0.5 \). We choose \( \gamma = 1 \). We assume that there is an atom of non-workers (fixed by assumption of the intensive margin model) and equal to xx% of the population.

The overall METRs we obtain should replace all VAT, individual income tax, transfers, and payroll taxes. We plot on the graphs the difference between the optimum and the actual schedules.

To facilitate discussion of reform, we compute an income tax/transfer schedule that would be optimum if the UK kept in place (1) the current VAT, (2) the current VAT and the current payroll tax. This is done by assuming that \( (1 - MTR_{income}) \cdot (1 - \tau_{VAT}) = (1 - MTR_{total}) \).

**Tax Reform Revenue Computations**

We compute revenue consequences of the IFS tax reform under two scenarios. In the first scenario, there are no behavioral responses and hence we just assume that pre-tax earnings are unchanged. In the second scenario, we assume positive participation and intensive elasticities. In that case, we proceed as follows:

Let us assume that individual \( i \) has earnings \( z_i^0 > 0 \) under the current system, faces a marginal tax rate \( \tau_i^0 \) and a participation tax rate \( t_i^0 \). We assume that individual \( i \) has a participation elasticity \( \eta_i \) and an intensive elasticity \( e_i \). Under the IFS reform, individual \( i \) (with earnings \( z_i^0 \)) faces new participation and marginal tax rates \( t_i^1 \) and \( \tau_i^1 \). The intensive

---

\textsuperscript{64}We adjust the constants for \( T(0) \) until all those constraints are satisfied. This is done using a secondary iterative procedure.
response changes earnings to $z_1^i$ such that:

$$z_1^i = z_0^i \cdot \left(1 - \frac{\tau_1^i}{1 - \tau_0^i}\right)^{e_i}.$$ 

The participation response transforms individual $i$ into a weighted average of a working individual (earning $z_1^i$) with weight $p_i$ such that:

$$p_i = \left(1 - \frac{t_1^i}{1 - t_0^i}\right)^{\eta_i},$$

and a non working individual (earning 0) with weight $1 - p_i$. The weight $p_i$ is above one when the participation tax rate decreases, meaning that the reform induces some non-working individuals to start working.

We then recompute total net taxes under the IFS reform where each individual has earnings $z_1^i$ with weight $p_i$ and zero earnings with weight $1 - p_i$, and we aggregate across all individuals. Note that we do not have to change anything (relative to the scenario with no behavioral responses) in the tax computations for individuals not working before the reform, as the entry effects are captured by looking only at individuals working before the reform.

In those computations, we take the short-cut that post-reform tax rates are computed based on initial earnings $z_0^i$. In principle, they should be based on post-reform earnings $z_1^i$. 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.

We compute the behavioural responses under a number of scenarios [currently 2] for the relevant elasticities:

1. $\eta_i = 0.25$ and $e_i = 0.1$ for all $i$.

2. The pattern of elasticities used in Adam (2005) (Table 5), where $e_i = 0.09$ except for the top income decile, where $e_i = 0.18$ (giving a population-weighted mean of 0.1), and where $\eta_i$ varies by family type and income decile, but with a mean of 0.25.

The results are shown in Table X. Assuming reasonable uniform elasticities, the reform would increase employment by just under 1%, but earnings conditional on work would fall. With elasticities varying with earnings and family type, the reform would increase employment by just under 2%, and earnings would fall by slightly less. The increases in employment

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are concentrated amongst single adults without children, lone parents, and women in couples with children (with the ranking depending on the assumed participation elasticity). Aggregate earnings would fall slightly (by less than 0.5% given the elasticities that vary by earnings and family type), but tax revenues would also fall (by 1.3%) because the tax lost from the negative intensive response exceeds the tax gained from the positive extensive response. Aggregate disposable income amongst households would be almost unaffected (assuming uniform elasticities, aggregate earnings, net tax revenues and household disposable income would all fall by more).

<table>
<thead>
<tr>
<th></th>
<th>Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Mean $z^0_i$ (£/wk)</td>
<td>468.89</td>
</tr>
<tr>
<td>Single, no kids</td>
<td>420.81</td>
</tr>
<tr>
<td>Couples, no kids, men</td>
<td>588.52</td>
</tr>
<tr>
<td>Couples, no kids, women</td>
<td>380.19</td>
</tr>
<tr>
<td>Lone parents</td>
<td>296.05</td>
</tr>
<tr>
<td>Couples, kids, men</td>
<td>650.56</td>
</tr>
<tr>
<td>Couples, kids, women</td>
<td>307.53</td>
</tr>
<tr>
<td>Mean $z^1_i$ (£/wk)</td>
<td>465.84</td>
</tr>
<tr>
<td>Single, no kids</td>
<td>419.30</td>
</tr>
<tr>
<td>Couples, no kids, men</td>
<td>586.14</td>
</tr>
<tr>
<td>Couples, no kids, women</td>
<td>378.56</td>
</tr>
<tr>
<td>Lone parents</td>
<td>295.29</td>
</tr>
<tr>
<td>Couples, kids, men</td>
<td>643.36</td>
</tr>
<tr>
<td>Couples, kids, women</td>
<td>304.08</td>
</tr>
<tr>
<td>Mean $p_i$</td>
<td>1.009</td>
</tr>
<tr>
<td>Single, no kids</td>
<td>1.020</td>
</tr>
<tr>
<td>Couples, no kids, men</td>
<td>0.980</td>
</tr>
<tr>
<td>Couples, no kids, women</td>
<td>0.999</td>
</tr>
<tr>
<td>Lone parents</td>
<td>1.013</td>
</tr>
<tr>
<td>Couples, kids, men</td>
<td>1.010</td>
</tr>
<tr>
<td>Couples, kids, women</td>
<td>1.015</td>
</tr>
</tbody>
</table>

And another table (all in £bn/yr):
Total earnings under base system 444.0 444.0
Change in earnings under IFS -5.0 -2.1
intensive response only -3.8 -3.5
extensive response only -1.3 +1.3

Total net taxes under base system 156.8 156.8
of which, employer’s NI 51.9 51.9
Change in taxes under IFS -3.3 -2.1
intensive response only -2.5 -2.4
extensive response only -0.9 +0.2

Total net income under base system 507.1 507.1
Change in net income under IFS -1.6 -0.0
intensive response only -1.3 -1.2
extensive response only -0.4 +1.1

Elasticities used in scenario 2:

<table>
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<tr>
<th>Earnings decile group</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single, no kids</td>
<td>0.30</td>
<td>0.30</td>
<td>0.24</td>
<td>0.24</td>
<td>0.18</td>
<td>0.18</td>
<td>0.12</td>
<td>0.12</td>
<td>0.06</td>
<td>0.06</td>
<td>0.18</td>
</tr>
<tr>
<td>Lone parent</td>
<td>0.45</td>
<td>0.45</td>
<td>0.36</td>
<td>0.36</td>
<td>0.27</td>
<td>0.27</td>
<td>0.18</td>
<td>0.18</td>
<td>0.09</td>
<td>0.09</td>
<td>0.27</td>
</tr>
<tr>
<td>Man, couple</td>
<td>0.30</td>
<td>0.30</td>
<td>0.24</td>
<td>0.24</td>
<td>0.18</td>
<td>0.18</td>
<td>0.12</td>
<td>0.12</td>
<td>0.06</td>
<td>0.06</td>
<td>0.18</td>
</tr>
<tr>
<td>Woman, couple, no kids</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>working partner</td>
<td>0.60</td>
<td>0.60</td>
<td>0.48</td>
<td>0.48</td>
<td>0.36</td>
<td>0.36</td>
<td>0.24</td>
<td>0.24</td>
<td>0.12</td>
<td>0.12</td>
<td>0.36</td>
</tr>
<tr>
<td>non-working partner</td>
<td>0.30</td>
<td>0.30</td>
<td>0.24</td>
<td>0.24</td>
<td>0.18</td>
<td>0.18</td>
<td>0.12</td>
<td>0.12</td>
<td>0.06</td>
<td>0.06</td>
<td>0.18</td>
</tr>
<tr>
<td>Woman, couple, kids</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>working partner</td>
<td>0.60</td>
<td>0.60</td>
<td>0.48</td>
<td>0.48</td>
<td>0.36</td>
<td>0.36</td>
<td>0.24</td>
<td>0.24</td>
<td>0.12</td>
<td>0.12</td>
<td>0.36</td>
</tr>
<tr>
<td>non-working partner</td>
<td>0.45</td>
<td>0.45</td>
<td>0.36</td>
<td>0.36</td>
<td>0.27</td>
<td>0.27</td>
<td>0.18</td>
<td>0.18</td>
<td>0.09</td>
<td>0.09</td>
<td>0.27</td>
</tr>
<tr>
<td>Average</td>
<td>0.42</td>
<td>0.42</td>
<td>0.33</td>
<td>0.33</td>
<td>0.25</td>
<td>0.25</td>
<td>0.17</td>
<td>0.17</td>
<td>0.08</td>
<td>0.08</td>
<td>0.25</td>
</tr>
</tbody>
</table>

- Further details on the Integrated Family Support (IFS)

The aim of the IFS is to create a transfer programme for low-income families that provides more transparency and certainty than child and working tax credits, as well as lowering PTRs and METRs at low levels of earnings. Achieving the first of these overwhelming suggests that the tapering of the IFS away from better-off families (hereafter known as “withholding”) should occur, wherever possible, by employers alongside deduction of payroll taxes. Accordingly, to keep administration simple and to keep the IFS targeted on families whose income is low when it is low, the IFS will not be an annual system but will be operated on a non-cumulative basis, with a weekly or monthly periodicity like NI.

Implementing this arrangement requires employers to know how much to withhold from allowance families. If a person has multiple jobs, earnings in all jobs other than the first are
taxed as if there is no earnings disregard, and people in allowance families would be subject to the IFS withholding with no disregard. There is no limit on withholding as we expect families with incomes too high to qualify for the IFS to opt out (and then get a refund from the government). The government would instruct employers to withhold up to the full value of the IFS from both adults in a two-earner couple. Although this is likely to lead to over-withholding, this will only affect relatively well-off IFS families, who could be refunded when the government learns about the over-withholding, or who could opt out of the scheme entirely (it would be fairly simple for the government to advise families on when they were likely to be subject to over-withholding).

To operate the current PAYE system in the UK, employers need to know a tax code for all of their employees. Employers initially learn this from a new employee’s P45, and HMRC then tell employers about changes in tax codes after that date. Under our proposed system, slightly more information would need to be transmitted at each stage, but the mechanisms for interacting would remain the same (and we further assume that the vast majority of these interactions between employers and HMRC would in the near future be done electronically).

Other forms of income.

Other forms of income such as asset income or self-employment income should also count in the phase-out of the IFS. Those sources of income are reconciled when a tax return is filed. In that case, the phase-out of the IFS would be paid by families at the time of tax filing on an annualized basis. This is the only link between the income tax and IFS, and only those with self-employment or asset income would be affected. Furthermore, as described in the text, asset income would not benefit from the disregard, and would be tapered above a much smaller disregard (it is useful to have a small disregard to simplify the administration for many families with very small amounts of interest income from bank accounts).

Under-payments and over-payments.

Under this design of a IFS, there should be much less under-payments or over-payments of the sort which bedevilled the child and working tax credit (see Brewer, 2006). If there is excess withholding (over and above the IFS), the government could refund the excess as soon as it learns about this from employers. Of course, families who consider that they are facing excess withholding are able to opt-out of the IFS programme at any time (and should do so if
their earnings are above the break-even point at which net entitlement to IFS is zero). If there is insufficient withholding, then the government could recover the excess IFS by reducing the IFS payments for a period of time. But a strong principle must be to reduce to an absolute minimum the occasions when wage-earning families have to send IFS payments back to the government, as this puts considerable hardship on low-income and credit-constrained families.

**Compliance/enforcement issues.**

Like any transfer programme assessed against income, there are incentives to hide income streams from the revenue authorities. One virtue of the new system is that it exempts very low incomes from IFS withholding, so the incentives to keep low-paid (below £90/wk) labour in the informal sector is much reduced, compared with the current tax and transfer system, especially for second earners. Individuals earning more than £90/wk would have an incentive to avoid the IFS withholding, but it is harder for higher-wage individuals to evade withholding without outright collusion with the employer. Furthermore, it may be easier for the government to reduce fraud by integrating in-work and out-of-work support into a single programme.

Compared with a cumulative system of in-work support, the IFS creates some incentives for seasonal work or for manipulating the timing of earnings (for example, individuals subject to IFS withholding would be better off receiving their earnings over as many weeks as possible so as to make maximum use from the weekly £90 IFS earnings disregard). This seems a worthwhile cost to pay in return for the benefit of having the IFS more closely related to current circumstances.

Like many transfer programmes assessed against the combined income of a couple, there would be an incentive for some couples (with or without children) to claim to the revenue authorities that they were in fact living apart, because a couple is entitled to less IFS than if the two adults were living apart. But, because each adult in a couple has their own disregard against IFS withholding, this feature - the so-called couple penalty - would be less than under the current tax credit system in the UK.

**Take-up.**

The desire to raise take-up (programme participation rates) of in-work support was cited by the government of the time as one reason to replace WFTC with the child and working tax credits. One way this was achieved was by extending entitlement to child tax credit to all but
the richest 10% of families with children, increasing the likelihood that families would expect to be entitled, and minimising the degree to which the programme was perceived as something for the poor. Around [xx%] half of families [y% of those with children] would be entitled to the IFS, compared to around 85% entitled to CTC now. If the government, using earnings and tax records, assesses that a family is not registered for the IFS but has earnings low enough to qualify, the government could send a notice to the family to encourage registration. As we noted above, the mechanism for withholding earnings might mean that some couples with children face over-withholding, and this fear may deter some families from claiming the IFS. However, the families affected in this way would be relatively well-off families.
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Figure 1A: Top 1% Income Share and Marginal Tax Rate

Note: Income shares from Atkinson but 1962-1989 are adjusted up by 5% (factor 1.05) so that continuity from 1989 to 1990 when filing shifts from couples to individual.
Figure 5B: Optimal tax sensitivity, redistribution preference

Figure 6: Fraction foreign born in top 1% and bottom 99%
Figure 7A-1: Budget constraint, lone parent

- Budget constraint
- Budget constraint (inc. housing benefit)

Figure 7B-1: Participation tax rate, lone parent

- PTR
- PTR (inc. housing benefit)
Notes:

Assumes a lone parent with two children, with £80 per week housing costs, no childcare costs average band and C council tax in the Greater London area. Wage = £5.52, April 2008 tax and benefit system with announced changes.
Notes:

Assumes a one-earner couple with two children, with £80 per week housing costs, no childcare costs average band and C council tax in the Greater London area. Wage = £5.52, April 2008 tax and benefit system with announced changes
Notes:

 Assumes a single adult without children, with £80 per week housing costs average band C council tax in the Greater London area. 
 Wage = £5.52, April 2008 tax and benefit system with announced changes
Figure 8A: PTR, Singles no children and lone parents

Figure 8B: MTR, Singles no children and lone parents
Figure 9C: PTR - Lone parents, impact of reform

Figure 9D: MTR - lone parents, impact of reform