

Means-testing and tax rates on earnings: on-line appendix

Mike Brewer, Emmanuel Saez and Andrew Shephard

January 2010

This document provides supplementary material to the chapter “Means-testing and tax rates on earnings”, due to published in *Dimensions of Tax Design* by OUP in 2010. A draft version is also available at http://www.ifs.org.uk/mirrleesreview/press_docs/rates.pdf.

1. Calculation of top marginal rates of tax

Figures 2.2A and 2.2B use data on top income shares in the UK, and on METRs affecting individuals with high incomes, which uses data on top income levels. This section details how they were constructed.

The series on top income shares and 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 smooths 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 For previous years, they were based on the authors' understanding of the tax system drawing on an unpublished document produced by HM Treasury called “A Guide to the Tax and Benefit System”.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, and, for 2003/4 and 2004/5, employee NI.

2. Details of numerical simulations of optimal income tax

The optimal Mirrlees tax simulations proceed as follows. We assume that individuals differ only in their ability n . 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

$$1 - T'(z) = (z/n)^k, \text{ which can be rewritten as } z = n \cdot (1 - T')^e.$$

Hence e is the elasticity of reported earnings with respect to the net-of-tax rate $1 - T'(z)$. 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. 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) 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 $\alpha=1.6$. 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 micro-simulation 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 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, and given a value of e). 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:

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

subject to the budget constraint

$$\int T(z)F(n)dn \geq E$$

where E is government spending (excluding redistributive transfers) and γ 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 expenditure on Job Seekers Allowance, income tax credits and reliefs, child benefit, housing benefit, council tax benefit and income support that are received by the working-age population (using expenditure figures from the Department for 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 λ 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 1 to 10^6 , with 2,000 elements.

Integration along the n variable is carried out using the trapezoidal approximation in Matlab.

We start with a given T' , and then derive all the vector variables z , u , T , λ , etc. which satisfy the government's budget constraint and the transversality conditions. We adjust the constants for $T(0)$ until all those constraints are satisfied. This is done using a secondary iterative procedure. 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, and thus 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 given by the data. 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 $(1-MTR_{income}) (1-MTR_{VAT})=(1-MTR_{total})$.

3. Interpreting the participation response: migration and tax rates

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. Clearly, governments can use other tools to affect immigration, and such policies are taken here as given. Emigration and immigration across EU countries is almost completely deregulated, and so our analysis is particularly relevant in this context.

For simplicity, suppose that the only behavioral response to taxes is migration (Mirrlees (1982) proposed such a model of optimal taxes with migration. Simula and Trannoy (2006) propose a recent extensive theoretical analysis of the problem). 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:

$$\eta_m = \frac{(z - T(z))}{P(c|z)} \cdot \frac{\delta P}{\delta c}$$

where $P(c|z)$ is 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 individual's migration decision is more responsive to changes in taxes (i.e. the migration elasticity η_m is high).

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. 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.¹ In that case, some form of coordination and harmonization across countries can in principle be beneficial.

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

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

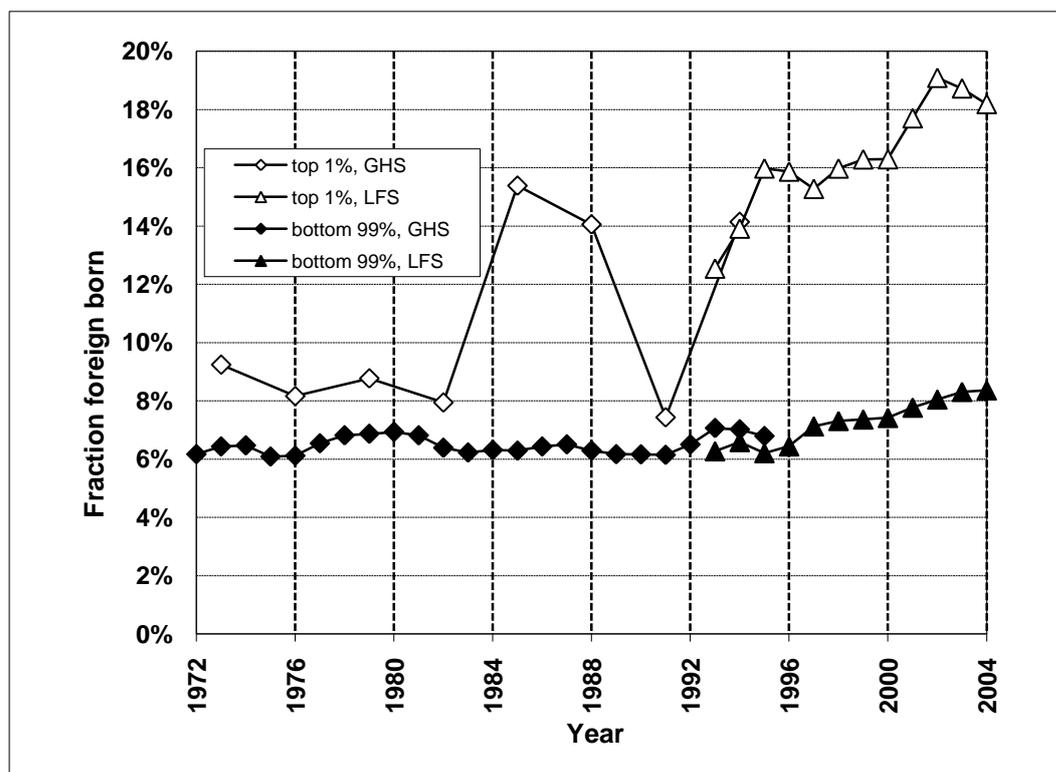
For example if $a=2$, $e=0.25$, the Laffer rate with no migration is $2/3$. If there is migration with $\eta_m = 0.5$, then the Laffer rate decreases to $1/2$. Thus, the possibility of migration from top earners can decrease significantly the ability of European countries to tax high incomes.

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. 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. 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

¹ 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).

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%.

Figure A1. Fraction foreign born in top 1% and bottom 99% from 1972 to 2004



Notes and sources: see text for details.

If we are willing to assume (heroically) 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 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 the chapter incorporated such migration effects, as migration to the UK of highly-skilled foreign workers will lead to a rise in top income shares.

4. Further details of the proposed Integrated Family Support programme

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.²

Receipt of selected other government transfers (incapacity benefit/employment and support allowance, 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

² Adults 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).

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. Our 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.

Withdrawing the IFS

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 a week, or just over 16 hours work at the current minimum wage.³ 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 a week and still keep the maximum IFS allowance. 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. 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).

Second, as 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, this 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,

³ 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.

with a weekly or monthly periodicity like NI. 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.

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 withheld 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 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).

Third, if an IFS family is over-withheld (in other words, if employers withhold 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.

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 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.

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.

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 bedevil the child and working tax credit. 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. Fewer families would be entitled to the IFS than are currently entitled to the child tax credit 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.

Calculating the change in revenue with behavioural response

We compute revenue consequences of the IFS tax reform under two scenarios. In the first scenario, there are no behavioural 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 t_i^0 and a participation tax rate τ_i^0 . We assume that individual i has a participation elasticity η_i and an intensive elasticity e_i . Under the IFS reform, individual i faces new participation and marginal tax rates t_i^1 and τ_i^1 . The intensive response changes earnings to z_i^1 such that:

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

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

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

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_i^1 weight p_i and zero earnings with weight $1 - p_i$, and we sum across all individuals. Note that we do not have to change anything (relative to the scenario with no behavioural 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_i^0 and the new marginal tax rate τ_i^1 . In principle, they should be based on post-reform earnings z_i^1 . However, the presence of non-convexities in the budget constraint would make actual computation more complex (a fully rigorous computation would most likely have a minor impact to our first-pass computations presented here, because we assume modest elasticities).

We compute the behavioural responses under a number of scenarios for the relevant elasticities:

- $\eta_i = 0.25$ and $e_i = 0.1$ for all i
- The pattern of elasticities similar to those 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 η_i varies by family type and income decile, but with a mean of 0.25.⁴

The results are shown in Table A1.

⁴ Adam, S. (2005) “Measuring the marginal efficiency cost of redistribution in the UK”, IFS WP 05/14.

Table A1. Behavioural impacts of the IFS reform

	Scenario	
	1	2
Mean z_i^0 (£/wk)	468.89	
Single, no kids	420.81	
Couples, no kids, men	588.52	
Couples, no kids, women	380.19	
Lone parents	296.05	
Couples, kids, men	650.56	
Couples, kids, women	307.53	
Mean z_i^1 (£/wk)	465.82	466.01
Single, no kids	419.14	419.10
Couples, no kids, men	586.42	586.48
Couples, no kids, women	378.54	378.69
Lone parents	294.70	294.86
Couples, kids, men	643.50	644.04
Couples, kids, women	303.88	304.21
Mean p_i	1.001	1.015
Single, no kids	1.017	1.019
Couples, no kids, men	0.992	0.997
Couples, no kids, women	0.998	1.001
Lone parents	1.011	1.034
Couples, kids, men	1.008	1.016
Couples, kids, women	1.013	1.039

Table A2. Change in economy-wide variables (£bn/yr)

	Scenario	
	1	2
Total earnings under base system	577.3	
Change in earnings under IFS, behavioural response	-5.9	-2.6
<i>Intensive response</i>	-3.8	-3.6
<i>Extensive response</i>	-2.2	+0.8
<i>Interaction</i>	+0.1	+0.1
Total net taxes under base system	156.8	
<i>Of which, employers' NI</i>	51.9	
Change in taxes under IFS, no behavioural response	+3.4	
Change in taxes under IFS, behavioural response	-3.7	-2.3
<i>Intensive response</i>	-2.5	-2.3
<i>Extensive response</i>	-1.3	-0.0
<i>Interaction</i>	+0.0	+0.0
Total net income under base system	507.1	
Change in net income under IFS, no behavioural response	-3.4	
Change in net income under IFS, behavioural response	-2.1	-0.3
<i>Intensive response</i>	-1.3	-1.2
<i>Extensive response</i>	-0.9	+0.8
<i>Interaction</i>	+0.1	+0.1

Assuming reasonable uniform elasticities, the reform would increase employment by just under 1%,⁵ 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 are concentrated amongst

⁵ And we do mean %, not ppts, here. The impact on the employment rate in ppts would be smaller.

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 (if we had assumed uniform elasticities, then aggregate earnings, net tax revenues and household disposable income would all have fallen by more).

The key achievement of the IFS is that it manages to redistribute income with minimal impact on total earnings and total net tax revenue, by targeting net tax cuts which work with the grain, rather than against the grain, of individuals' work incentives. But without knowing the government's preferences for redistribution or other objectives, we cannot hope to predict whether our reform will appeal.

References

- Adam, S. (2005) "Measuring the marginal efficiency cost of redistribution in the UK", IFS WP 05/14.
- Atkinson, A. (2007), 'Top Incomes in the United Kingdom over the Twentieth Century', in Atkinson, A. and Piketty, T. eds., *Top Incomes from a Historical and International Perspective*, Oxford: Oxford University Press.
- Griffith, R., and Klemm, A. (2004), 'What has been the Tax Competition Experience of the last 20 Years?', *Tax Notes International*, 34, 1299–316.
- Lundberg, S. J., Pollak, R. A., and Wales, T. J. (1997), 'Do Husbands and Wives Pool Their Resources: Evidence from the United Kingdom Child Tax Credit', *Journal of Human Resources*, 32, 463–80.
- Mirrlees, J. (1982), 'Migration and Optimal Income Taxes', *Journal of Public Economics*, 18, 319–41.
- Simula, L. and Trannoy, A. (2006), 'Optimal Non-Linear Income Tax when Agents Vote with their Feet', *Finanzarchiv*, 62, 393–415.