Taxation of Earnings: the impact on labor supply and human capital

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Notes for Presentation2

I. Introduction

Can the tax system be reformed to generate the levels of revenue required to fund public goods while reducing the overall level of distortions implicit in the system? This question lies at the heart of many economic analyses of tax reform including the Mirrlees Review.3 Motivated by the aim to develop a broad set of principles for what makes a ‘good tax system', the Review was an attempt to build a case for tax reform from the large body of economic theory and empirical evidence. The discussion in this paper draws on the work in the Review and concerns the taxation of labour earnings as well as relevant aspects of the welfare benefit and tax credit systems. It focuses on the empirical foundations for tax reform and argues for placing the analysis of earnings taxation in a lifetime setting, recognising the importance of human capital investments.

In addressing the earnings tax reform question we have to remember that earnings taxation not only raises revenue for public goods, it also does most of the heavy lifting in redistributing resources from richer to poorer households. Further, from a more dynamic perspective, it ‘insures’ individuals and families against adverse events such as job loss and

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2 Background notes for the presentation at the BFI workshop entitled ‘The facts about taxes: the empirical foundations of supply-side economics’. This research is funded by the ESRC through the Centre for the Microeconomic Analysis of Public Policy at IFS.
3 The Review was published in two volumes, Dimensions of Tax Design (Mirrlees et. al., 2010) bringing together expert evidence across a wide range of aspects of tax reform, and Tax by Design (Mirrlees et. al., 2011) setting out the conclusions and recommendations. Evidence from the UK was used as a running example throughout.
disability. Not surprisingly, it occupies a special place in debates about levels and structure of taxation.

This paper draws on the large literature on earnings taxation and makes extensive use of the results in three recent studies:

- **Mirrlees Review (2011)** - an in depth proposal for comprehensive tax reform, referred to above,

- **Blundell (2012)** - which examined the role of evidence in developing the tax reform agenda, and


These three studies provide more detailed analysis of estimated responses and simulated reforms discussed in what follows.

Although I will tempt to draw fairly general conclusions for open developed economies, throughout the discussion the UK is used as the main running example. This was also the case for the Mirrlees Review and it is worth noting that a number of subsequent studies have examined the implications of that approach for tax reform in other economies, for example Auerbach (2012) for the US, and Milligan (2012) for Canada.

One central question in the policy debate on earnings tax reform is whether, and to what degree, ‘supply side’ reforms can be used to relieve the pressure from ageing populations. How best to increase employment and earnings over the working life? The work presented here suggests that the key to using tax policy for improving the trends in employment, hours and earnings in the longer-run will be to focus on labor market entry, retirement and human capital. Enhancing the flow into work for those leaving education and for returning mothers after childbirth, while maintaining work among those in their late 50s and 60s. These margins are precisely where labor supply has been shown to be responsive to tax policy incentives and, consequently, where it may also be best to focus policies aimed at reducing distortions. Understanding the implicit incentives (or disincentives) created in the tax and welfare system for human capital investments will also be seen to have a key role to play. Encouraging human capital improves the pay-off to work and ensures earnings grow, and hold up longer, throughout the working life.
Reform of the tax system as it impacts on labor supply and human capital is not simply about increasing life-time earnings. There are many other aspects of human welfare, including the utility from consuming goods, from home production, from reducing risks, etc. that need to be acknowledged in any analysis. To make progress we have to uncover exactly where the key distortions in the current tax system occur, noting that not all distortions induced by the tax system are necessarily welfare reducing. They may simply correct failures in the market or, more generally, reflect differences between individual and society preferences.

Taxes on earnings should be seen as part of the whole ‘tax system’. In terms of an overall reform package, it is important to view corporate and personal taxation together as there are many aspects where they overlap: not every tax needs to be progressive for the tax system to be progressive; not every tax needs to be ‘green’ for the tax system to provide the right incentives for environmental protection. Although the focus here is on labour earnings taxation and human capital, we still need to be aware of the interactions with capital, savings and environmental taxes.

In most developed economies, the schedule of tax rates on earned income is rather complex. This may not always be apparent from the income tax schedule itself, but note that what really matters is the total amount of earnings taken in tax and withdrawn benefits—the effective tax rate. The schedule of effective tax rates is made complicated by the many interactions between income taxes, earnings-related social security contributions by employers, welfare benefits, and tax credits.

What is really important in designing tax rate schedules is to take account of empirical evidence on the impact of the effective tax schedule on the behavior of different groups of people. There is an enormous empirical literature on this subject, see Blundell and MaCurdy (1999) and Meghir and Phillips (2010), for surveys. At a very high level, some of the main points that emerge from this evidence are that substitution effects are generally larger than income effects: taxes reduce labour supply. Especially for low earners, responses are larger at the extensive margin—employment—than at the intensive margin—hours of work. Responses at both the intensive and extensive margins (and both substitution effects and income effects) are largest for women with school-age children and for those aged over 55.

The results of this literature have led to arguments for a greater focus on lifetime careers, see Ljundqvist and Sargent (2011) for example, while other authors have made a convincing case to incorporate aspects of human capital, see Keane and Rogerson (2012), for example.
Earnings respond to taxes in other ways than employment, hours and human capital. We may choose to look at taxable income directly, acknowledging for example, that some responses may be simply finding ways of avoiding or evading tax. The taxable income elasticity subsumes the intensive and extensive margins and the usual income and substitution effects: by definition, it captures any response that affects tax payments. Under certain conditions, see Feldstein (1999), it also provides a simple and direct measurement of the welfare cost of earnings tax reform. In general, differences between different kinds of behavioral response matter and the taxable income elasticity will not contain all the relevant evidence to assess reform of the tax system but it is valuable evidence in putting together a clear understanding the potential costs of taxation and the appropriate directions for reform.

More generally, how people respond to taxes depends not only on the structure of marginal rates but also on the tax base. The tax base determines how much scope there is for people to reduce their taxable income in response to higher tax rates by shifting between taxed and untaxed forms of income. In principle, the earnings tax base should include all forms of remuneration, including benefits in kind, and deduct all costs of generating earnings, such as work expenses (whether paid by the employer or by the employee). There is good evidence that the base-broadening reforms in the US in the 1980s reduced the taxable income elasticity and made it easier to raise revenue by increasing the tax rate on higher incomes, see Kopczuk (2005). Indeed, one argument for looking at the tax system as a whole is to bring tax base and tax rate design issues together.

This introductory discussion sets up the remainder of this paper. In the next section, a framework for the empirical foundation of earnings tax reform is developed. Section III presents some key facts on employment and earnings. Section IV examines the evidence on responses and considers a lifetime perspective. Section V then concludes with prospects for reform including arguments for a life-time perspective focussing on three key ingredients: (i) improving labour market entry - for those leaving education and for women after childbirth, (ii) maintaining employment among older workers, and (iii) increasing human capital investments.
II. The Role of Empirical Evidence in Tax Design

How should evidence be used in the study of tax design? What is the appropriate balance between theory and empirics? This section briefly examines the role of evidence in drawing up recommendations for reform of the taxation of earnings.\(^4\)

The role of evidence in developing a tax reform agenda is loosely organised under five related headings or ‘steps’:

1. Key margins of adjustment,
2. Measurement of effective tax rates,
3. The importance of information and complexity,
4. Evidence on the size of responses, and
5. Implications for policy design.

The first of these, ‘key margins of adjustment’ highlights the importance of establishing the descriptive facts about key aspects of behaviour where we think taxes could have an impact. This will be central to the discussion in this paper and some of these core facts will be presented in the next section.

The second heading, ‘measurement of effective tax rates’, reinforces a pervasive theme in the Mirrlees Review which was to consider the tax system as a whole and examine the ‘wedge’ created by all aspects of the tax system, including the implicit tax rates in the benefit and tax-credit systems. To assess the effective incentive, or disincentive, to work induced by the tax and welfare system, requires a careful analysis of how tax rates, tax credits and welfare benefits overlap. Benefits create incentives to work through the provision of income when out of work, as well as through the withdrawal rate (taper rate) on those welfare benefits as income is earned. When considered together with tax credits, employer taxes and income tax rates, effective tax rates can be extremely high, especially for low-income workers. In the UK this leaves some people facing effective marginal tax rates of over 90%. To an extent this may just reflect the balance between redistribution and work incentives that lies at the very heart of much empirical tax design. But it is also key area for potential redesign.

Consider a typical budget constraint for a low earning family. A complete analysis of the effective tax rate will combine the implicit tax rates in the benefit system, the tax credit system and the income tax system. Figure 1 provides such a case study for a single mother in

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\(^4\) See Blundell (2012) for a more detailed exposition.
the UK and shows the complexity arising from the cocktail of taxes and welfare benefits. This constraint assumes all eligible benefits are accessed.

One component of particular interest in the taxation of earnings is the tax-credit system – Working Tax Credit in the UK – which, like EITC in the US, has become an increasingly important part of the effective tax system facing low earning families in many countries, particularly the UK and US, see Blundell and Hoynes (2004), for example. Taken together with Income Support and other benefits, low-income earners in the UK can face a complex rate schedule with relatively high effective tax rates. Indeed families in receipt of other benefits would gain less from the Working Tax Credit than otherwise equivalent families not receiving these benefits.

**Figure 1:** The Interaction between Taxes and Benefits in the UK

What does the tax and benefit system imply across for effective tax rates across the distribution of earnings and different family types? To describe the distribution of incentives implicit in the tax and benefit system, there are two summary measures that are useful to document: the effective marginal tax rate (EMTR) -- that is the proportion of a small increase in earnings taken in tax and withdrawn benefits; and the participation tax rates (PTR) -- the
incentive to be in paid work at all -- defined by the proportion of total earnings taken in tax and withdrawn benefits. As an example, the distribution of these tax rates by income and family type in the UK is presented in Figure 2a and 2b.

**Figure 2a,b: Effective Marginal and Effective Participation Tax Rates in the UK**

In an important sense it is the participation tax rate that is relevant for the employment margin, and the marginal tax rate for the effort margin. The EMTRs and the PTRs can be negative as well as positive, but they are typically positive and often high at lower incomes. The effective tax rates in these Figures indicate the strong redistribution towards low-income families with children in the current UK tax system. Indeed, the more accurately the tax system targets low income, the higher the effective marginal tax rate on low earnings is likely to be. Not surprisingly then, tax schedules can easily possess the feature of high effective marginal tax rates at low earnings. It is simply the result of means-testing which is the flip side of targeted redistribution. Whether it is an efficient design or not will depend on the responsiveness of labour supply to these implicit tax rates, on the distribution of income and on the desire to redistribute to low-income families, see the illuminating discussion in Brewer, Saez and Shephard (2010).

The analysis of effective tax rates also naturally motives the third heading in the list of steps, ‘the importance of information and complexity’. This relates to the understanding by individuals of the incentives implicit in the tax and welfare system. It concerns the importance of stigma, hassle and information costs for those accessing the system. In many countries, certainly the UK as we saw above, there are multiple benefits with an array of overlapping means-tests and taxes. This degree of complexity can leave some individuals unwilling, unable or just too uniformed to access all the benefits and tax-credits to which they are eligible.

In a sequence of recent studies Saez (2010), Chetty, Friedman and Saez (2012), and references therein, show the central importance of information in properly measuring effective incentives in the tax system. They consider bunching at the ‘kinks’ and the role of information in relation to the Earned Income Tax Credit, using administrative data. They argue that information is key to understanding responses. One way to formalize some of the issues surrounding information and complexity in earnings taxation is to allow individuals who are eligible to certain benefits and tax-credits not to participate or not to ‘take-up’, see Moffitt (1983). This reflects the idea that individuals may not fully understand the rules of the tax code and welfare rule, or they may simply find the stigma or hassle costs involved in participating in the benefit or tax credit program too high to be worthwhile. It is worth noting the practical difficulty of incorporating differential take-up across many different benefits in any empirical analysis. Moreover because benefits and tax credits are typically based on
family income, a complete analysis requires understanding family labour work and earning decisions.

It is difficult to argue against a policy reform that makes it more transparent as to which benefits and tax credits individuals are eligible, and what the effective tax rates in the system are. Indeed, one immediate impact of the publication of the Mirrlees Review was to motivate the UK government to introduce legislation for a single integrated benefit combing many of the different existing elements of welfare.\(^5\)

The forth heading or ‘step’ in our list ‘evidence on the size of responses’ is the core of any rigorous empirical analysis and concerns the robust measurement of the impact of tax reforms. There are many such studies ranging from experimental and quasi-experimental analyses of specific reforms to more structural analyses of the general incentives in the tax and benefit system. The results from this empirical research are discussed extensively in the Mirrlees Review and elsewhere. We will draw on some of the key results below. It is worth highlighting at this stage the important distinction uncovered between the extensive (whether to work) and intensive (how much to work) margins of labour supply, (e.g. Heckman, 1993; Blundell and MaCurdy, 1999; and Blau and Kahn, 2007). The ‘extensive’ margins of education and career choice will also be important for a longer-run analysis.

Knowing precisely where the largest responses to incentives are is a key ingredient in achieving a good empirical foundation for tax reform. Although for many workers the employment, hours and human capital margins are the main margins for their responses to tax incentives, for other workers there will be exemptions and deductions that will allow them to change their taxable income with little change in their overall earnings. Acknowledging this is a key aspect of examining tax rate reform, especially for top earners and the self-employed.

Under the final heading in the list, ‘implications for policy design’, these empirical relationships are brought together with the structure of mechanism design from economic theory to determine efficiency costs, overall optimality and improvements to tax design. There are three key ingredients to any ‘optimal’ analysis of tax reform: (i) the accurate measurement of responses, (ii) the detailed description of the distribution of individuals and families across the tax schedule and, (iii) some view of social welfare weights. The last of these is normative and therefore something where reasonable people may differ. The first two

\(^5\) A persuasive idea, although in its current incarnation as ‘Universal Credit’, it faces many practical implementation issues. See the IFS webpage for an analysis of this reform and its relationship to the Mirrlees Review suggestion.
are positive and can be learned from a careful evidence based analysis as in the four steps above. It is these first two that form the core empirical foundations of tax reform.

The way in which the optimal tax approach combines with evidence to help us think about the appropriate pattern of tax rates is best illustrated by considering under what conditions a small rise in the tax rate for some small band of income is a ‘good’ idea. The tax rise increases the taxes paid by every taxpayer with incomes in or above the small band. However, it is a rise in the effective marginal tax rate only for those taxpayers in the band. Since the band of income is small, for them the substitution effect is dominant. For those workers with incomes above the tax band, there is no change in their effective marginal tax rate, so there can be no substitution effect. But they do pay a higher share of their income in taxes: their average tax rate is increased. This generates a revenue gain to society, but also a welfare loss for those individuals who pay the extra taxes.

It is the size of the substitution effect in labour supply and the number of people in the small band of income that determine the efficiency loss from the tax increase. However, the choice of tax rate for the chosen band of income will also depend on the proportion of the population with incomes above the band. The higher this proportion, the greater is the amount of revenue available for public goods and for redistribution to the poorest. Finally, the choice of tax rate will depend on the welfare weights afforded to people on different incomes. The greater the existing inequality, the greater is the likely relative weight attached to those who gain from redistribution.

That at least is a good way of thinking about reform at the intensive margin—how much to work. Now consider the extensive margin—whether to work or not to work. The evidence on labour supply responses suggests that for some demographic groups, such as low-wage parents, the extensive margin matters a great deal. This is an important observation for tax reform. It can imply low, even negative, tax rates for low earners, see Saez (2002) and Laroque (2005). If a reduction in a tax rate induces individuals to move into employment, this will add to the potential gains from the reform. There is then a balance between the extensive response and the intensive response. When the extensive labour supply response is sufficiently high, the earnings tax system can be improved by including an earnings subsidy. This is one coherent argument used in the efficient design of earned income tax credits (and in-work benefits) for low-wage workers, see Blundell and Shephard (2012), for example.
As noted above for some workers, especially top earners and the self-employed, it may be useful to incorporate the response of taxable income directly in tax design. If, for example, taxable income did not respond to changes in the top tax bracket, increasing the top rate would increase government revenue and the amount raised would depend on the proportion of people and the average taxable income in the top income bracket.

Figure 3. The Pareto distribution and the taxable income distribution in the UK

In terms of the distribution of taxable income, Figure 3 shows that the Pareto distribution can provide a good approximation, simplifying this part of the analysis. However, increasing the top rate may also induce top-bracket taxpayers to reduce their taxable earnings and this reduction has a cost to society, as tax revenues will be lower. The higher the taxable income elasticity—the proportionate change in taxable income for a given change in the tax rate, the larger is the tax rise needed to raise a given amount of revenue. This sounds straightforward, but the taxable income elasticity is, we will argue, notoriously hard to measure.

III. **Some Facts about Labor Supply and Earnings**

With the focus on earnings tax reforms, our analysis in this section begins with the key changes in lifetime employment patterns over the last three decades. This sets the scene for understanding where, over their working life, individuals and families are most likely, and most able, to respond to tax reform.
Figure 4 shows average yearly hours worked in the labour market since 1968 in three contrasting countries: the US, the UK and France. These numbers include all individuals aged between 19 and 74. As Blundell, Bozio and Laroque (2013), and many others have documented, the history of variation in hours and employment has been made up of three key trends which we will argue also point to the three key margins where responses to tax reform are most likely to occur: a decline in employment among men especially at older ages, a strong rise in employment and total hours of work for women, and a decline in employment among those in their late teens and early 20s partly reflecting the increase in educational attainment over this period.

![Figure 4: Total Hours Worked per Individual by Year](image)

Notes: Average annual hours worked for all individuals aged 19-74.
Source: LFS, EnEm, and CPS from Blundell, Bozio and Laroque (2011)

For some age groups there are only very minor differences across countries whereas at other ages the differences are stark. Average employment rates show surprisingly little variation across countries in the 30-55 age range. Figure 5 shows this to be the case for men in 2007, the last buoyant year before the great recession. This somewhat surprising fact is also observed for women in this age range, as shown in Figure 6.
The similarity of average employment rates for men aged 30-54 in these three economies is striking. In complete contrast are the differences in employment at early and later working ages. At early adult ages some individuals are still in education but many leave education and take time to enter the labor market, see Blundell, Bozio and Laroque (2012). At older ages the incentives in social security pensions, disability insurance/benefit and the tax system
more generally, induce widely varying patterns of employment. Prescott (2004), Rogerson and Ohanian (2008), Gruber and Wise (1999) among others have argued the importance of variations in the extensive margin at older ages for the design of social security and tax systems.

![Figure 7: Total Hours Worked: Women 2007](image)

Note too the lower participation of women around fertility ages. This later difference around fertility years is even more strongly contrasted for working hours as displayed in Figure 7. For women with younger children it is not usually just an employment decision that is important it is also whether to work part-time or full-time. Some of this we will attribute to the specific design of the tax and benefit system, especially incentives to take part-time work in the UK tax credit system. Perhaps even more important given that we will also argue that part-time and full-time work can lead to important differences in wages and on the job experience.

It is not just employment and hours that matter though. Overall gross earnings are the key to income levels and to sustaining an ageing population. For this we need to add hourly wages into the mix and this is where differences in human capital investments really matter. Many industrial countries saw a relative decline in the real wages of the lower skilled at the end of the 20th century. This phenomenon was particularly acute in the UK and in the US during the
1980s and 1990s. ‘Make work pay’ policies that provided in-work benefits, such as Working Families Tax Credit in the UK, were in part introduced and expanded in response to these trends.

As Machin and Van Reenen (2008) among others have shown, the UK and the US also stand out as economies where wages have risen much more strongly at the very top than. These changes are large by historical standards. As the details given in Table 1 demonstrate, earnings at the 95th percentile grew considerably faster than those at the 90th (and indeed earnings at the 99th percentile grew faster still).

An important point about these inequality trends is that they place increased pressure on redistributive parts of the tax and benefit system. They mean that lower skilled workers have fallen further behind and are more likely to fall below any relative poverty line. If welfare benefits are increased in line with (or close to) average earnings, this weakens work incentives, highlighting the importance of underlying inequality in gross earnings for the design of the tax and benefit system for the low-paid.

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<th>Table 1. Hourly wage inequality in the UK and the US: real wage trends by percentile (annualized percentage points)</th>
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Source: Machin and Van Reenen, 2008.

Skill differences matter enormously for earnings. The hourly wages of those with more skills grow faster and for longer over their working life. As an example Figure 8 charts the average hourly wages (in log units) for UK women by age according to their education level. There are many important selection and composition corrections that need to be accounted for to
draw robust conclusions but the descriptive picture of wages is indicative that higher the education level the longer that wages grow and the higher is the point at which they peak (add Figures for men and for the US).

![Figure 8: Life-Cycle Wage Profiles by Education](image)

Notes: Log average hourly wages by age for UK women workers across education levels. Source: BHPS and Blundell, Costa-Dias, Meghir and Shaw (2013).

The story behind these trends in employment, hours and earnings is both interesting and revealing. The remainder of this paper argues that they point to key ways for reducing distortions in the tax system and for improving employment levels and earnings in the longer-run.

IV. Evidence on Responses

There has been substantial empirical research examining the labor supply responses to tax reform for individuals and families, see Blundell and MaCurdy (1999) and Meghir and Phillips (2010), for two among many surveys. Studies range from experimental and quasi-experimental analysis of specific reforms to more structural analysis of the general incentives in the tax and benefit system. It is clear (to some, at least) that an eclectic mix of structural
and (quasi-) experimental approaches can deliver a powerful evidence base. The quasi-experimental studies provide robust estimates of particular policy contrasts while the structural models deliver simulations necessary for a more complete analysis of policy reform. The advent of increased access to administrative data sources has added further precision to empirical analysis, reducing measurement error and allowing the study of responses for specific groups and at specific points on the tax schedule, see Chetty et al (2011), for example. Tax return information itself has provided direct evidence on taxable income elasticities, see Saez, Slemrod and Giertz (2012) and references therein.

As we noted above, this empirical research has emphasized the need to distinguish between the intensive and extensive margins of labour supply - that is between the decision of whether to work or not and how much to work. It has also shown clear differences in responses by age, gender and family composition. Both of these observations are central to tax design. Especially for low earners, responses appear to be larger at the extensive margin—employment—than at the intensive margin—hours of work. Responses at both the intensive and extensive margins (and both substitution effects and income effects) are largest for women with school-age children and for those aged over 55.

Building on these results, there has also been recent a flurry of important contributions that emphasize the life-cycle view, noting that although responses may appear small at certain points in the life-cycle there are other points where they are not. The argument is that labor supply viewed over the whole life-cycle can be quite responsive to taxes even for those who appear not to respond to changes in incentives early in the working career, see Ljundqvist and Sargent (2011) and references therein. In this analysis, tax reforms can substantively alter the input of hours and effort over the lifetime.

French and Jones (2012) dig deeper into these lifetime responses developing a micro-data based model of retirement choices, allowing for the disincentives in social security and medical insurance at the individual level. Reduction in these disincentives is found to have much larger impacts for older workers than for younger works. At older ages there are more workers closer to their participation margin making older workers more likely to respond to incentives and providing more convincing micro-evidence on the potential of supply side responses through the extension of the working life.

Added to this life-cycle view is a greater focus on the interaction between human capital investments and labour supply. In a lifetime framework it is natural to account for responses
in educational and on-the-job investments alongside labor supply. Human capital investments increase the pay-off to work and enhance earnings over the working life. Drawing on a long line of research relating experience capital and future wages, Keane and Rogerson (2012) argue convincingly that allowing for human capital increases the responsiveness of labor supply to tax changes and that these effects differ over the life-cycle.

The life-cycle human-capital setting for the analysis of labor supply responses is hardly new, see Heckman (1976). However, it does seem deserving of more attention and further integration with the general analysis of supply-side reforms to tax, welfare and social insurance. This is increasingly reflected in micro-based studies that acknowledge features of both labor supply and human capital behaviour in tax policy analysis. In a recent study, Blundell et al (2013) for example, note that the pay-off to human capital investments may be greater among workers with already higher initial educational investments. These education investments themselves will depend on perceived returns that can be clearly influenced by redistributive taxation.

As in Heckman and Cairnero (2003), early human capital investments beget future skill development. Suggesting that for workers with low early educational investments, the gain from experience may be more muted. For these low education workers the value of lost experience is less and this can increase their responsiveness to year-by-year variation in supply-side incentives, at least in buoyant economic times. Conditional on educational choices, decisions are less subject to the longer term dynamic considerations of career progression that are central to more educated workers. The Blundell et al paper also argues that there maybe little ‘learning by doing’ experience capital gained in part-time jobs. Explaining, in part, the part-time penalty in wages and providing further evidence of why responses at the extensive margin may differ from those at the intensive margin.

The focus here on hours, employment and human capital should not detract from other key ways that earnings respond to taxes. For example, as we noted earlier, when it comes to the taxation of top incomes and the self-employed, concerns about the tax base come back in to play. Feldstein (1995, 1999) makes a convincing case for looking directly at taxable income. The more opportunities for exemptions and deductions and the possibility to pass income through other lower tax jurisdictions, the more difficult it is to raise revenue from the top income earners. Consequently, we require a more general elasticity measure that captures these other avenues for response. The taxable income elasticity does just that.
A higher tax rate on a smaller base will raise less revenue and will probably be harder to sustain. To quote Slemrod and Kopczuk (2002) “When personal tax rates on ordinary income rise, evasion may increase, businesses may shift to corporate form, there may be a rise in the consumption of deductible activities such as charitable giving, and individuals may rearrange their portfolios and compensation packages to receive more income as tax-preferred capital gains. These responses to higher taxes, and all others, will show up in declines in taxable income, and there is a growing body of evidence, that, at least for high-income individuals, the elasticity of taxable income to the marginal tax rate is substantial.”

It is hardly surprising therefore to find that the responsiveness of taxable income to the tax rate is a key parameter for the setting of top tax rates depends. This elasticity captures additional avoidance and tax shifting responses and, as the quote above suggests, it can be expected to fall as the tax base broadens. For a given tax base we can get an idea of the Laffer rate for the top tax bracket, the revenue maximising rate, through a simple formula. This conveniently exploits the Pareto tail approximation for the taxable earnings distribution. Given an estimate of Pareto parameter ‘a’ and an estimate of the taxable income elasticity ‘e’, the revenue maximising rate is given by $1/[1 + e^a]$, see Brewer, Saez and Shephard (2010), for example. For the distribution of taxable income in the UK, as in Figure 3, the Pareto parameter is around 1.67. In the Mirrlees Review the central estimate for elasticity for the UK was .46, although based on historic reforms to top tax rates and subject to a fair degree of imprecision.

**A lifetime perspective**

Seen from a lifetime perspective, the various different estimated response ‘elasticities’ reported in the empirical literature, form a much more coherent pattern. The points at which many of the key lifetime decisions are being made are also the points at which incentives, including those induced through the tax and welfare system, have most bite. These are the entry into work after school, work decisions for those with young children, and work decisions for older workers, deciding when and how to retire. These points in the lifetime accord closely with the descriptive evidence referred to in section III.

**Younger workers and families**

Gathering up this evidence it seems that younger workers with little formal education are likely to experience a low pay-off from ‘on the job’ human capital investments whether they are passive ‘learning by doing’ or on active investments. This simply reflects the
complementarity between human capital investments of the kind explored in Heckman and Cairner (2003). Consequently, in buoyant economic times at least, low educated workers have little ‘dynamic incentive’ to stay in work over and above the current period incentives typically modelled in standard labor supply analyses. Typically though we have seen that they face important nonlinearities and complexities in the tax and welfare benefit system through the interaction and overlap of the tax, tax credit and welfare systems, especially if they have children. Care needs to be taken to model these nonlinear budget constraints and to account for take-up/awareness of welfare and tax credit entitlements.

It is likely that the distribution of younger low educated workers will be closer to the participation margin, than for their more educated counterparts, making them particularly sensitive to incentives at the extensive margin. For these workers it becomes important to allow for fixed costs of work and childcare costs. Blundell et al (2013) provide some evidence that once these details are accounted for ‘standard’, relatively static, models of labor supply behaviour that account for demographic differences and differences at the extensive and intensive margin as well as program ‘take-up’, as in Keane and Moffitt (1998) for example, provide a reasonably good guide to the behavioural responses to tax and welfare reform. This has certainly been our experience in the UK, see discussion in, Brewer et al (2008), for example.

The literature on labour supply responses for low education workers suggests moderately high extensive margin elasticities, especially for women with younger children, and rather lower intensive margin elasticities (often also pointing to important income effects for such groups), see Blundell and MaCurdy (1999), for example. This combination of elasticities can then be used to argue for the introduction and/or expansion of EITC style subsidy programmes for certain groups of low wage workers, see Brewer, Saez and Shephard (2010) and references therein.

Perhaps the most responsive of these decisions is among low educated mothers returning to work after having a child. This has been well documented in the empirical literature and remains a key point in the design of work incentives for low wage workers. Noting this, Blundell and Shephard (2012) suggest ‘tagging’ implicit tax rates in tax credits and in the taper rate of means-tested benefits according to the age of the youngest child.

Children play a key role in this discussion. Even if fertility decisions are exogenous to the tax system (which maybe an assumption worth relaxing, see Keane and Wolpin (2010)), the
reforms that follow from these ‘Mirrlees’ style arguments often argue for targeted wage subsidies that encourage work among young low educated women. Of course, there are other arguments made to justify these policies, see Moffitt (2005) for a discussion. Nonetheless, if early childhood investments by parents are a key to future child development, subsidising work for low education mothers with younger children, might seem counter-productive. However, if human capital begets human capital from one generation to the next then this concern may be less forceful, see Heckman (2011). Instead the early child human capital investment argument might suggest targeted subsidies or targeted loans for high quality childcare to complement earnings incentives for low wage parents.

*Human Capital Investments*

Human capital investment decisions themselves have often been left to one side in arguments about labor supply incentives. But progressive taxes will change the incentives to acquire education, and to invest in human capital over the working life. They do so in two ways. First, by reducing the expected return to education. Second, by insuring against very low wage outcomes that might otherwise occur for workers with low education levels. Blundell et al (2013) show both to be potentially important considerations in incentives for high school and college enrolment. On the flip-side targeted financial incentives to remain in education have met with some success, see Dearden, Emmerson and Meghir (2009), for example. However, the degree to which progressive taxes do reduce education investments is still far from fully researched.

Human capital investments take two forms – formal education and on-the-job investments. As we saw for the sample of women in Figure 8 above, the hourly wages of those with more education grow for longer into their working life. The higher the education level the longer that wages grow and the higher they peak. What recent research has also found (Imae and Keane, 2004, and Blundell, Costa-Dias, Meghir and Shaw, 2013, for example), is that on the job investments tend to be ‘complementary’ to formal educational investments. Education complements experience capital, increasing earnings and extending the life-cycle profile making early retirement less advantageous.6

For those younger workers who have acquired higher levels of formal education before entering the labor market, there is an enhanced dynamic incentive that adds to the static

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6 There is also some evidence that this complementarity extends to workplace qualification training too, see Blundell, Dearden and Meghir (1996).
current period incentives for work. This has been highlighted by Keane (2009). The idea that human capital investments enhance incentives to work and to work for longer is perhaps no surprise, see Heckman, Lochner and Taber (1998) and references therein. For educated workers, employment generates valuable experience, which more than likely depreciates with time out of the labor market. Consequently very few such younger workers will be near the participation margin and are unlikely to respond very much to employment incentives or disincentives in the tax system while they are young. But seen from a lifetime labour supply perspective the overall impact of taxation on the career length and earnings profile of higher educated workers can be significant. Incentives for early retirement implicit in some social security, earnings tests and medical insurance schemes may then act to reduce the incentive to acquire human capital.

Added to this, Blundell et al (2013) find that part-time work produces little in the way of experience pay-off, at least for the women in their sample. So there is a dynamic incentive to stay in full-time work. This part-time experience penalty adds to the other fixed cost and work organisation arguments as to why part-time work is often found to be less financially rewarding.

Older workers

Even those with high human capital investments are likely to become more responsive to incentives at the extensive margin as they approach retirement. This pattern of responsiveness over the lifetime is something confirmed in French and Jones (2012) who find substantially high labor supply responses at the extensive margin among older workers. There is a greater density of older workers around this margin with important implications for tax policy to which we return below. That later working decisions are responsive to incentives has been documented in many studies. These include the cross-country studies of Gruber and Wise (1999) which focus on the post 55 age group and the more macro based studies, see Rogerson and Wallenius (2009).

A dominant characteristic of the evidence in section III above was the strong variation in labour supply for men and for women in their late 50s and 60s. In most developed countries, labour market activity has fallen at older ages—with some reversal recently. In the UK, for example individuals who are relatively poor or wealthy are more likely to leave employment early than those in the middle of the wealth distribution. Figure 9 shows this clearly. Broadly speaking, the poor are more likely to move onto disability benefits, while those with higher
levels of pension and financial wealth are more likely to retire early and live on private pension income. Those in the middle are more likely to remain in paid work.

**Figure 9.** Early retirement and inactivity by age and wealth quintile in the UK: men

![Graph showing early retirement and inactivity by age and wealth quintile in the UK: men.](image)

Note: Wealth quintiles are defined within each five-year age group.
Source: Banks and Casanova (2003), based on sample of men from the 2002 English Longitudinal Study of Ageing.

**VI. Conclusions and summary implications for reform**

Five messages emerge from the evidence on labour supply. First, it is important to take a ‘lifetime’ view. That is there are different points in the lifecycle where responses to tax incentives are most effective. Second, it is necessary to take account of the interaction between the tax, tax credit and the welfare system. Incentives in the tax credit and the welfare system can be as important as incentives in the personal income tax system for influencing work decisions. The apparent incentives in the reform to a particular tax, tax credit or welfare benefit can be blurred by these interactions. Third, fixed costs and information costs matter for work incentives. Fixed costs of work mean that decisions at the extensive margin (whether to work or not) and decisions at the intensive margin (how much to work when in work) will differ in their responsiveness to incentives. Additionally, information and stigma costs mean that individuals and families may not face the exact incentives as written in the tax and welfare law. Consequently, larger reforms that are well understood are more likely to
have the desired impact on work incentives and net incomes. Fourth, accounting for human capital investment decisions matters for work incentives. Formal schooling investments enhance wages over the working life and ‘on the job’ human capital investments create an additional dynamic incentive to any tax reform. Finally, tax avoidance and tax shifting opportunities can induce important taxable income responses to tax reform, in addition to the induced changes in gross earnings.

The evidence points towards a blueprint for a coherent and effective policy. This would take a life-cycle view of work and human capital accumulation. Key proposals would be to simplify and integrate the benefit/welfare system, target work incentives where they are most effective and align rates across similar sources of income to reduce avoidance opportunities and broaden the tax base.

Tax policy would be designed to acknowledge that incentives have been found to operate most effectively at certain key points in the life-cycle. In terms of enhancing lifetime earnings the evidence suggests three key policy ingredients:

(i) improving labour market entry - for those leaving education and for women after childbirth,
(ii) maintaining employment among older workers, and
(iii) increasing human capital investments.

These three ingredients can go hand in hand. The path to improving long-term trends in employment and earnings would be to reduce disincentives in the tax and welfare system around labour market entry and retirement. These are the margins of labor supply that have been found to be most response to tax incentives. Improving the flows into work for those leaving education and for mothers with young children, while maintaining work among those in their late 50s and 60s. Reforms should recognize that early human capital investments enhance the incentive to work and to accumulate human capital while in work, ensuring gross earnings hold up longer through the life-cycle. In turn, net income earned later in the working life provides an important incentive for human capital investments.

These arguments point to a targeted rearrangement of tax rate schedule directing incentives towards points in the lifetime when labor supply responses, especially at the extensive margin, are found to be strongest; largely for parents with early school age children, and for older workers. For those leaving school with lower educational qualifications the aim is to avoid excessive spells of unemployment. The transition into work for such individuals
appears responsive to work subsidy incentives, unemployment insurance and monitoring, see Blundell, Costa-Dias, Meghir and Van Reenen (2004), for example. But the policy design issue here is to avoid young individuals leaving education too early and experiencing spells neither in work nor education. Financial incentives to stay in high school for those with poor family backgrounds can play a role in this regard too, see Dearden, Emmerson and Meghir (2009). In general work decisions for the young lower educated do appear sensitive to incentives in the tax a benefit system, see Meghir and Philips (2010).

For older workers, work decisions are particularly responsive taxes. Reducing disincentives to work for people in their late 50s and 60s implicit in social security retirement ages, earnings tests, disability insurance and medical insurance provisions can strongly improve incentives to stay in work for longer and improve incentives to invest in human capital too. The more welfare benefits can be linked to contributions the less distortionary they become.

To close this discussion it is worth noting that for the most part we have not directly addressed the way in which it should treat families. Joint taxation and joint means-testing of benefits create very different work incentives, and have quite different distributional consequences, from independent taxation and individualized benefits. It is not just how we think about redistribution that matters for decisions over the taxation of families. We have seen evidence that shows women’s work decisions, at least when they have dependent children, respond significantly to tax rate changes. Other things being equal, this suggests that women with dependent children should be taxed at lower rates. But as we have argued a balance has to be struck between the implicit tax rates on workers in low-income families with children and the desire to redistribute to such families. If we do not worry too much about the sharing of income and resources within the family, the mixed system of individualized taxation and joint income based means-tested welfare benefits, as in the UK, can provide such a balance.7

Some References

7 See Kleven et al (2009) and the discussion in Mirrlees (2011).


