The Impact of Taxation on Labour Force Participation and Labour Supply

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OECD

THE OECD JOBS STUDY
WORKING PAPER SERIES

NO.8

THE IMPACT OF TAXATION ON LABOUR FORCE PARTICIPATION AND LABOUR SUPPLY

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ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Paris 1995

THE OECD JOBS STUDY: WORKING PAPER SERIES

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SUMMARY

This working paper considers how hours of work and labour force participation are likely to respond to tax reforms. As regards hours of work, the analysis looks at married women and lone parents. Married women constitute a group which responds to incentives, as shown by experimental and sample survey studies. Lone parents, an important fraction of the working age population in some countries, often are subject to special tax and income support provisions and have limited sources of alternative income. A second part of the analysis concerns inflows to and outflows from employment, labour force participation and duration of unemployment as they affect men and women in different age groups and with differing family responsibilities.

The analysis is based mainly on the well-documented tax reforms in the United Kingdom. The first part of the paper develops the appropriate methodology for analysing labour supply responses to tax changes and the second part attempts to clarify the magnitude of labour supply responses by the various groups concerned.

L'IMPACT DES IMPÔTS SUR L'ACTIVITÉ ET L'OFFRE DE TRAVAIL

RÉSUMÉ

Ce document de travail étudie les effets possibles de la reforme de la fiscalité sur le temps du travail et les taux de participation. En ce qui concerne le temps du travail, l'analyse porte sur les femmes mariées et les parents isolés. Les femmes mariées constitue un groupe dont le comportement est influencé par des incitations ainsi que les études d'expériences et d'échantillonnage l'ont démontré. Dans certains pays les parents isolés forme une fraction importante de la population en age actif et bénéficient souvent de dispositions spéciales d'imposition et de soutien des revenus tout en n'ayant que peu de sources alternatives de revenus. Une deuxième partie de l'analyse considère les entrées et sorties de l'emploi, de la population active ainsi que la durée du chômage pour les hommes et femmes dans différents groupes d'age et de situation familiale.

L'étude est fondée sur les réformes de la fiscalité au Royame Uni bien documentées. La première partie du document développe le cadre methodologique pour l'analyse de l'offre de la main d'oeuvre à la suite de réformes de la fiscalité et une deuxième partie cherche à estimer l'envergure des réactions des différents groupes dans l'offre de main d'oeuvre.

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I. INTRODUCTION

The tax reforms of the 1980s and early 1990s have involved some of the most dramatic changes in tax policy in the postwar era. In Europe and North America there has been a movement away from highly progressive direct tax structures, towards higher indirect taxes coupled with a broadening of the direct tax base. Social security and pensions have also come under close scrutiny. In many countries it was the perceived disincentives to work that motivated many of these reforms and labour supply responses are commonly attributed a prominent role in the analysis of tax reform. For example, Hausman and Poterba (1987) and Bosworth and Burtless (1992) in their evaluation of the United States tax reforms of the 1980s emphasise the importance of labour supply responses, especially those by married women. This reflects a general view that labour supply responses need to be distinguished by type of individual and by whether they involve a movement *into* work or a *change* in the effort or hours of work of those already in employment. Economic theory alone -- even the simplest neoclassical framework -- does not hold clear-cut predictions for the direction of responses, let alone their magnitude.

At the same time as countries have implemented or debated major tax reforms, there has been considerable growth in research into the measurement of disincentive effects, particularly as a result of the introduction of new methods for analysing individual work patterns in cross-section and longitudinal survey data. Much of this research was found subsequently to exhibit excessive sensitivity and lack of robustness, preventing viable policy conclusions from being drawn. However, there is now a clearer picture of labour supply responses emerging and, perhaps surprisingly, studies across Europe and North America suggest similar conclusions.

The tax reforms and changes to social security benefit structures during the 1980s followed a similar pattern in many countries. There are now fewer marginal direct tax rates than there were in 1978, and, at least at the top end of the income distribution, they are lower. Since 1985, tax reforms have substantially reduced marginal rates for all except those on low incomes relative to that of an average production worker, but in many cases marginal rates for those at a given multiple of APW earnings are nevertheless higher than they were in 1978. In the United Kingdom, for example, over this period direct tax rates faced by individuals at the top end of the earnings distribution fell from over 80 per cent to around 40 per cent with less dramatic, albeit well publicised, reductions for basic rate payers. The 1986 tax reform in the United States contained similar reductions in high rates and a move toward simplification of the tax system. Recent policy changes in Scandinavia and Europe have tended to mirror these changes. In Germany, the reforms which began in 1986 have significantly reduced marginal tax rates for middle income earners. In Sweden, the 1991 tax reform has taken the top tax rates down from around 80 per cent to around 50 per cent, with a reduction in the large number of marginal rate bands to just two: of 30 and 50 per cent. Following the pattern in the United States and the United Kingdom, the reform was broadly revenue-neutral as a result of a simultaneous broadening of the direct tax base through a reduction in the availability of deductions and an increase in indirect taxation. At the same time as taxes have been reformed, the value of state-provided unemployment benefits and retirement incomes has tended to fall behind the growth in real earnings. There has also been, in some countries, a greater reliance on means-tested or income targeted benefits and a move away from universal benefit systems.

The 1980s also saw considerable changes in the demographic structure of the population, particularly an increase in the number of lone parents and in the proportion of the population above retirement age. The growth of these groups has required new research into understanding how these individuals might respond to labour market incentives.

A principal objective of the policy experiments in taxation and social security was the encouragement of work effort to allay worries about the growth in numbers of individuals not working and

receiving benefit income. In many countries, detailed micro-data are available for the 1980s which can be used to study labour market behaviour, in particular, the effect of tax reforms. The usual framework for analysis of behavioural responses is through labour supply elasticity. However, this is *not* an appropriate means of analysing labour supply responses to reforms, since wage elasticities and effective marginal tax rates typically diverge substantially across individuals. In particular, there are well documented differences in elasticities between married men and married women, between part-time and full-time workers, etc. These differences are also pervasive in many other dimensions. Even after the reforms of the 1980s, different individuals still face significantly different effective marginal tax rates. There can be no single, representative labour supply elasticity, as different individuals have both different incentives and different responses to those incentives. The first task in the analysis of tax reform is to associate individual labour supply responses with corresponding marginal tax rates.

'Labour supply' itself is difficult to define. Typically the term is used to refer to both hours of work and labour market participation, which are likely to respond to tax reforms in very different ways. But, should the analysis account for effort or just hours of work? Should labour supply responses be measured over the life-cycle or is a static single period analysis sufficient? Do choices of occupation and levels of human capital investment dominate choices over labour supply? Do the collective demands of firms and/or unions dominate individual choices? Do individuals participate in untaxed activities, either in the household or the black economy, when effective tax rates are high?

The emphasis of this working paper is on two separate aspects of labour supply. The first is labour supply as measured by working hours. The analysis will look at married women and lone parents. Married women are generally thought to be the group most responsive to incentives: the early work of Rosen (1976a, b) suggests that their perception of marginal tax rates is good and numerous empirical studies have recovered relatively large elasticities from both experimental and sample survey data. Lone parents have become an important part of the working age population in a number of countries. They are often subject to separate tax and social security regimes and usually have more limited sources of alternative income than individuals in other kinds of households. The second aspect of the analysis is inflows to and outflows from employment, covering both labour force participation and unemployment duration. In each context it is important to distinguish individuals by sex, age and child caring status. The interaction between family members, especially with regard to unemployment income and labour supply, has also proved important.

The analysis begins by describing how tax reforms have altered incentives, in particular, the level and distribution of marginal tax rates individuals face. The United Kingdom tax reforms are used as an example, not necessarily because they are representative of all OECD tax reforms (although the reductions in marginal tax rates and rate simplification are typical), but because they are well documented and extensively researched. The evidence on labour supply responses is then assessed and the issues of sensitivity and robustness discussed. To the extent that tax reforms are largely exogenous and independent of individual preferences, they provide an ideal setting for drawing more robust conclusions on the size (and direction) of responses. The first part of this working paper develops the appropriate methodology for analysing such responses. The second part of the working paper will try to piece together a picture of the magnitude of labour supply responses for the various groups described above. The intention is to provide a reference point from which to judge the likely impact of tax reform proposals and to compare with estimates of responses for other countries.

II. A PICTURE OF TAX REFORM AND THE MEASUREMENT OF LABOUR SUPPLY RESPONSES

Hours of work and earnings in the 1980s

The United Kingdom tax reforms of the 1980s involved a widespread reduction in marginal rates, changes in tax allowances, increases in VAT and a restructuring of the benefit system making it more dependent on net income. These reforms are summarised in the appendix. Empirical evidence on labour supply responses suggests that they vary with hours worked, gross earnings and other characteristics that also determine marginal tax rates, so it is important to note how changes in effective marginal tax rates (noted in the appendix) affected individuals according to their position in the income and hours distribution. Table 1 presents the average marginal rates faced by women married to employed men in a United Kingdom household survey (the Family Expenditure Survey) by hours of work. Reductions in marginal tax rates were not restricted to women with higher hours but were present across the range, and the reductions in the 'top' tax rates (those over 40 per cent in the United Kingdom) were not important for this group.

For women married to employed men, the effective tax system over this period was fairly simple: apart from a 'kink' at the point at which social security contributions and personal income tax are first levied, most of these women face a predominantly linear budget constraint as described by Figure 1. This considerably simplifies labour supply analysis, since the effect of the 1980s reforms can be summarised by moves in the position of the tax kink and the slope of the budget constraint after the kink point.

There are significant numbers of married women in each hours range (except the very lowest) throughout the period in sharp contrast with the distribution of working hours in other European countries such as France [Bourguignon and Magnac (1991)]. This reflects widespread participation in part-time work: 45 per cent of women in the United Kingdom work part-time compared with under a quarter in France [OECD *Employment Outlook*]. Only Australia, the Netherlands, Norway and Sweden record similarly high figures.

For married women the consideration of hours of work responses seem most relevant as their hours of work are spread over a wide range and this is true for most occupations and industries (Tables 2 and 3), although the bunching in skilled manual and managerial occupations is suggestive of collective agreement on labour supply rather than pure individual choice. This broad spread is useful in evaluating the likely size of responses across the spectrum of the hours distribution. Table 4 allocates individuals to segments of the budget constraint (of which Figure 1 is a simplified version), which is determined by the combination of taxes and contributions paid and benefits received. In Figure 2, this is related to hours of work, with the sample divided into those on the linear segment of the budget constraint, those near to the tax kink point and those with earnings below the level at which they pay tax.

Table 1: Tax rates and weekly hours of work of married women

Hours	Proportion	80/81	81/82	82/83	83/84	84/85	85/86	86/87	87/88	88/89	89/90
≤ 5	0.03	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.04	0.03	0.00
≤ 10	0.07	0.07	0.05	0.07	0.06	0.03	0.01	0.05	0.03	0.00	0.01
≤ 15	0.05	0.36	0.33	0.26	0.24	0.22	0.12	0.26	0.18	0.16	0.17
≤ 20	0.12	0.37	0.37	0.38	0.38	0.38	0.34	0.34	0.32	0.30	0.29
≤ 25	0.09	0.37	0.38	0.40	0.39	0.39	0.38	0.36	0.34	0.32	0.32
≤ 30	0.09	0.37	0.38	0.39	0.39	0.39	0.39	0.37	0.34	0.33	0.32
≤ 35	0.14	0.37	0.38	0.40	0.39	0.39	0.39	0.38	0.36	0.34	0.34
≤ 40	0.38	0.37	0.38	0.39	0.39	0.39	0.39	0.38	0.36	0.34	0.34
40 <	0.03	0.39	0.38	0.39	0.39	0.37	0.40	0.37	0.35	0.33	0.34
Total		0.35	0.34	0.34	0.35	0.34	0.33	0.33	0.31	0.30	0.29

Note: Average marginal tax rates. Working women married to employed men.
Source: Blundell (1993).

Table 2: Hours of work of married women by occupation, 1981-1986

Hours	Professional	Managerial	Teacher	Clerical	Shop-Worker	Skilled	Semi-skilled	Unskilled
≤ 5	2.42	0.94	8.76	2.48	1.75	2.21	3.42	9.68
≤ 10	4.83	1.25	7.63	5.30	9.75	5.65	16.52	23.65
≤ 15	5.43	1.57	7.81	5.70	21.44	7.37	14.13	30.00
≤ 20	15.46	4.08	6.48	12.30	27.49	10.32	16.39	16.83
≤ 25	8.09	2.51	9.14	6.07	11.31	7.62	9.16	8.41
≤ 30	8.70	5.64	28.57	5.17	5.46	5.65	7.74	3.33
≤ 35	13.04	13.17	13.52	18.90	2.53	8.60	4.32	1.43
≤ 40	38.53	58.62	9.71	39.84	16.96	47.17	23.61	5.24
≤ 45	0.97	5.33	2.86	1.26	0.58	1.72	0.90	0.32
45 <	0.72	3.76	3.24	0.29	1.19	0.25	0.77	0.00

Note: Per cent of occupation group. Armed forces excluded. Working women married to employed men.
Source: Blundell (1993).

Table 3: Hours of work of married women by industry, 1981-1986

Hours	Public Services	Primary Industry	Heavy Manuf.	Light Manuf.	Printing	Private Services	Transport	Financial Services
≤ 5	2.06	1.64	2.14	2.65	4.32	3.28	0.72	4.50
≤ 10	5.18	1.64	4.28	5.04	4.94	11.72	4.35	9.24
≤ 15	11.55	8.20	3.83	5.80	7.41	18.60	6.88	8.53
≤ 20	10.57	5.74	8.11	11.22	8.02	18.88	10.14	11.49
≤ 25	14.99	4.10	5.63	8.32	6.17	9.07	5.43	4.38
≤ 30	8.59	0.00	3.15	6.81	4.32	6.43	2.90	2.96
≤ 35	10.55	9.84	8.78	11.85	17.28	6.20	10.14	36.37
≤ 40	8.12	68.85	58.45	40.73	40.12	19.43	48.19	19.08
≤ 45	26.04	0.00	0.56	1.26	0.62	1.50	7.25	0.47
45 <	1.43	0.00	0.56	0.50	1.85	1.19	1.45	0.47
Total	3783	122	888	793	162	2193	276	844

Note: As Table 2.

Table 4: Tax benefit combinations (married women)

	IT	NI	FIS	SB	RR	HB	Total	(%)
1.	-	-	-	-	-	-	3083	26.72
2.	IT	-	-	-	-	-	106	0.92
3.	-	NI	-	-	-	-	597	5.17
4.	IT	NI	-	-	-	-	7591	65.80
5.	-	-	FIS	-	-	-	10	0.09
6.	IT	NI	FIS	-	-	-	3	0.03
7.	-	-	-	-	RR	-	13	0.11
8.	IT	NI	-	-	RR	-	17	0.15
9.	-	-	-	-	-	HB	55	0.48
10.	-	NI	-	-	-	HB	6	0.05
11.	IT	NI	-	-	-	HB	33	0.29
12.	-	-	FIS	-	-	HB	5	0.04
13.	-	-	-	-	RR	HB	12	0.10

Note: Only combinations with more than one observation presented. Results derived from Family Expenditure Survey 1980-1989.
Marginal tax rates calculated on the basis of taxes paid and benefits received. This avoids the problem of modelling benefit take-up when marginal rates are calculated on the basis of entitlement.

Key: IT   = Income Tax;
NI   = National Insurance;
FIS = Family Income Supplement;
SB   = Supplementary Benefit;
RR   = Rate Rebate;
HB   = Rent Rebate/Housing Benefit.

In addition to tax reforms, patterns of labour supply may have been affected by the broadening of the distribution of earnings during the 1980s. Although earnings inequality increased in 12 out of 17 OECD countries during the 1980s [OECD (1993c)], the increase in the United Kingdom was exceptionally large. However, the largest part of the growth in inequality in household incomes can be attributed to the tax and benefit reforms of the 1980s [Johnson and Webb (1992)].

Measuring responses

The size of labour supply responses has been the subject of much controversy. In his exhaustive survey of male labour supply, Pencavel (1986) points to the small and negative responses by prime aged men recovered in the early micro-econometric analyses especially in the United States. The results were subsequently challenged in the more coherent 'second generation' studies developed in Burtless and Hausman (1979) and Hausman (1981). These studies pointed to positive wage effects and negative income effects resulting in non-trivial welfare losses due to taxation, hinting at overall expansion in labour supply from proposed reforms.

Although elegant and internally consistent, the results from studies using the Hausman procedure have been shown to be fragile to mis-specification and measurement error. More robust estimation techniques point to smaller elasticities [MaCurdy, Green and Paarsch (1991)] or at least indicate sensitivity to the measurement of marginal tax rates and non-taxable other income. This conclusion is reflected in work on other countries, for example, the studies by Flood and MaCurdy (1992) and Blomquist (1992) for Sweden.

These sensitivity issues are potentially more critical for married women once it is recognised how influential, and yet unreliable, the estimated wage effect on participation can be [see Mroz (1987) on the United States and Blundell, Ham and Meghir, (1987) on the United Kingdom]. A simple condition, in which an individual moves into employment if the net market wage exceeds a certain level (known as the 'reservation wage'), is the standard way of modelling participation. It is easy to show that many of the large elasticities for female labour supply are simply an extrapolation of the wage effect to participation. Yet, since we cannot know the true market wage for non-participants or correctly measure the size of fixed and search costs, such an extrapolation must be unreliable. Put another way, researchers are assuming that some proportion (say 10 per cent) of women will enter the labour market if net income is $200 per 40 hour week, this figure being based on some estimate of how much they value non-market activities (work in the home, looking for other paid work or leisure). The market wage being offered to that group is being assumed to be $180 per week. A tax reduction of just over 10 per cent should induce them to enter the labour force. This may or may not be true, but it is almost certainly not true that because 10 per cent of women work 40 hours extra following a 10 per cent tax cut, all women's hours of work will increase by four hours a week if taxes are cut by 10 per cent, although this assumption is sometimes made. The participation and hours worked decisions are separate.

This distinction between participation and hours of work is an example of how potentially important features of the labour market are often ignored in simulation models. These include fixed costs of work for women with children, the cyclical nature of demand side constraints on job offers and the impact on current labour supply of life-cycle wealth, which will be affected by future changes in after tax wages as a result of tax reforms.

If individuals have some degree of choice over their labour supply (in other words, if hours are not imposed by employers or negotiated collectively with labour unions), the characteristics of a tax and benefit system will have implications for observed labour supply behaviour. For example, if the net result of the tax and benefit system is not a proportional tax (where the effective marginal tax rate is constant), then bunching in the distribution of hours should be observed. The system of social security contributions leads to a non-linear tax schedule, as at the lower earnings limit (LEL) of the National Insurance system,

there is a very large effective marginal tax rate. It might be expected that part-time workers would respond to this marginal rate by attempting to locate themselves just before the LEL kink, with relatively few to be found just above. Figure 3 (based on 1984 Family Expenditure Survey data) confirms this prediction: over twice as many married women earn in the range £4 below the kink at £34 than in the £4 above the kink.

Choice theory would suggest that if the LEL kink was lowered (raised) the bunching of hours would tend to move down (up). For similar reasons, choice theory predicts that bunching will also tend to occur where the marginal tax rate increases -- say from zero to 25 per cent. A cut in the tax rate may induce individuals in the 25 per cent band either to increase or decrease hours of work. For those earning just above the tax allowance the effect can only be positive (as no or very little tax was previously paid, the tax reduction cannot lead to an income effect, so the substitution effect clearly dominates) but for those on higher incomes the overall response can go either way. A decrease in hours in this case is commonly referred to as 'backward bending' labour supply and is explained by the income effect (from the extra net income at unchanged hours) working against the positive incentive effect of the marginal tax reduction. Of course, even with backward bending labour supply, direct tax increases would still result in a welfare loss in comparison to the lower tax situation, although the supply of hours is increased. In this case, a more redistributive tax can also raise hours of work.

The shape of labour supply responses

Determining the shape of the labour supply curve is therefore a key question. The answer is unlikely to be linear. Consider an increase in the tax rate in a proportional tax system. This reduces the hourly wage for those in employment and reduces the payoff to each extra hour worked. Individuals free to enter the labour market would be less likely to do so. People already in work may also be expected to reduce their work effort. However, from the earlier discussion this latter result is only a prediction from choice theory if those already in work are compensated for the loss in utility generated by the loss in leisure time. In the absence of such compensation, the income effect generated by the loss in earned income, may increase desired work effort: the so-called backward bending supply curve referred to above.

This effect is likely to be more important for individuals working longer hours. This is evident in the non-parametric (or kernel) regressions presented in Figures 4 and 5.[1] Figure 4 depicts the labour supply behaviour for a sample of married women with other income above and below the median level in the United Kingdom Family Expenditure Survey data set. The non-parametric regression method is used because this does not restrict the slope of the labour supply curve at any point. There is a distinct decline in the wage response of women as their hours increase toward full-time hours. At full-time hours, the response becomes negligible if not negative, whereas at low hours the response is large and positive. There is also evidence of a strong income effect, with the labour supply curve for those with above median other income nearly everywhere below that for the group with below median other income. Figure 5 presents the same regression estimated on the labour supply of lone mothers, which again shows evidence of a strong income effect over a large range and of backward bending labour supply.

These non-parametric regression results should be interpreted with caution since no allowance is made for endogeneity of the marginal wage, of other income or of sample selection. It should also be noted that the point-wise standard errors given for married women indicate (the lines above and below the central line), the data are sparse above hourly wage rates of around £6. Notwithstanding these caveats, the raw wages, hours and other income data reveal a non-linear relationship between hours and wages, with labour supply forward-sloping at lower hours (initially quite steeply so) and then becoming backward-bending. The relative positions of the two curves reveal a powerful negative income effect on hours of work. These results highlight the importance of using a flexible labour supply model that does not rule out such non-linearities *a priori* when assessing the incentive effects of taxation.

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This picture of labour supply is a useful way of describing the methods of tax reform simulation. By looking at individuals with different wage rates and different levels of other income, labour supply simulation aims to infer how behaviour will change when taxes change.[2] The implication of the raw data is that cuts in marginal tax rates increase labour supply at the lower end of the income scale, but reduce hours of work at higher income levels.

The sensitivity of econometric estimates

The figures in Annex 1 show that tax and social security contribution systems are often very complex, with kinks caused by changes in marginal rates and social security contribution ceilings. When benefit systems are considered in addition, the marginal rate schedules become still more complex, and the budget constraint facing individuals can be highly non-linear. As a result, the effective hourly wage rate, net of taxes and benefits, facing individuals as they change their hours is far from constant. A further problem in labour supply analysis is separating responses to incentives to other factors influencing hours of work. This could happen because their preferences differ (some people like leisure, others consumption) but it may also reflect differences in their marginal tax rates.

A fortuitous feature of the simplification of the tax system during the 1980s is the resulting large groups of people for whom the tax rate is constant. For women married to employed men in the United Kingdom in 1991, the budget constraint can be reasonably described by Figure 1: apart from a range around the social security contribution kink and the basic tax rate kink, marginal tax rates are constant. Selecting a sample of workers with this constant tax rate (and correcting selection bias) allows a more robust evaluation of labour supply responses. This is the approach adopted in Blundell, Duncan and Meghir (1992 a,b) whose results form the baseline for comparing elasticity estimates below.

Grouping of hours at (or near) kink points on the budget constraint is another problem when investigating tax systems with many different rates. Choice theory suggests that such grouping should occur and that for individuals at these points, desired labour supply should be below (above) the tax kink when evaluated at the tax rate above (below) the kink. Only if this holds will individuals bunched near a kink point be exhibiting rational choice behaviour, but this also implies that the compensated wage elasticity must be positive. If the budget constraint is complex, there will be a large number of such kinks, and so empirical results will be misleading: the data are not given a free hand in determining the estimated labour supply relationship.

This point is central to the debate over taxation and labour supply. Consider the linear labour supply model, popular in tax reform analysis [see Hausman (1981) and Blomquist (1983)], which may be written as

$$h = a + bw + cy$$

where h, w and y are measures of hours of work, hourly wages and other income respectively while a, b and c are unknown constants, the last two being the labour supply response coefficients. Together they determine desired labour supply for any wage and income combination.

When marginal tax rates increase, an individual will decide to remain at a tax kink if his/her desired hours at the higher tax rate would be below the tax kink. This means that the parameters b and c have to be restricted when estimating labour supply effects: choice theory requires b - ch to be positive. With many kink points, this must hold for a wide range of hours, b will have to be positive and c negative, and with b positive there is *forward sloping* labour supply everywhere. But the raw data presented above suggest backward bending labour supply schedules over a considerable hours range. So restrictions from theory become a constraint on the empirical evidence: a negative b cannot be recovered even if the slope of the labour supply curve is close to zero or negative over a large range. MaCurdy, Green and Paarsch

(1991) show that these restrictions appear to have been binding in the influential Hausman (1981) results and may explain the fragility of this model to small changes in specification.

Any realistic empirical model has to allow for measurement error and optimisation error. This allows individuals who would like to locate at the tax kink to be observed off this point and the resulting distribution of working hours is consequently 'smoothed'. Although estimation is more complex [see Hausman (1985)], the arguments raised in the context of the linear labour supply model remain.

There are two possible responses to these issues. First, it is possible to derive models that are more flexible than the linear case. In Blundell, Duncan and Meghir (1992a), for example, the non-linear labour supply model due to Heckman (1974c) was found to fit the data well, satisfying rational choice behaviour and producing a shape for the labour supply curve not unlike Figure 4. Secondly, more robust (albeit less efficient) estimation techniques can be used [see, for example, MaCurdy, Green and Paarsch (1991) in a linear labour supply model of United States men]. Blundell, Duncan and Meghir (1992b) use the simplification of the tax schedule as a device for achieving robust estimates. With a constant effective marginal tax rate over a large income range in the United Kingdom (Table 6 and Figure 2 above), it is possible to select a large sample of individuals on either side of and well away from the kink. A simple estimator can then be used which does not require optimal behaviour for all individuals in the sample.

'Real world' characteristics of the labour market

Before turning to simulation of tax reforms, certain caveats to the standard choice theoretic approach to the measurement of labour supply responses should be noted. These reflect features and institutions of the 'real world' labour market. The effects of some of these on labour supply responses are well researched, while others remain part of the research agenda.

a) Fixed costs of work

Fixed costs of work can take the form of time or money costs, and may even arise as part of the tax and benefit system. For example, a 'safety net' benefit system that seeks to ensure each family has a minimum level of income gives little incentive to accept a job paying less than that minimum since family income would be unaffected. With such a system, people on low hourly wages would find part-time jobs unattractive, and their choice would be restricted to non-participation or full-time jobs. Child-care costs can also be considered as a fixed cost of working, again making part-time work less attractive (although where child-care is available on a daily or hourly basis the effect of the cost on labour supply is more like a proportional tax on earnings). Empirical studies have found a positive correlation between child-care availability and participation, and these effects are not restricted to children: the presence of an older dependent relative in the household is also found to be negatively correlated with participation.

Fixed costs of work influence the trade-off between work and non-work and reduce the effectiveness of marginal wage increases at the point of participation or at low hours as an encouragement to work. For example, 'earnings disregards' in social security benefit calculations, which raise the marginal wage for those with very low earnings are far less effective in the presence of fixed costs.

The presence of fixed costs means that labour market participation of those for whom the fixed cost is sunk, simply reducing income whatever hours are chosen, is likely to be decided on rather differently from participant's choices over increasing or decreasing hours of work. The effect of wages and taxes on participation and hours of work should therefore be modelled separately.

Cogan (1981) showed the elasticity for married women falling from almost 2 to around 0.5 in the United States once fixed costs (averaging 28 per cent of annual earnings in his data) were taken into account. Similarly, Blundell, Ham and Meghir (1987) showed a significant downward shift in the wage response of married women in the United Kingdom after fixed costs were allowed for. But most studies

of tax reforms *do not* separate participation and hours effects despite the clear empirical evidence [see also Mroz (1987)], that estimated wage and income effects are highly sensitive to this separation. The reason is simple but unconvincing: unless fixed costs can be measured, the effects of tax reform on participation are difficult to predict. The result is that many studies extrapolate a strong wage effect on participation across the whole hours distribution, which is exacerbated in a linear model where a strong wage effect at low hours, as in Figure 4 for example, would produce highly misleading predictions at higher hours.

b) Life-cycle savings, demographics and wealth

Individuals may supply labour not just to consume now, but in order to save for future periods when the relative value of non-work activity is higher: for example, retirement, periods of ill-health and spells of unemployment. For women (and men to an extent), this will also cover periods of family formation. As a result, two otherwise identical individuals may supply very different levels of labour reflecting their different expectations of future needs. The individual with higher future needs or a more uncertain future income stream is relatively less well-off in a life-cycle context, and so will supply more labour. To allow for this, a life-cycle consistent labour supply model has been introduced [MaCurdy (1983) and Blundell and Walker (1986)] in which consumption expenditures are used to correct unearned income for savings.[3] The general effect of this adjustment to other income is to increase the size and precision of the estimated income effect on labour supply, *increasing* the compensated elasticity and the welfare costs of tax distortions.

A change in marginal tax rates will have an impact on future net earned income and therefore on expected wealth. Savings will adjust to reflect this. Tax reforms are usually believed permanent and are often unexpected. As a result, they can have a large effect on expected wealth. For example, if a reduction in tax rates reduced the need for saving, the wealth effect may add to the usual income effect and reduce the effectiveness of the incentive to work more hours still further. On the other hand, if the decline in tax rates is coupled with an expected decline in the real value of social security (pensions or unemployment benefit, for example) it may encourage an increase in labour supply to meet future contingencies.

Most empirical analyses of inter-temporal labour supply focus on the inter-temporal elasticity of substitution: the response to an *anticipated* change in the real wage in one period, holding all future real wages constant and maintaining the marginal utility of income, see Altonji (1986) and Browning, Deaton and Irish (1985). It is not surprising, at least in a certain world, that a fall in the *real* wage for one period would reduce labour supply during that period in the knowledge that it is a one-off change. Uncertainty and risk aversion reduce this effect, but elasticities for women are often large and can be in excess of one [see Heckman and MaCurdy (1980)]. However, a tax change is usually neither temporary nor anticipated, and marginal utility cannot be maintained since tax increases (decreases) reduce (increase) wealth and therefore increase (reduce) marginal utility. Large estimated inter-temporal elasticities are significantly reduced once unexpected wealth effects are acknowledged: for example, Card (1991) finds a reduction of 50 per cent. It is likely that the standard life-cycle consistent elasticity provides an inflated view of responses after wealth effects are accounted for [see Bover (1989) for elasticities for the United States], although it can easily be shown that the uncompensated wage elasticity in a life-cycle consistent model provides a more accurate guide to responses.

c) On-the-job human capital and seniority

For some groups there is a significant pay-off to participation in terms of higher future wages; interrupted labour market histories reduce wages, [see Eckstein and Wolpin (1989) and Shaw (1989), for example]. This can occur in a neoclassical model with on-the-job human capital or in a collective bargaining model with seniority related pay. In either case the pay-off to continuing in employment may induce participation where 'simple' choice theory would suggest otherwise. Short-run, temporary fluctuations in marginal wages or in other income are less likely to result in movements in and out of the labour market, thereby reducing the impact of short-run changes to taxes and benefits.

A linear proportional tax clearly encourages more investment in human capital than a system with an increasing marginal rate [Heckman (1976)]. In terms of the impact on labour supply elasticities, the evidence seems to point to a larger experience effect for married women in professional occupations and those with advanced educational qualifications. It is unlikely, therefore, that the 'simple' labour supply model provides reasonable predictions for such groups, who will aim to stay in the labour force through periods where the income earned would not normally be sufficient to induce them into the labour force because of the increase in wages in the long-term.

d) Job queues, unions and collective bargaining

If unions bargain over employment and wages then there will be unfulfilled labour supply at the going wage rate. Information asymmetries in a continuously changing environment also mean that there will be individuals who would like to work but who do not receive job offers. Again, the effects of wage changes on participation will not simply reflect individual choice.

In industries or occupations where unions negotiate over hours of work, as well as employment and wages, bargaining will again result in restrictions on labour supply. This may result in spurious negative correlation between hours of work and real marginal wages unrelated to individual labour supply choice. As a result, researchers have been reluctant to fit standard labour supply models to data on people in highly unionised sectors, and is another reason why research has concentrated on female labour supply, particularly in non-professional occupations.

e) Benefit take-up and effective tax rates

Means-tested benefits are invariably subject to a lower than 100 per cent take-up among eligible households [see Blundell, Fry and Walker, (1988) on housing benefit and Dorsett and Heady, (1991) on family credit in the United Kingdom]. An increase in the benefit withdrawal rate can exhibit two opposing responses [Fraker and Moffitt (1988)]: a higher tax rate for those continuing to take-up the benefit, but as the value of the benefit falls as a result of higher withdrawal, fewer eligible individuals will take-up their entitlement and for them the effective tax rate is reduced. In their study of food stamps in the United States, Fraker and Moffitt find these effects almost completely cancelling out in aggregate. In the United Kingdom, take-up is responsive to the *value* of benefits [see Blundell, Fry and Walker (1988), for example] and this can be expected to reduce the impact of withdrawal rates on labour supply.

The attraction of micro-simulations

The 1980s saw a number of policy experiments that may have influenced labour supply behaviour, providing an ideal opportunity for counterfactual simulation. The Appendix outlines three main feature of the reforms: a cut in income tax rates, increases in the real value of the income tax allowance and a shift toward indirect taxation, particularly from increased VAT.[4] The analysis here will focus on the cut in the basic rate of income tax: using the 1989 FES data, we consider an increase in the basic rate from 25 per cent to 33 per cent, the level that existed up to 1979. The increase in the real value of tax allowances will be ignored in this counterfactual simulation, since the lower levels of allowances in 1979 would have resulted in much higher tax rates on low paid workers, especially women in part-time employment. Similarly, the offsetting changes to indirect taxes and VAT are ignored. While the micro-simulation model can easily account for these changes, exploring the pattern and magnitude of labour supply reactions to a series of off-setting changes is considerably simpler if each component is considered separately.

The sample is restricted to women married to employed men for two reasons. First, the tax and benefit system for them is relatively straightforward. Secondly, it is possible to contrast the different impact that occurs whether husband's income is held constant or the effects of the tax reform on his income are allowed for. This difference emphasises the importance of modelling income effects in the whole household as well as the substitution or incentive effects for individual household members.

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Table 5

Simulation 1: An increase in the basic rate of income tax for married women
Hours of work before and after reform

	0	<4	<8	<12	<16	<20	<24	<28	<32	<36	<40	<44	44+
0	147	-	-	-	-	-	-	-	-	-	-	-	-
<4	-	49	-	-	-	-	-	-	-	-	-	-	-
<8	-	-	33	1	-	-	-	-	-	-	-	-	-
<12	1	-	-	49	1	-	-	-	1	-	-	-	-
<16	-	-	-	2	186	1	4	1	-	1	-	-	-
<20	1	-	-	-	3	78	1	-	-	-	1	-	-
<24	-	2	-	-	-	7	74	-	-	1	-	-	-
<28	-	-	_	1	5	-	3	72	-	-	-	-	-
<32	-	-	1	-	-	-	-	4	63	-	-	-	-
<36	-	-	-	-	-	1	-	1	5	81	-	-	-
<40	-	-	-	-	1	-	-	-	-	14	178	-	-
<44	-	-	-	-	-	-	-	-	-	1	8	14	-
44+	-	-	-	-	-	-	-	-	-	1	-		21

Note: Women married to employed men.
Source: Blundell, Duncan and Meghir (1992b).

Table 5 provides a cross-tabulation of hours pre- and post-reform for the sample of married women. Down the left-hand side are the hours of work of those in the sample supply and along the top are the hours of work they are estimated to supply after the tax reform. The figures are the number of women falling into each cell. If the tax reform had no effect, all women would supply the same amount of hours pre- and post-reform, and there would be entries only in the diagonal.

Although the majority of women do maintain the same hours of work after the reform, a significant minority are found below the diagonal. There are small decreases in hours of work for the majority in response to the basic rate increase as might be expected from the small but generally positive uncompensated wage effects estimated in the models used to provide parameters for the simulation (see below). The backward bending effects are apparent for a few women, reflected in the observations above the diagonal. These women are increasing hours of work in response to the reduction in after tax income. The income effect is magnified in simulation 2 (Table 6) in which husband's net income is also reduced in line with the basic rate increase. There are now many more observations above the diagonal, and there are even non-working women who now wish to work given the reduction in household income. As emphasised above, taking into account all family income may lead to larger income effects than simply looking at the individual.

Table 6

Simulation 2: An increase in the basic rate of income tax allowing husband's income to change
Hours of work before and after reform

	0	<4	<8	<12	<16	<20	<24	<28	<32	<36	<40	<44	44+
0	118	1	2	-	11	10	3	1	-	-	1	-	-
<4	1	48	-	-	-	-	-	-	-	-	-	-	-
<8	-	1	28	5	-	-	-	-	-	-	-	-	-
<12	-	-	-	45	5	-	-	-	1	-	-	-	-
<16	-	-	-	2	181	5	7	10	-	-	-	-	-
<20	-	-	-	1	-	72	1	-	-	-	1	-	-
<24	-	-	-	-	-	4	73	1	-	1	-	-	-
<28	-	-	-	1	6	1	3	72	-	-	-	-	-
<32	-	-	-	-	-	-	-	-	65	1	-	-	-
<36	-	-	-	-	-	-	-	2	-	85	-	-	-
<40	-	-	-	-	-	-	-	-	-	8	183	2	-
<44	-	-	-	-	-	-	-	-	-	-	6	17	-
44+	-	-	-	-	-	-	-	-	-	-	-	-	22

III. A SUMMARY OF LABOUR SUPPLY RESPONSE ESTIMATES

Hours of work elasticities

The size of labour supply responses to income and marginal wage changes is still the subject of debate among empirical economists after more than 20 years of analysis. The most reliable picture of responses is for married women, and though there remains some dispute over the size of responses, using the method outlined above it is easy to explain differences between studies. For prime-aged men the story is less clear-cut, but there a consistent picture of the sign and size of responses is now emerging.

a) Married women

Table 7 gives a representative (though by no means exhaustive) comparison of empirical studies. The results point to a positive uncompensated wage elasticity (uncomp. wage) from the substitution effect and to a negative income effect as choice theory would suggest. This results in reasonably large compensated wage effects (comp. wage) and indicates non-negligible efficiency gains from reducing tax rates for these. Recalling Figure 4, however, a single response measure could be misleading: detailed analysis of individual labour supply responses at the Institute for Fiscal Studies has highlighted the variation in elasticities between different groups, depending on their hours of work and family circumstances. These results are data-coherent and produce well behaved elasticities supporting a degree of backward-bending labour supply behaviour, whilst remaining theory-consistent for over 98 per cent of the sample.

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Table 7. **Some elasticities for married women's labour supply**

Author	Uncomp. Wage	Comp. Wage	Income
Cogan (1981)	0.65	0.68	-0.03
Hausman (1981)	0.45	0.90	-0.45
Arrufat and Zabalza (1986)	0.68	0.62	-0.06
Kaiser, van Essen and Spahn (1992)	1.04	1.22	-0.18
Strom and Wagenhals (1991)	0.96	1.02	-0.06
Blundell and Walker (1982)	0.43	0.65	-0.22
Blundell, Duncan and Meghir (1992b)	0.42	0.61	-0.19

Source: Killingsworth (1983, p. 193) and Blundell (1993).

There is still debate over the sensitivity of these labour supply estimates to small changes in specification, and studies adopting more robust procedures tend to find slightly smaller elasticities. An elasticity of about 0.5 for married women is a fairly robust result, and higher elasticities such as those found in the studies by Hausman and by Kaiser *et al.* partly reflect an upward bias from the participation response. The likely size of the effect on participation of married women is assessed below.

It should not be assumed from these results that a 1 per cent cut in the marginal tax rate would increase labour supply by 0.5 percent, since responses differ across the hours distribution and tax reform does not effect the marginal wage of all individuals in the same way. For some women there are large positive responses, while for others the response to an increase in the hourly wage is very small or even negative. Arrufat and Zabalza (1986) find a significant fall in the elasticity with hours worked, highlighting the importance of micro-simulation in the evaluation of tax reforms.

b) Prime-aged men

There is much less variation in hours worked by married men (inflows and outflows from employment are discussed below). The majority of prime aged men are likely to be found in occupations and/or industries in which labour supply is determined by collective agreement of some kind. As a result, there are far fewer credible studies of male labour supply, and these tend to find smaller and often negative wage elasticities. Table 8 documents some examples of the literature. Because men are generally found in full-time employment, these results are not completely out of line from the results for women, especially full-time women, but the lack of variation in hours of work leads to a lack of precision in the estimates. The large income effects in Table 8, especially in the case of Hausman (1981) for the United States, imply large compensated effects and therefore correspondingly sizeable efficiency losses from taxation [although the results of MaCurdy *et al.*, (1991) suggest that this income effect is probably over-estimated]. Responses in working hours by prime-aged men are small and possibly negative.

Table 8. **Married men's labour supply elasticities**

Author	Uncomp. Wage	Comp. Wage	Income
Hausman (1981)	0.03	0.95	-0.92
Ashworth and Ulph (1981)	-0.33	0.29	-0.62
Kaiser, van Essen and Spahn (1992)	-0.004	0.28	-0.28
Blundell and Walker (1982)	-0.23	0.13	-0.36

Source: as Table 7.

Table 9. **Lone mothers labour supply elasticities**

Author	Uncomp. Wage	Comp. Wage	Income
Hausman (1980)	0.03	0.65	-0.12
Bingley, Symons and Walker (1992)	0.76	1.28	-0.52
Blundell and Walker (1982)	1.44	1.68	-0.24

Source: As Table 7.

Labour market inflows and outflows

The analysis of labour market transitions covers three distinct areas: labour market participation of married women, duration of unemployment of those seeking work and the flow into unemployment by employed individuals. There has been little analysis of the schooling/work choice and the early retirement decision and so no comment on the responsiveness of these decisions is made. As with working hours, incentives differ between individuals meaning that micro-data are required to measure responses. The importance of robustness and careful analysis of individual data follow from the previous discussion, so this section reports current results without further consideration of the problems in generating them.

a) Labour market participation by married women

Married women's decisions whether to work or not potentially exhibit the largest response to taxation. A particularly important issue is the presence of fixed costs of work. This interferes with the prediction of responses, especially for women who would like to work part-time. Nevertheless, a large number of studies in different countries point to a large participation effect, again reflecting a labour supply curve much like that in Figure 4: examples include Strom and Wagenhals (1991) on Germany, Layard, Barton and Zabalza (1980) on the United Kingdom and Cogan (1981) on the United States. These results point to a response elasticity that is probably reasonably well determined and around unity.

This estimated elasticity may be affected by two factors raised above: fixed costs of work and the household income effect arising from husbands who are also affected by tax reform. The micro-simulation exercise above showed that the income effect can largely offset the incentive effect, even for labour force participation. Although married women's hours choices have been found to be responsive to after tax wage changes, the income effect is also typically large and of the opposite sign. It is important to caution against the use of these elasticities independently and to allow for the feedback through the income effect.

It is also important to take account of feedback through the benefits system as a result of participation choices. In the United Kingdom the unit of assessment for benefits is the family. The benefit income of an unemployed man will be reduced if his wife works, imposing a 'tax' on the income of the married women. Although there is a level of earnings exception before benefits are reduced, this is extremely low. There is a strong disincentive to work for women married to unemployed men, and this is reflected in low observed participation rates, despite low level of household income and high estimated income effects in most cases [see Kell and Wright (1991) on the United Kingdom]. This highlights the importance of considering the detail structure of the tax and benefit system as it affects different families as well as overall elasticities.

b) Duration of unemployment

The analysis of unemployment durations has mainly considered the rate of exit from unemployment without looking at which labour market state the unemployed individual is moving to. Given the growing numbers in many countries in early retirement, long-term sickness and on training or other programmes, this limited analysis misses important features of labour markets. Ignoring these alternative labour market states probably results in under-estimates of the effect of unemployment income on the return to work probability.

Subject to these caveats, a wide range of studies have found rather small effects of replacement rates on return to work probabilities. But since job search within work can be as efficient as search during unemployment, the only effect of replacement rates is through the value of 'leisure', or perhaps more accurately the value of non-market activities (looking after children etc.). The value of leisure is likely to vary between individuals: in the case of married women with children this is likely to be particularly high, and may explain the higher estimated elasticities for this group. For men the value is likely to be lower, except perhaps in the case of early retirement or entry to education. Atkinson and Micklewright (1985) provide one of the most comprehensive analyses of unemployment duration and find that estimates from many empirical studies are rather sensitive to incidental assumptions and data selection.

Among the best of the earlier studies of unemployment duration are those of Lancaster and Nickell (1980). They estimated an elasticity of exit from unemployment with respect to the replacement rate for men of between -0.4 and -1. In comparison, the robustness studies of Atkinson and Micklewright (1985) and Atkinson, Gomulka, Micklewright and Rau (1984) find a much wider range and some evidence of a smaller effect, a sensitivity reflected in other studies. A reasonable conclusion from these studies is that the elasticity is of the order of -0.5. This implies that a 50 per cent rise in unemployment income reduces the exit probability by around 20 per cent in a given period: for example, if the probability of an individual finding a job in a particular period was 10 per cent, then the 50 per cent increase in unemployment income would cut that to 8 per cent.

c) The transition to unemployment

Given these results, it is difficult to believe that entry into unemployment for prime-aged men is significantly affected by replacement rates, although this is not the case for married women or for men considering early retirement or education. Stern's (1986) detailed study of repeat unemployment spells found no significant effect of benefit income on the length of individuals' spells.

IV. CONCLUSIONS

Empirical analysis of labour supply, both hours of work and participation, has a central role in the evaluation of tax reform. This chapter presented illustrative simulations of the effects of reforms, stressing the importance of micro-simulation which allows correct modelling of the tax and benefit schedule

faced by an individual, and allows responses to wage and income changes to vary between individuals of different demographic and economic circumstances.

The wide ranging tax reforms of the 1980s provide a number of important policy experiments which invite analysis. Married women appear to be the group most responsive to tax reforms, measured in the normal framework. However, tax reform has significant family income effects on married women as well as changing marginal wages and the results showed that these income effects can go a long way towards cancelling out labour supply increases due to net wage changes. It is important to analyse tax reform in a household context.

Care is also needed both in estimating and interpreting labour supply parameters. The overall picture of labour supply responses, especially for married women, is now fairly well understood but it is important to distinguish between participation and hours of work effects and look at the precise shape of the labour supply curve over the range of hours worked. Furthermore, some reforms are designed to encourage participation (changes to the benefit structure, for example) while others aim to encourage more work from those already in employment (reductions in income tax rates).

After assessing the sensitivity of empirical procedures and providing examples of more robust estimates, a summary of the estimated responses was given, divided into different demographic groups. These elasticities may be useful in designing policy but in themselves cannot give the whole picture: tax reforms have different effects on effective marginal tax rates of different individuals. Micro-simulation alone can combine data on working patterns and the structure of marginal effective tax rates.

Notes

1. In non-parametric regression, each data point is assigned a distribution (or kernel) and these distributions are then summed to give an overall distribution. The regressions were performed using the interactive program NP-REG devised by Duncan and Jones (1991).

2. Reforms to the system of means-tested benefits can be treated in the same framework: they usually combine a change in hourly net wage (through the movements in benefit withdrawal rates) with a change in the level of unearned (other) income. However, since benefits are often assessed on the basis of the family unit rather than the individual, withdrawal rates will often affect all workers in the household. This can produce quite complex interactions in household labour supply, most notably in the UK for the labour supply of women married to unemployed men, who displayed persistently lower rates of labour market participation during the 1980s [Kell and Wright (1989)].

3. The UK FES data are ideal for this as they include consumers' expenditure records for all households as well as their weekly labour supplies.

4. The introduction of independent income taxation for married couples was a major feature of 1980s reform, but its impact on labour supply was probably rather limited.

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Tax Reform in the United Kingdom

Table A1 summarises some of the main features of the United Kingdom tax and benefit system over the 1980s. The main 'in-work' benefits and tax thresholds were maintained in real value, with the exception of the lump sum child benefit which had lost 10 per cent of its real value by 1989. Income tax allowances, above which income tax becomes payable, were increased by 20 per cent in real terms, taking a significant number of people out of the tax system. Table A2 gives a more detailed picture of changes in taxes, showing the decline in basic and higher income tax rates countered, to a degree, by the increase in employees' national insurance contributions (NI), which although linked in name to unemployment and pension benefit entitlement, contributions have only a marginal effect on incomes when unemployed. The floor and ceiling to contributions have remained constant in real terms over the period. Finally, the increase in the main VAT rate reflects a policy of shifting to indirect taxation. Reforms to the system of means-tested benefits eliminated marginal effective tax rates of over 100 per cent, although partly at the expense of extending the range of income over which benefit withdrawal occurred.

Table A1. **Main benefit rates and tax allowances in the United Kingdom**

	1989	Uprated 1979
	Benefits per week (£)	
Child benefit	7.25	8.21
Single unemployment benefit	34.70	32.33
Income support per couple	54.80	51.84
	Tax allowances per year	
Single persons allowance	2785	2215
Married man's allowance	4375	3445

Note: Uprated by retail prices index, May 1979 to March 1989. Child benefit is a lump sum benefit equal for each child in this period. A married woman is eligible for the Single Allowance.

Table A2. **Tax and benefit changes, 1979-1989**

	79	80	81	82	83	84	85	86	87	88
Basic rate	33-30	30	30	30	30	30	30	29	27	25
Top rate	83-60	60	60	60	60	60	60	60	60	40
Allowances	8% rise	-	frozen	-	8% rise	2% rise	2% rise	-	-	-
NI	6.5	6.75	7.75	8.75	9	9	9	9	9	9
VAT	9-15	15	15	15	15	15	15	15	15	15

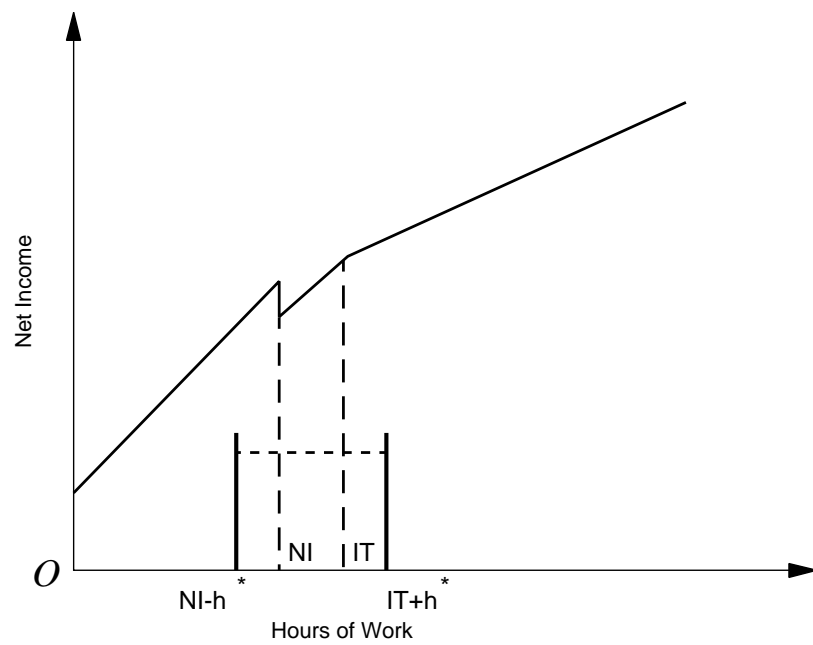Figure 1. **Married women and the United Kingdom tax system**

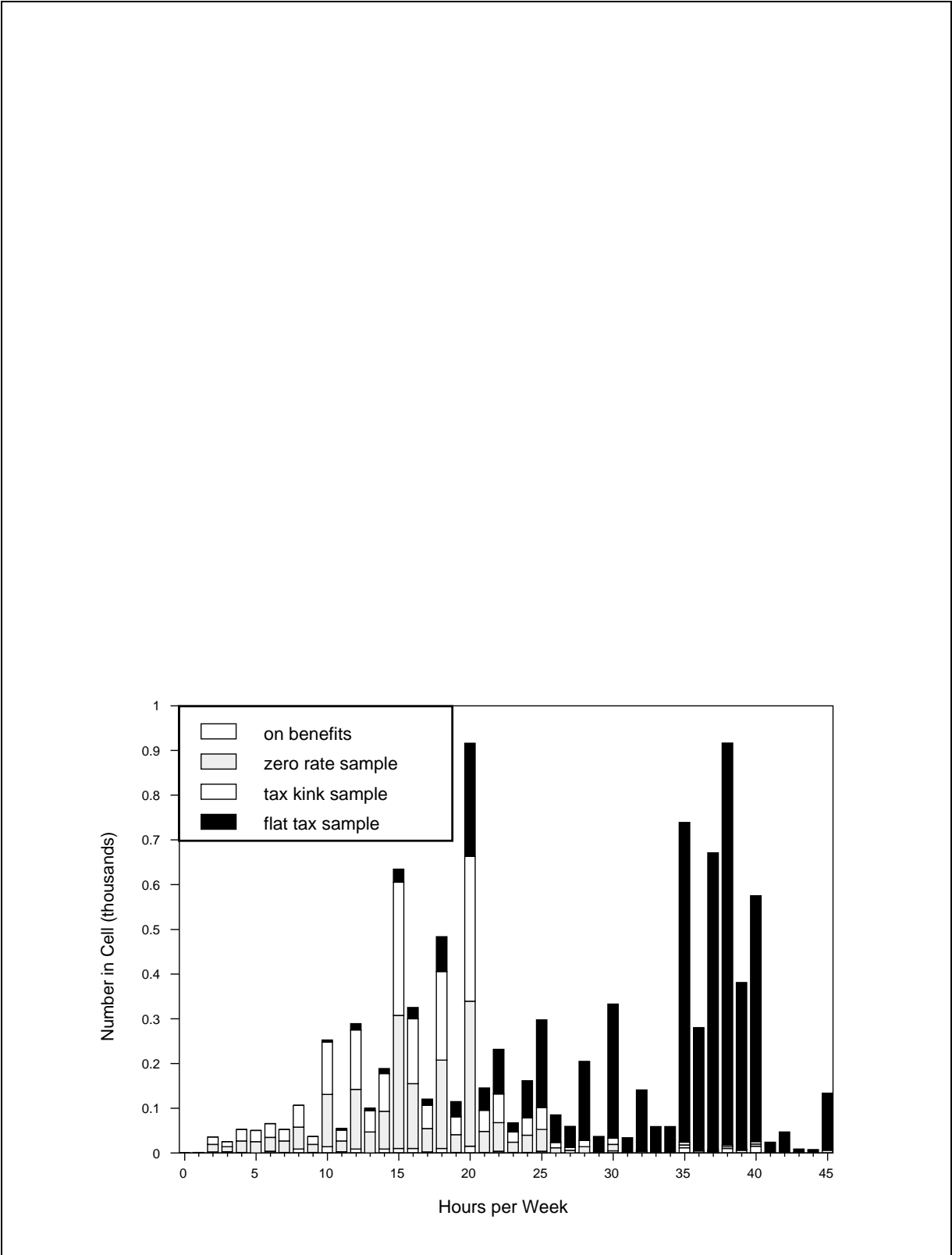Figure 2. **Hours distribution for married women in the United Kingdom**

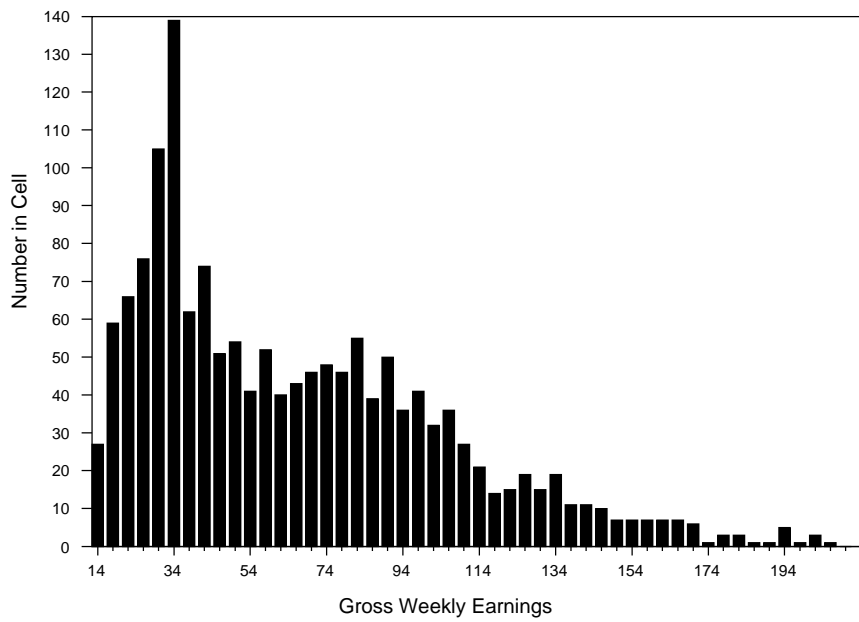Figure 3. **Married women's earnings and the NI kink**

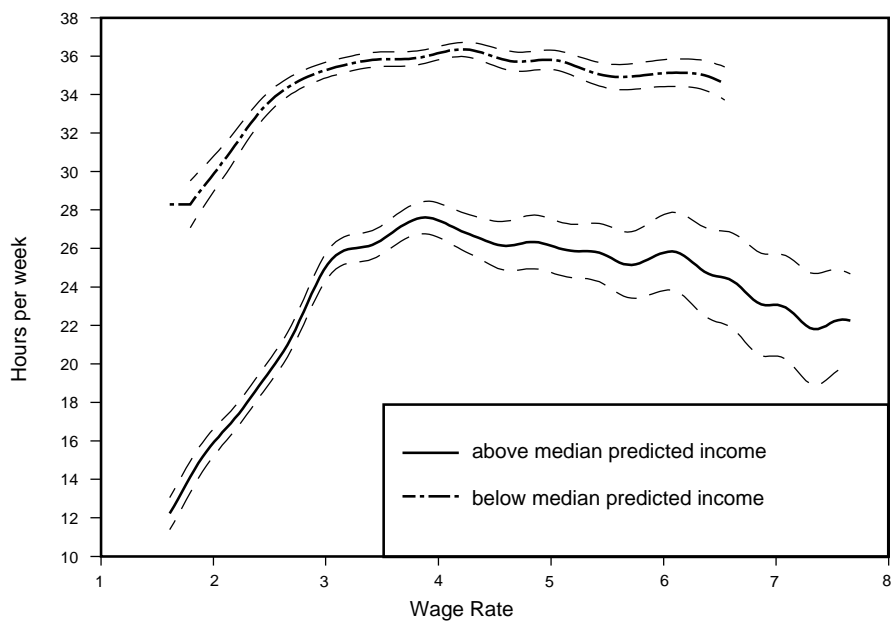Figure 4. **A picture of labour supply
(married women)**

Figure 5. **A picture of labour supply**
(lone mothers)

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