
**INCOME TAX AND
WELFARE REFORMS:
Microsimulation Modelling and Analysis**

Tim Callan



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INCOME TAX AND WELFARE REFORMS: MICROSIMULATION MODELLING AND ANALYSIS

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MICROSIMULATION MODELLING AND ANALYSIS*

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GENERAL SUMMARY

Objectives of the Study

This paper sets out a new approach to the analysis of income tax and welfare reforms in Ireland. It provides a way of answering such questions as: How many individuals or families would stand to gain or lose from a reform? Who would be the main beneficiaries or losers from a change? How many families would see their marginal income tax rates fall or rise? The lack of this type of information has hampered debate on the merits of reform proposals.

Microsimulation Modelling

Until now questions about the effects of tax reforms have been examined using supposedly "typical" family circumstances as hypothetical examples. This procedure can be highly misleading. For example, reaction to the Budget's changes in taxation tends to focus on its impact on a one-earner married couple with 2 children, taxed under PAYE. Less than 1 family in 20 actually falls into this category; and those who do differ widely in terms of income, housing tenure and other characteristics relevant to their tax liabilities. In any event, hypothetical calculations for such cases cannot identify the overall pattern of gains and losses.

Microsimulation modelling offers a solution to these problems. A microsimulation model can be used to calculate or "simulate" the tax liabilities faced by each family in a large scale sample of households, under existing rules and under various alternative policies. The information on the effects of policy changes on each household (i.e., at "micro" level) can then be summarised to answer various questions. In this way it is possible to assess the immediate impact of a policy change on the net incomes of families at different income levels, changes in the marginal income tax rates they face, and the overall cost or net revenue of reform proposals.

Individuals and families may change their behaviour in response to policy changes. For example, an individual facing a lower marginal tax rate may decide to work longer hours. In principle, microsimulation

models can be extended to take such behavioural responses into account; but the present model, like many currently in use in other countries, focuses on "cash" or "first-round" effects of policy changes.

Data Base, Model Structure and Reliability Assessments

A data base with information on the incomes and other circumstances of a nationally representative sample of families is an essential prerequisite for a tax-benefit model. The present model is based on information from the Survey of Income Distribution, Poverty and Usage of State Services, conducted by the ESRI in 1987. This survey gathered detailed information on income from employment, self-employment, social welfare and other sources; as well as information on housing tenure and costs which could be relevant to tax liabilities.

The rules of the 1987 income tax system are modelled, so that tax liabilities can be predicted from the data on gross incomes provided by respondents. The reliability of these predictions is assessed by detailed comparisons of the level and distribution of income tax liabilities against statistics from the Revenue Commissioners' annual reports. These checks show that predictions based on the ESRI data are, in general, close to the relevant official figures. The reliability of information on receipt of social welfare payments is also examined. It is found that the numbers in receipt of payments under the major schemes, and expenditures on these schemes, are close to those reported by the Department of Social Welfare's official statistics. These results confirm the representativeness of the data, and their suitability for costing and analysing policy changes.

Taxation of Social Welfare Benefits

One of the reforms examined is the taxation of short-term social welfare benefits - a proposal which has generated considerable controversy. It has sometimes been argued that taxation of these benefits would be regressive, bearing particularly on those on low incomes. Analysis of the issue using the ESRI tax-benefit model shows that this is not the case, if incomes over a 12 month period are taken into account. Most short-term welfare recipients would not be affected; and less than 1 in 10 of those who would lose are in the bottom 30 per cent of the income distribution, adjusted for family size. Out of every £10 of tax foregone by the exclusion of short-term welfare payments from the tax base, over £8 goes to the families whose annual net income puts them in the top half of the distribution. The results do not imply that social welfare expenditure

itself is poorly targeted; but they do imply that the benefit from exempting short-term social welfare expenditure from taxation does not go to those with relatively low annual incomes.

The model is also used to analyse the effect of taxing child benefit, while using the revenue gained from this process to increase the benefit. On the basis of 1987 incomes and tax parameters, it is found that an increase of close to 40 per cent in the gross child benefit payment could be financed by making the payment taxable. On average, those in the bottom half of the income distribution, adjusted for family size, would gain from such a change; while those in the top half would lose. This change could, therefore, achieve the objective of "targeting" child income support towards those on lower incomes, without many of the disadvantages associated with means-testing or income cut-offs. All families with children would continue to gain some net benefit from the scheme; but a part of that benefit would be selectively withdrawn through the income tax system, so that those with high incomes would receive a net benefit of about £2 for every £5 received by those with the lowest incomes. Given that most married women with children are not working in the paid labour market, any tax liability would usually apply to the father's earnings, while the payment made to mothers would increase.

Base-Broadening, Rate-Reducing Reforms

A package of base-broadening and rate-reducing measures, along the lines proposed by the Commission on Taxation for a first phase of direct tax reform, is examined. It includes abolition of employee PRSI contributions, thereby reducing the standard rate of tax-cum-PRSI by almost 8 percentage points; a cut in the top rate of tax of 8 percentage points; and a standard rate band of about double the 1987 level. These reductions in income taxes would be financed by a property tax (with an income-related exemption); abolition of reliefs for medical insurance and life assurance premia; and taxation of short-term social welfare benefits. The package is designed to bring in the same net revenue as the actual 1987 system of tax and social insurance, i.e., it is "revenue-neutral".

Model-based calculations show that this package would have resulted in substantial reductions in effective marginal tax rates (including social insurance contribution rates) for many taxpayers. The number of taxpayers facing marginal rates of over 35 per cent would have been reduced from almost 750,000 to about 250,000. Over half a million taxpayers would

have experienced reductions of more than 5 percentage points; about half of these would have experienced reductions of more than 10 percentage points.

The reform package involves very substantial net gains and losses within most income groups. This reflects, in part, the fact that at each income level, those benefiting most from exemptions and deductions under the 1987 system tend to lose from the withdrawal of these benefits, while those not so benefiting tend to gain from the general reduction in tax rates. The reform also involves a considerable amount of vertical redistribution. There are gains at the very bottom of the income distribution, but the main change is a redistribution from the upper middle reaches of the distribution towards the very top. The idea that cuts in tax rates and broadening of bands financed by extension of the tax base would maintain the overall progressivity of the income tax system does not seem to be borne out. Base-broadening measures help to improve the trade-off between the efficiency gains from lower tax rates and distributional concerns; but a modified trade-off does persist.

The position of the tax system on this trade-off can be heavily influenced by under-indexation of personal allowances and tax bands. A comparison of an indexed 1980 income tax policy with the actual 1987 policy strongly illustrated these points. Tax liabilities in 1987 were almost one-third higher than under an indexed 1980 policy; the liabilities for those in the highest income groups were affected even more strongly by under-indexation. While inflation rates are now much lower than in the early 1980s, mandatory indexation of bands and personal allowances still seems highly desirable. It would ensure that explicit decisions would be required to make such important changes in average tax rates and the redistributive impact of the tax system.

Conclusions

The approach set out in this paper for the assessment of reforms to the tax and welfare systems in Ireland represents a major advance on what has previously been possible. Further development of the model will be required to provide up-to-date costings of policy changes, and allow more detailed analysis of social welfare policy options. But the applications to specific reforms in this paper illustrate the value of the general approach and of the current model. It allows exploration of policy options before they are implemented. Proposals can be examined, revised in the light of problems shown by this examination, and re-evaluated. This process offers the chance to make significant improvements in the design of policy.

Chapter 1

MICROSIMULATION MODELLING OF TAX/BENEFIT POLICIES

1.1 Introduction

The Commission on Taxation identified equity, efficiency and simplicity as the main criteria against which the structure of a tax system should be judged, for a given level of revenue. In evaluating proposals for reform it is relatively straightforward to judge the impact on simplicity and compliance costs. But assessing the likely effects on revenue, incentives and the distribution of income presents a greater challenge. This paper sets out a new response to that challenge in the Irish context, drawing on the rapidly expanding international work on microsimulation modelling of tax and benefit changes.

What is a microsimulation model? A simple working definition is that microsimulation models are designed to analyse the effects of policy changes on a representative sample of individuals or families.¹ Specifically, tax/benefit models calculate for each family in a representative sample the social welfare benefits to which it is entitled and the income tax for which it is liable, under existing policies or some alternative policy.² It is then possible to see, for example, how many families stand to gain large or small amounts as a direct result of policy changes; the average cash gain or loss for particular types of family (e.g., those including low-paid employees); the numbers experiencing increases or decreases in marginal tax rates which might affect changes in work effort; and the change in net government revenue in the absence of such behavioural responses to the change. In this way, microsimulation models can provide detailed information on the revenue, incentive and distributional implications of changes in taxes and benefits.

Having outlined the broad structure of the approach, the remainder of this chapter discusses its advantages and limitations. We begin by setting out in more detail the need for analysis based on representative samples of actual households rather than illustrative calculations based on hypothetical examples.

¹Chapter 3 describes the model used to analyse Irish income tax and social welfare policies in this paper.

²Some tax-benefit models go further, and attempt to attribute indirect tax liabilities as well.

1.2 Why are Tax-Benefit Models Needed?

Tax-benefit models are used to analyse the cost, revenue, distributive and incentive effects of policy changes. But are microsimulation models needed to perform this analysis? Or are there any simpler methods which would suffice?

As far as the costing of policy changes goes, an adequate answer might be expected from administrative statistics. This is true for many policy changes, but by no means all. The nature of the income tax system, for example, means that microsimulation techniques must be applied to the administrative records in order to find out the cost of reducing tax rates or widening tax bands.³ The current lack of integration between the income tax and social welfare systems makes it difficult to estimate the benefits of integration: administrative statistics collected by the Department of Social Welfare are based on payments under particular schemes, and are not at present matched with corresponding tax records. More generally, there are difficulties in using administrative statistics to assess reforms which extend the coverage of a tax or benefit, since administrative data will usually refer only to those currently covered. A tax-benefit model based on a representative sample can overcome these problems if the individual household data contains sufficient information on which to base calculations of social welfare entitlements and income tax liabilities. If so, then a tax-benefit model can be useful in simply costing the effects of policy changes which involve integrating taxation and social welfare.

But even when administrative statistics allow accurate costing of policy changes there are important advantages to be gained from tax-benefit models. In assessing prospective policy changes it is important to know not only what the aggregate costs or revenues will be, but also to know how they affect individual families. It is in terms of the welfare of individuals or households, after all, that economics typically characterises societal welfare.⁴ In the absence of a tax-benefit model, calculations for supposedly typical families are often used to illustrate these effects. For instance, the Budget statement is accompanied by calculations of the effects of tax changes for a number of examples. The most "typical" of these - and the one which dominates in media coverage - is the married couple with 2 children and 1 earner, taxed under PAYE. But less than 1

³A recent OECD study noted that while a formal tax model was not used in Ireland "the database and the estimating techniques used are in many respects similar to tax model techniques, although the scope and capabilities are more limited than in the model-based methods" (OECD, 1988, p. 14).

⁴e.g. using a "social welfare function" along the lines of Samuelson (1955).

family in 20 falls into that category. Even among these families, there is considerable diversity in terms of income, housing tenure and other characteristics relevant to their treatment by the tax-benefit system. In the UK a systematic attempt was made by the Department of Health and Social Security to construct a limited number of hypothetical households which would adequately represent the effects of changes. The 8 family types selected by them covered 70 per cent of actual families in terms of demographic composition; but when assumptions about housing tenure, spouse's earnings and the like are taken into account, the coverage falls to under 5 per cent (Atkinson, King and Sutherland, 1983). Perhaps the sternest warning about the use of hypothetical families is that of Stark (1988), pointing out that "It is usually possible to prove anything with a well-chosen 'typical' household".

Even apart from these problems, analysis of hypothetical examples could not answer many important questions⁵ such as: How many families would gain or lose? How much would be the average gain or loss for particular groups? How much would the effects on net incomes vary within income groups? How would those at particular points in the income distribution be affected? What is the effect on the income distribution itself? Thus, the need for an alternative approach is clear.

1.3 Advantages

Tax-benefit modelling offers a solution to these problems. Instead of trying to expand the number of hypothetical examples to cover the population (which would very soon become unmanageable) one can use a nationally representative sample. This ensures adequate representation of the diversity of actual household circumstances. It allows a better answer to questions about the overall impact of proposals on particular groups (the low paid, two-earner couples, families with children) and on the variation in impact within these groups than is currently possible.

The advantages of the microsimulation approach which are particularly important from the point of view of relevance to policy include the following:

⁵For some relatively simple policy changes it may be possible to answer some of these questions using a combination of administrative or demographic statistics and hypothetical examples; but these methods are not sufficient to deal with the changes which are typically of interest.

1. Policy changes can be specified in terms of the instruments at the government's disposal - rates of tax, tax free allowances and social welfare rates.
2. The cash effects on families and households can be calculated. This allows the policy maker to establish how many people gain or lose in cash terms, a first approximation of the likely gains and losses, and to identify the main characteristics of cash gainers and losers. Alternatively it can be used to show the first-round effects on prespecified groups.
3. When considering the effects of changing one policy the interactions with other policies can be taken into account. For instance, a change in long-term social welfare rates also affects tax liabilities: part of the gross cost is recouped, and the distribution of net benefit differs from the distribution of the gross increase.
4. Fundamental policy reforms can be analysed as well as incremental changes.
5. The approach facilitates direct comparisons of alternative policy packages, as well as of any given reform and the status quo.

1.4 Limitations

All the structural advantages listed above can be gained by simply modelling the existing rules of the tax and transfer systems and those which would apply under a reform of the systems, and applying them to calculate the immediate cash effects on families. Such calculations are usually called "cash gain", "first round" or "static" effects. But the limitations of these figures should be recognised. The static revenue/cost estimates are biased. As King (1988) puts it "schemes which have beneficial effects on incentives will appear more expensive than they actually are, and the cost of schemes which reduce efficiency will be underestimated". The

modelling approach can, however, be extended to what is called "dynamic microsimulation", attempting to take into account behavioural responses to policy changes.

In the direct tax/transfer area, labour supply responses are generally considered the most important.⁶ Incorporating labour supply responses into a dynamic tax/benefit model is a challenging undertaking. Extensive international efforts have so far met with limited success, and most work with tax-benefit models still relates to cash gains and losses. Atkinson and Sutherland (1988a) suggest two main reasons why this is so.

The first is that the present state of the debate about tax reforms has scarcely moved beyond the use of simple hypothetical examples, and the use of sample survey data is in itself a major step which needs careful explanation... The complexity of the tax and social security system, coupled with the diversity of individual circumstances, means in our experience that the first-stage calculations are often as much as can be profitably introduced into the policy debate....

The second reason ... is that welfare calculations taking account of behavioural responses are conditional on estimated responses....Experience has shown that estimated behavioural relations are sensitive to the choice of data, to the sample studied, to the specification of the relationship, to the modelling of the policy parameters, to the treatment of unobserved characteristics etc. Moreover the available evidence is often confined to sub-samples of the population and cannot legitimately be extrapolated to the whole population. So that, although great progress has been made in recent years in the estimation of behavioural responses, in our view the routine incorporation of these responses into tax-benefit models is some distance in the future (Atkinson and Sutherland, 1988a, p. 3).

⁶Other responses of interest might include changes in housing demand consequent on a property tax; or changes in the pattern of demand for goods and services arising from the redistribution of income through income tax or social welfare changes.

In the Irish context, microeconomic estimation of labour supply responses has lagged far behind that in other developed countries. Work is currently proceeding on the estimation of labour supply responses (Callan and Farrell, 1991) which could ultimately be incorporated into the modelling process. But the diversity of results in the international literature on labour supply models suggests that even when it is possible to incorporate estimated responses, the "cash gain" calculations will continue to play an important role as a benchmark.

1.5 Structure of the Paper

The advantages and limitations of microsimulation models are discussed in more detail in the next chapter, which reviews the international experience in the design and use of tax-benefit models. It includes an assessment of recent international attempts to incorporate labour supply responses in such models, and draws out the implications from the international experience for the design of an Irish model. The current implementation of the approach for Ireland is set out in Chapter 3. The relevant features of the dataset, concepts used in the analysis and structure of the model are described. A number of tests of the model's accuracy in simulating policy changes are reported in Chapter 4. Some policy options are explored in the next two chapters. Chapter 5 deals with taxation of short-term social welfare payments, and the inclusion of child benefit in the income tax base. Analysis of some base-broadening and rate-reducing policy options, as recommended by the Commission on Taxation (1982, 1985) and the National Economic and Social Council (1986, 1990), is contained in Chapter 6. The main themes are drawn together in the final chapter, which also discusses future directions in the development of the model.

Chapter 2

INTERNATIONAL EXPERIENCE WITH TAX-BENEFIT MODELS

2.1 Introduction

Microsimulation modelling of tax and transfer policies has developed rapidly over the past 25 years or so. The theoretical basis provided by the work of Orcutt and his colleagues (Orcutt, 1957 and 1960; Orcutt *et al.* 1961) and the analytical needs of the US social policy debate in the 1960s led to the development of early models.¹ A model of Reforms in Income Maintenance (RIM) was sponsored and extensively used by the Commission on Income Maintenance Programs set up by President Johnson in 1968; this was the forerunner of the Transfer Income Model (TRIM) of the early 1970s. US models since then have developed in several directions: some aiming at incorporation of behavioural responses to policy changes; others at exploring the future effects of current demographic and other trends by "ageing" the data base.²

Interest in tax-benefit models in other countries has also mushroomed. A major impetus towards the development of microcomputer based models has come from the work of the Programme for Taxation, Incentives and the Distribution of Income at the London School for Economics (Atkinson, King and Sutherland, 1983; Atkinson and Sutherland, 1988a) and the Institute for Fiscal Studies (Dilnot, Kay and Morris, 1984; and Dilnot, Stark and Webb, 1988). The list of countries for which microsimulation models have been constructed now includes the US, the UK, Germany, France, Italy, Denmark, the Netherlands, Finland, Norway, Austria, Canada and Australia.

This chapter aims at drawing out the implications from the international experience with tax-benefit models for the design of a tax-transfer model in Ireland. A comprehensive review of the historical development, structure and uses of each of these models is outside the

¹Much of the extensive US legislation on social programs in the 1960s was undertaken before the development of even these early models.

²Each of these distinct approaches (incorporation of behavioural responses, and simulation of policy effects over a time path by "ageing" the data base) can be called "dynamic". "Dynamic" methods for "ageing" the data base, which involve projecting the life-cycle of the base-period households, are also distinguished from "static" methods, which alter the weights attached to households to reflect updated control totals or distributions.

scope of this chapter.³ There are, however, two broad sources of summary information on the lessons to be learned from past experience. First, there are a number of accounts of the historical development of the US models in particular, which summarise the problems and solutions adopted. Second, the structure of current models reflects to some extent a survival of the fittest: successive revisions and redevelopments have aimed at overcoming problems in earlier versions. However, the "dead hand of the past" may also cause the current structure to diverge from what would currently be regarded as ideal: for example, a policy reform not envisaged during the original design phase may be modelled by a more complex process than if it had been incorporated from the start. Distinguishing features of the model which reflect "historical accidents" and those which reflect a considered response to problems can be difficult, especially when documentation is sparse. For this reason, we concentrate on the current structure of the UK models constructed by the IFS and LSE teams to provide evidence of this type: representatives of each of these teams have provided extensive help and guidance from their experience. There is the additional advantage in this case of a broad similarity between the Irish and UK tax/transfer systems, and between the data sources used (the UK CSO's Family Expenditure Survey and the ESRI Survey of Income Distribution, Poverty and Usage of State Services).

2.2 Lessons from US Experience

Webb, Michel and Bergsman (1990) summarise the experience in developing the RIM model into TRIM in the early 1970s, and later into a more complete framework (TRIM2). They emphasise the importance of a flexible modular structure to the model: this facilitates development of the model by allowing the development of extra modules, or modifications of one module while others can be left unchanged. Their experience was that the speed with which calculations could be carried out also became relevant, as requests for simulations of revised policy proposals began to increase. They also found it important to document exactly what the models were doing, and to ensure that each simulation was to some extent self-documenting, i.e., the results of the simulation included not only the results, but information on what policy changes had produced them, and whether there were any special considerations such as the simulations being based on a sub-sample. Flexibility in terms of the output of tables

³See Merz (1985), Orcutt, Merz and Quinke (1986), Haveman and Hollenbeck (1980) and Lewis and Michel (1990) for useful reviews of a number of models.

was also seen as desirable. Achieving flexibility in several directions, speed and a modular structure required good programming technique and organisation of the data. Their main concerns for future development included making the models more user-friendly and accessible to outside users; in particular, an interactive specification of policies for the simulations was seen as desirable.

Beebout (1980) emphasises two goals of the Microsimulation Analysis of Transfers to Households (MATH), which was also developed from the TRIM model. First, standardisation of procedures for adjustments to the raw data base (such as imputation of missing information, or addition of variables not included in the data base by use of regression or statistical matching techniques). Second, allowing wide variations in policy assumptions by making extensive use of parameterisation, i.e., modelling the existing system and alternatives in a sufficiently general way that different systems can be summarised by a number of key parameter values.⁴

Merz (1985) identifies two trends in more recent US microsimulation models. First, a growing concern with behavioural responses: this issue is considered in Section 4 of this chapter. Second, increasing attention being given to updating data bases using available demographic and economic information, particularly by means of what he terms "static ageing" techniques.

Much of the US experience reviewed by these authors has been with models operating on mainframe computers. Recent UK models, operating on personal computers (PCs), have made considerable progress in the directions deemed desirable by these reviews of US experience. Thus, it is to recent UK experience with PC-based models that we now turn.

2.3 Tax-Benefit Models in the UK

Two main UK models based on micro-data are reviewed here. The model known as TAXMOD was produced in the course of the ESRC Programme on Taxation, Incentives and the Distribution of Income at the London School of Economics (LSE).⁵ The Institute for Fiscal Studies has also developed a model, initially for mainframes but with later versions

⁴A simple example may help to make this clear. One approach to modelling tax allowances for mortgage interest would be to permit a full deduction for interest paid, or none at all; but a more general way would be to define the proportion of interest which would be allowable as a policy parameter. This would allow all values from 0 to 100 per cent to be examined.

⁵A rather different mainframe-based model, the Tax Reform Analysis Package (TRAP), was also produced by the LSE team. Some of its features are considered in Section 4 below.

running on PCs. The main focus is on the structure of the latest versions for which published information is available, though noting some of the changes which have taken place in the development process.

2.3.1 TAXMOD

The TAXMOD program (described in Atkinson and Sutherland, 1988a) is designed to be used directly by policy makers as well as to be readily available to other researchers. This had a major influence on the construction of the program, which is menu-driven. It is based on a set of tax units drawn from the 1982 Family Expenditure Survey (FES). Particular attention is given to a weighting procedure which ensures that the grossed-up sample represents key features of the population.⁶ The weights are chosen to ensure that the distribution of the reweighted sample replicates control distributions over family composition categories, employment status, income range (from an Inland Revenue sample of taxpayers) and housing tenure. The model initially dealt only with those in full-time work, excluding cases where the head of a tax unit is unemployed, retired, a part-time worker (under 30 hours a week), sick or not in the labour force. The total coverage was then 15 million out of the total of 27 million tax units, and the range of questions which could be addressed was correspondingly limited. But more recent developments have expanded the coverage, so that now there are no systematic exclusions from the population of private households.

In order to assess a particular policy change using the model, the precise details of the reform must first be specified. The program then calculates the effect which this reform would have on each household by comparison with the baseline, current situation.⁷ The program produces a wide range of indicators of gains and losses, for prespecified groups, overall summary statistics on the change in the distribution, etc. The model does not incorporate possible responses in behaviour: incomes before taxes and transfers are treated as being unaffected by the policy change.

⁶See Atkinson, Gomulka and Sutherland (1988) for details of the procedure.

⁷In order to put the actual tax/transfer regime on the same basis as the reform being analysed, it is necessary to predict the effects on households using the existing rules, as well as the effects of the reform; thus, for example, predicted tax liabilities rather than actual tax payments under the current regime are used in the baseline. Non-take-up of means-tested benefits is modelled simply by giving each eligible household or individual a probability of take-up equal to the overall take-up rate.

For any specified reform, the net effect on government revenue is calculated. An alternative approach is to impose revenue neutrality. TRAP, the mainframe predecessor of TAXMOD, had such a facility, with the standard tax rate or a lump-sum subsidy automatically adjusting to provide a revenue neutral outcome. But in practice it has been found that such revenue neutral options can be quite readily derived by users, who may choose to use additional instruments other than the standard tax rate in order to do so.

The model has been used to assess the impact of such changes as the integration of income tax and national insurance contributions, raising the income tax threshold, increasing child benefit, altering tax reliefs, and changing the graduated rate structure, in various combinations. It has also been used to investigate "basic income" and "partial basic income" schemes and the tax treatment of husbands and wives (Atkinson and Sutherland, 1988b and c respectively).

2.3.2 The IFS Tax/Benefit Model

The Institute for Fiscal Studies has developed a model of the UK tax/benefit system for implementation, like TAXMOD, with the sample of actual households gathered in the FES. The basic model is based on the tax unit but can aggregate these into households to produce household-based output. While the model is made available to policy makers and other researchers, it has also been the base for more specialised development and applied by IFS researchers to the analysis of labour supply behaviour in some depth (as discussed in Section 4 below).

The model covers almost all tax units in the FES, but excludes students. It has primarily been used to examine possible reforms of the tax/benefit system, including the fundamental reforms suggested by Dilnot, Kay and Morris (1984), and to explore replacement ratios, marginal tax rates, and incentive effects. It has also been used to analyse the impact of the changes actually introduced in successive Budgets, for example the restructuring of the National Insurance contribution system in the 1985 Budget (see Davis and Dilnot, 1985), or the longer-term view of the implications of a series of budgets, as in Johnson and Stark (1989).

While focused very deliberately on the analysis of concrete policy proposals/actions taken and intended as a tool for policy making, it can also be used as the starting point for sophisticated behavioural analysis. Labour supply responses are not incorporated in the full IFS model; however, estimated responses for married individuals are included in a version known as SPAIN (Simulation Package for the Analysis of INcentives)

which is considered in Section 4 below. The main model does, however, incorporate routines which deal with the relationship between estimated entitlement to means-tested benefits and actual "take-up" of benefit. Take-up of small entitlements tends to be particularly low, as is take-up of means-tested benefit by working families. The estimated relationships embodying these features can be used in either of two ways. First, to predict which of the sample cases take up their benefit entitlements; or second, to treat each of the sample cases as representing a population group, and apply the estimated probability of take-up to derive "expected" benefit receipts for that population group.

Much of the published output of the IFS model is not grossed-up, or is based simply on treating each unit as representing the same number of units in the population. More recent versions of the model allow the option of grossing-up along the lines pursued in TAXMOD.

2.4 Allowing for Behavioural Responses

Behavioural responses may have major implications for the distributional - and revenue - effects of many policy changes; indeed policy reforms are frequently designed with the intention of producing precisely such responses. For this reason, estimation and incorporation of behavioural responses has become a major concern in the further development of many of the models, in the US and elsewhere. Behavioural responses can be used simply to improve positive predictions of the effects of reforms and the money gains/losses they produce. They can also provide the basis for estimates of gains and losses in economic welfare (or "utility"), which may be measured in money terms. This is done, for example, by the TRAP model which was the forerunner of TAXMOD, and by the analyses of Apps (1989) and Jones and Savage (1989)⁸.

The behavioural responses which will be relevant will vary depending on the precise area being analysed. In the context of the income tax and social security systems the most obvious area of importance is labour supply, but clearly the model could also focus on other areas. It could be used to look at changes in the tax treatment of housing, for example, where

⁸The money measure of welfare change in each of these studies is given by the concept of "equivalent gain", i.e., the change in income which, in the absence of a policy change, would leave the family as well off as if the policy change actually occurred. This should not be confused with the simple adjustment for household size and composition which yields income per equivalent adult or "equivalent income": for this reason IFS researchers have chosen to call this "equivalised income".

housing demand responses become more relevant and labour supply less so. Here we will concentrate on labour supply: many of the issues which arise in this context are also important elsewhere.

A very substantial literature analysing the determinants of labour supply at the individual (rather than aggregate) level has developed in recent years, as micro-data on individuals and families became more widely available. Substantial progress has been made in estimation techniques.⁹ But there is considerable uncertainty about the exact magnitudes and, in some cases, the signs, of the responses of male and female labour supply to changes in policy parameters. Changes in taxes and social security systems affect labour supply primarily through wages and non-labour income; but diverse estimates of the responsiveness of labour supply, especially that of married women, to changes in wages and non-labour income have been generated. The results are sensitive not only to choice of survey or of sample¹⁰ but also to the specification of the economic model and its functional form. This diversity need not be of concern if one model or class of models was clearly superior; but this is not the case. Each of the models deals with a subset of the major concerns, such as the detailed budget constraints implied by tax and social security systems (a topic surveyed by Moffitt, 1990); involuntary unemployment (Blundell, Ham and Meghir, 1986); or other demand-side constraints which may restrict individuals' labour supply options (Brown *et al.* 1986, van Soest *et al.* 1990).¹¹ It is impossible to incorporate simultaneously all the refinements found in the literature into one estimated model: the combined data requirements would exceed what could be expected even from a survey specifically devoted to labour supply issues.¹² Thus, it is important that the uncertainty about estimated parameters (which is not adequately summarised by their standard errors) should be incorporated into simulation results which use them.

⁹For general reviews of this literature, see for example, Killingsworth (1983) or Killingsworth and Heckman (1986).

¹⁰To an extent not accounted for by sampling variation.

¹¹Other topics which have been the focus of interest include the joint determination of labour supply and commodity demands (Atkinson and Stern, 1980; Blundell and Walker, 1982); and intertemporal aspects of labour supply (Blundell and Walker, 1986).

¹²On this point, see Brown *et al.* (1986) and Kooreman and van Soest (1990).

Progress in incorporating such complex behavioural relationships into an operational model of the tax/benefit system has been rather patchy. In practice, there may be a trade-off between theoretical elaboration, theory consistency and the coverage of the model. Elaborate models may be developed applying only to particular sub-groups, such as married women with working husbands in single tax-unit households.¹³ But, as Atkinson and Sutherland (1988) note, it is not legitimate to extrapolate such results to wider samples.

A further problem is that "there is clear evidence of an underlying trade-off between flexibility and theory-consistency" (Blundell and Meghir, 1986). For example, a simple linear labour supply function, relating hours worked to wage rates and non-labour income, will be consistent with the restrictions of economic theory for all individuals if the coefficient on wages is positive and that on non-labour income is zero or negative. But with a functional form which allows greater flexibility of labour supply response¹⁴ (e.g., with quadratic terms in wage rates) the estimated parameters will, typically, imply that the data for certain individuals violate the theoretical restrictions. King (1986) notes that this has important implications: when the data violate the theoretical restrictions, welfare gain calculations for these households will then be meaningless; but dropping them from the sample leads to an unknown bias and narrows the coverage of the model, reducing the policy relevance of the analysis. The results of Jones and Savage (1989) and Apps (1989) show the empirical relevance of these points. Models which explicitly incorporate individual variations in taste ("preference error") can help to resolve this problem. But such models often require quite simple functional forms and/or imposition of parameter restrictions before estimation.¹⁵ In such circumstances it is not clear that they represent a superior alternative.

In the Irish context, there is little previous research based on individual or household level data on which to build. For example, the main previous studies of female labour force participation (Walsh, 1971 and Walsh and Whelan, 1973) were undertaken before many of the techniques now commonly used in the international literature had been developed. The

¹³This is the group dealt with by the SPAIN model (Blundell *et al.*, 1986).

¹⁴Stern (1986) emphasises the inherent drawbacks of the simple functional forms and stresses the need for tractable and flexible functional forms.

¹⁵Moffitt (1990) and MaCurdy, Green and Paarsch (1990)

ESRI data was designed to allow microeconomic estimation of a number of labour supply issues, building on the extensive international literature. A substantial programme of research in this area is under way: first results are contained in Callan and Farrell (1991) which concentrates on the labour supply of married women.

It is intended to incorporate the results of these labour supply estimates into the modelling process. However, international experience suggests quite a long lag between the development of "static" microsimulation models and later versions which incorporate estimated labour supply relationships. The summary above of problems and uncertainties in the estimation process itself and of the calculation of measures of economic welfare based on estimated utility functions illustrates some of the reasons for this lag. In the interim, however, some insights into behavioural responses can be gained by a number of simpler techniques. The present paper uses one of these: documenting the effects of policy changes on marginal tax rates. This in itself represents an important advance on what has previously been possible in the evaluation of policy changes in Ireland. Another technique which could be employed is to apply a range of elasticities of hours worked to wage rates and labour income, in order to capture the possible responses of those currently at work. This technique could be useful, for example, in evaluating reforms for which it is claimed that strong incentive effects will have a major impact on revenue: it could establish the size of the elasticity required to achieve the claimed revenue effect. A similar method might be applied to evaluate reforms which claimed to increase participation: sensitivity analysis would show how strong an effect on participation would be required to achieve the claimed revenue effect. The evidence from Callan and Farrell (1991) suggests that hours worked are not very sensitive to the wage rate, and that the overall labour supply response would be dominated by changes in participation. But in order to incorporate participation effects, the model would have to *predict not only the size of the overall effect on participation, but also which persons would become participants*: this is a priority for further development of the model.

As already mentioned, labour supply is not the only behavioural element which will be relevant to the assessment of the effects of tax/benefit reforms. Depending on the policy reforms involved, the responses of most interest could be in many other areas, e.g., responses in the housing market, or in the utilisation of public services such as health. It may, therefore, be necessary to develop other behavioural relationships and introduce them into the model for particular analyses. Labour supply

is the clear priority in this context, however. A broader issue relates to the feedback effects which behavioural changes induced by policy reforms may themselves have on prices and demand: labour supply responses, for example, may lead to changes in wage rates and unemployment, which could only be picked up in a full labour market model. It is unlikely that such effects could be incorporated directly into a tax/benefit model based on individuals and families, though their likely magnitude could perhaps be illustrated by reference to such other work as may be available.

2.5 Conclusion

The implications of the international experience might be summed up as follows. Static microsimulation models must be built first, and cash-gain calculations represent an important first step for policy analysis. Microeconomic estimation of labour supply responses comes next. Incorporation of labour supply responses into microsimulation models, still at an early stage of development internationally, should attempt to take into account the uncertainty of the estimated results, perhaps through sensitivity analyses. Estimation of labour supply responses can also provide individual utility functions which can be used in the calculation of welfare gains and aggregated into a Samuelsonian social welfare function; this opens up a range of other possibilities including some of those explored in the Irish context by Madden's (1989) analysis of indirect tax reform and Honohan and Irvine's (1987) calculations of marginal deadweight losses from taxation. In principle, third round ("labour market") or fourth round ("general equilibrium") effects could also be modelled; but international experience would suggest that the progress in these areas will be even more difficult.

Having outlined the strategy into which the current model fits, and the length of the road to be travelled, it is now time to emphasise the importance of the first steps. The current version of the tax-benefit model for Ireland is based on cash gain calculations, but it also allows a calculation of the effects on marginal income tax rates, which can be used to inform assessments of the likely behavioural responses. Both features (cash gain and marginal tax rate calculations) represent significant advances in the analysis of policy options in Ireland. Decisions on policy issues have had to be taken in the past without a knowledge of even the first-round effects on a representative sample of households. The applications in this paper will show that the static model can play a useful part in informing policy choices.

Chapter 3

DATA BASE AND MODEL STRUCTURE

3.1 Introduction

Tax-benefit models consist of two main elements: information on the incomes and other circumstances of families and a set of rules applied to that data base. Clearly, the available data have an influence on what sorts of policy changes can be analysed. But there are also choices to be made in the organisation of the raw data, and in the structure of the modelling process, which it is important to understand. Thus, the present chapter describes the relevant aspects of the raw survey data used in this study, and the means by which it is processed into a form suitable for a tax-benefit model. It also sets out the structure of the present model, and gives some indications of directions for future development.

The representativeness of the survey is also a critical question from the point of view of policy analysis. To some extent, this can be assessed by simple comparisons of survey-based estimates with actual population totals and distributions from independent sources. But some of the most important cross-checks on the adequacy of the model data base come from simple applications of the model-based procedures themselves: estimation of the distribution of taxable income, or the distribution of marginal tax rates, for example. Both forms of reliability assessment deal with relating the model's data base to external sources of information. Given the importance of this topic, it seems preferable to bring all the evidence relevant to it together in Chapter 4. Thus, Section 3.2 below deals with the content of the survey rather than its representativeness. The model's structure is outlined in Section 3.3.

3.2 Data Requirements

The first requirement for a tax-benefit model is a sample survey including the information relevant to the calculation of income tax liabilities and social welfare entitlements. These informational needs were taken into account in the design of the ESRI Survey of Income Distribution, Poverty and Usage of State Services which was conducted in 1987.¹

¹Further details on the survey are set out in Callan, Nolan *et al.* (1989). Sets of the questionnaires used in the survey are available on request from the ESRI.

Private households constituted the population to be sampled; those living in institutions were excluded. The Electoral Register was used as a sampling frame, with a multi-stage stratified and clustered sample giving each individual on the Register an equal probability of selection (see Whelan, 1979 and Keogh and Whelan, 1986).

The survey interviewed a national sample of over 3,300 households. The response rate from the effective sample (i.e., the total sample *less* those who had moved away, died, or had addresses which no longer existed) was 64 per cent; lower than that attained by surveys which demanded less information, or less sensitive information, but similar to that achieved by the CSO's Household Budget Surveys.² Non-response would only distort the representativeness of the sample if some groups were more likely to respond than others, so that certain groups would be overrepresented and others underrepresented. This can be assessed by comparisons between the sample and external information on the demographic and socio-economic characteristics of the population of private households.

A higher than average response rate for rural households, households headed by persons aged over 35, and a lower response rate among households headed by a semi-skilled or unskilled manual worker led to underrepresentation of households which were urban, headed by a person under 35, or headed by a semi-skilled or unskilled worker. A reweighting scheme was implemented to correct for these biases, so that the weighted ESRI sample is nationally representative in terms of urban/rural location, age group and socio-economic group of the head of household, and household size.³ The representativeness of the sample in terms of other variables is examined in Chapter 4.

The survey gathered detailed information on current and recent labour market experience, income from work, social welfare and other sources and so on. Every adult in the household not in full-time education was interviewed, where feasible, in order to obtain the most accurate and

²The response rate was 56 to 57 per cent in the CSO's 1973 and 1980 Household Budget Surveys, and just under 60 per cent in the 1987 HBS. A much improved response rate from farm households, achieved through co-operation with Teagasc's National Farm Survey was a major factor in the increased overall response rate to the 1987 Household Budget Survey.

³Since households with several electors had a higher chance of being chosen, they were also overrepresented; the reweighting procedure also corrected for this tendency. The precision of income estimates based on the sample is improved by this approach, given that the variance of income is greater in larger households.

comprehensive responses possible. In cases where a full individual interview could not be completed an abbreviated questionnaire with key information on income and labour force status was obtained.

Table 3.1 highlights the differences between the main income concepts used in the analysis. The full individual questionnaires gathered information on gross (and net⁴) income from employment (for the last pay period), self-employment (for a 12 month period) and social welfare not only for those currently receiving such income, but also for those who had received it during the 12 months before the interview; information on the number of weeks worked or in receipt of social welfare was also obtained. This, combined with information on annual income from more variable sources such as rent, interest and dividends allowed the construction of a measure of gross annual income.

The estimate of annual income was derived as follows. Current or last gross pay was multiplied by the number of weeks at work during the 12 months prior to the interview; and social welfare payments were also multiplied by the number of weeks for which they had been received during that year.⁵ Annualised current income is still used here for those individuals for whom only an abbreviated questionnaire was completed.⁶ Some specific implications will be noted where relevant in the interpretation of the results. However, it seems likely that for income tax purposes, the measure of annual income which reflects periods in and out of work is more relevant than an annualised current income figure. Current income, on the other hand, is more relevant to the calculation of social welfare entitlements. It is possible for the model to deal with these and other differences between income concepts for income tax and social welfare purposes: it does not have to "plump" for a single measure of income for all purposes.

⁴It is the gross income measure which is used as an input to the model. The model itself is used to derive income tax liabilities, and the net income measure. Chapter 4 gives detailed comparisons between the level and distribution of tax liabilities predicted by the model and tax receipts recorded by the Revenue Commissioners.

⁵The fact that earnings would tend to rise over time (due to general wage inflation and/or person-specific pay increases) means that this annual income construct would tend to over-estimate pay in the previous 12 months. But it can be regarded instead as an estimate of annual income centred on the date of interview; these points are taken up again when comparing sample based estimates of the income and tax distributions with Revenue Commissioners' statistics.

⁶There were approximately 6,700 cases for which sufficient information to construct annual income was available, leaving about 1,850 cases for which annualised current income has been used.

Table 3.1: *Main Income Concepts used in the Model*

Current gross income	Weekly pay/profit for those currently at work <i>plus</i> social welfare for those currently receiving it <i>plus</i> other income
Annualised current income	52 times current income
Annual income	Last pay/profit times weeks at work in past year <i>plus</i> last welfare payment times weeks received in past year <i>plus</i> other income

The estimation of farm incomes, based on a detailed farm questionnaire covering output/activity levels and costs is described in Callan, Nolan *et al.* (1989). Here it is important to note that the concept of farm income used is family farm income as defined by Teagasc in the National Farm Survey: this can be significantly higher than taxable farm income because of provisions in the tax code for capital allowances and stock relief. The implications of this discrepancy will be examined in Chapter 4.

A critical step in the organisation of the raw data is choosing the unit of analysis. Some policies operate at individual level⁷, others have a household element⁸. But perhaps the most common unit for policy purposes is an intermediate unit, comprising an adult or married couple, together with dependent children, if any. This will be the basic unit used in the modelling of tax and transfer policies: it will be referred to as the "tax unit". The precise definition of a dependent child varies, for instance, for different social welfare schemes; while the income tax of children depends on their income. Thus a "child" of 17 might be earning a wage and paying income tax, but simultaneously qualify as a dependant of a parent receiving a social welfare payment. A practical approach has been taken here. A dependent child is defined here as aged below 15 or still in full-time education: roughly the same as the income tax unit in Ireland when child tax allowances were still in place. The current income tax system can be analysed within this framework, while modifications of the tax treatment

⁷For example, entitlement to category II health services can be established by individual PRSI contributions; but even here, there is an alternative qualification for child dependants or dependent spouses.

⁸For example, some social welfare means tests have a household element.

of husbands and wives, or the tax treatment of dependent children, can also be examined. Furthermore, many social welfare schemes operate, in effect, at this level, because the differences between the precise social welfare definitions and the approximation used here are small in practice.⁹ Thus, the definition used here seems to be the one which allows most flexibility to cope with possible future reforms or the analysis of past changes in policy.¹⁰ Approximately two-thirds of households in the sample contain just one tax unit, but 21 per cent contain two tax units and 13 per cent contain three or more. A total of just under 6,000 tax units in the sample represents approximately 1.5 million tax units in the country.

Since the nature of the tax unit is critical in what follows, it may be helpful if some examples are provided to illustrate the distinctions between households, nuclear family units¹¹ and tax units. A household containing a married couple and children aged under 15 comprises one tax unit, which coincides with the nuclear family. If the children are over 15, but still in full-time education, the household still comprises one tax unit. A household with a married couple and three children, aged 18, 21 and 25, none of whom are in full-time education would comprise *four* tax units, though it contains only one nuclear family unit. This is the most common type of "multiple tax unit" household. Similarly, a household consisting simply of a brother and sister would comprise two tax units. However, households which contain more than one nuclear family would also constitute multiple tax unit households, e.g., a household containing grandparents or non-relatives.

Detailed information on housing costs and household composition was collected in a household questionnaire. Establishing the amounts of mortgage interest paid was particularly important from the point of view of modelling its tax treatment. Pilot interviews indicated that, as expected, many individuals were unable to answer direct questions about the amounts of interest paid. The revised questionnaire, therefore, asked instead for information that was more readily available. Respondents were asked first

⁹Entitlement to child benefit is assessed within the model using the definition of a child specific to that scheme (aged up to 16, and up to 18 if in full-time education). Entitlements to child dependant allowances under other social welfare schemes are not assessed within the model at this stage, but simply taken as being equal to recorded receipt of payment.

¹⁰For example, the organisation of the data would permit analysis of the change from income tax allowances for dependent children to an increased child benefit (children's allowance), which requires the identification of dependent children.

¹¹Adopted and foster-children are treated as children of their adoptive/foster parents.

for the amount of their regular mortgage repayments; then for the total amount borrowed, the date the loan was taken out, and the term of the mortgage. This information allowed an allocation of the amount of the total repayment between interest and repayment of capital. An even more accurate procedure was possible where respondents were able to answer a question about the amount of the mortgage outstanding at the date of the last annual mortgage statement.

Both TAXMOD and the IFS model advert to problems in allocating housing costs, with both adopting the simple solution of treating the first recorded tax unit as the householder, and others contributing to housing costs as per Supplementary Benefit rules.¹² This is seen as a reasonable assumption for most cases, but not appropriate to those sharing flats. The approach adopted here is to allocate rent and mortgage costs fully to the tax unit of the head of household; no housing costs are attributed to others.¹³ Flat-sharers can be approximately identified, in which case housing costs are shared equally.

Students living away from home only during term-time were treated as members of their parents' household. This procedure helped to remedy one of the few deficiencies identified by Keogh and Whelan's (1986) assessment of the adequacy of the Electoral Register as a sampling frame: its tendency to underrepresent young single persons. Information on each student's income from grants, scholarships and irregular employment was sought from their parents. In most cases, this income is below the personal tax allowance. Therefore it is treated as an addition to the net income of the tax unit.

Both Atkinson and Sutherland (1988a) and Dilnot, Stark and Webb (1988) document discrepancies between the variables measured in the Family Expenditure Survey and those on which benefits or income tax are assessed, similar to those outlined above. However, they conclude that despite such caveats, "the FES is an extremely rich dataset which is remarkably well suited to use in tax and benefit modelling".¹⁴ A similar conclusion with respect to the ESRI Survey of Income Distribution, Poverty and Usage of State Services is justified, as the remainder of this paper will demonstrate.

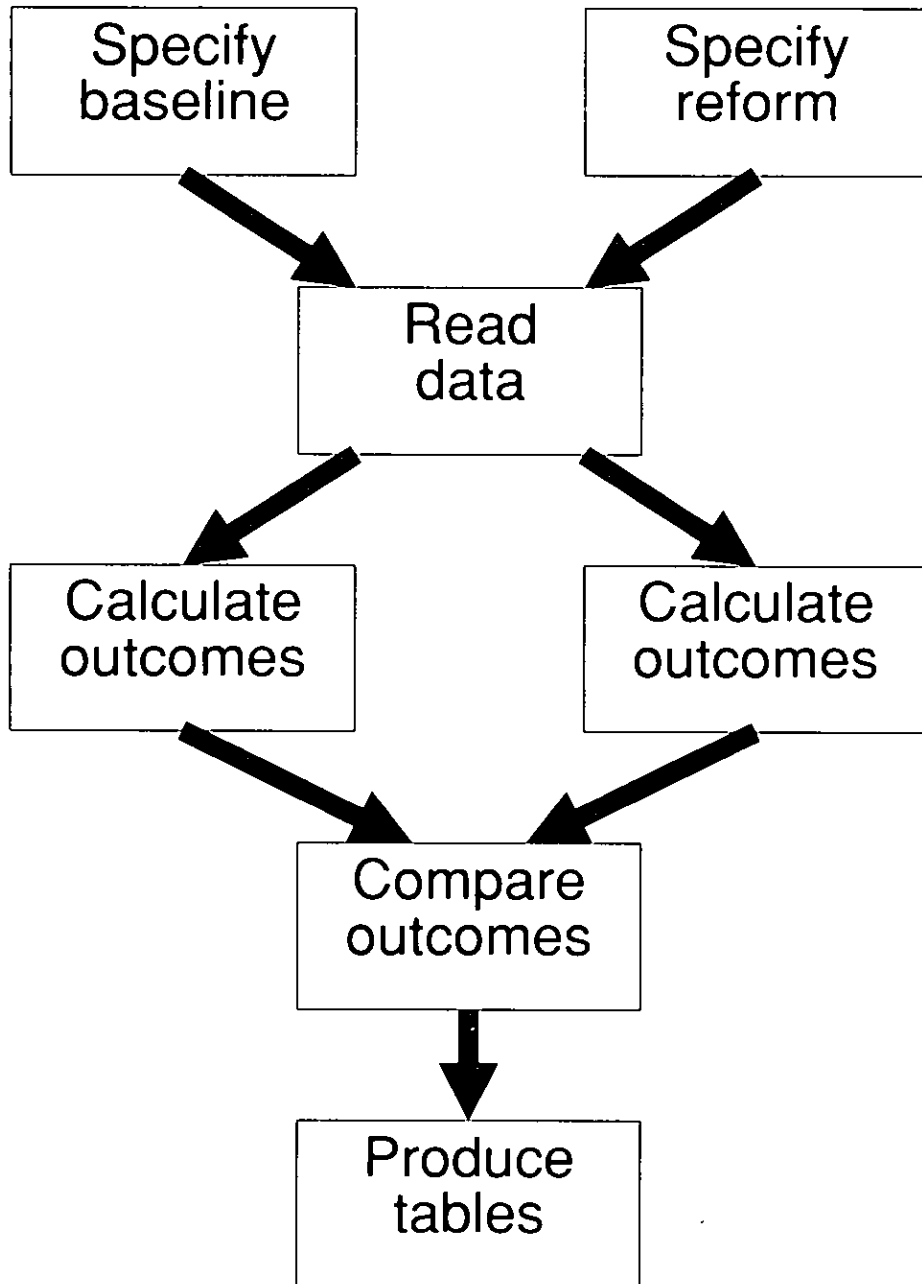
¹²IFS also advert to the difficulties of allocating indirect taxes to tax units within households - apart altogether from the question of incidence assumptions.

¹³This allocation is adequate for the analyses of mortgage interest performed later; other possible analyses might demand more attention to the division of housing costs between tax units.

¹⁴Dilnot, Stark and Webb (1988) p. 64.

3.3 Model Structure

The second requirement for microsimulation analysis of tax/benefit policies is the processing of this information by a suite of computer programmes, often referred to as a tax/benefit model. The operations performed by the model can be thought of as involving five stages, as illustrated in Figure 3.1. The first stage involves the setting of policy parameters for the baseline simulation (e.g., they could be set equal to actual policy parameters in 1987, the year the survey was undertaken) and for the policy change of interest. The second stage of the modelling process is to read the raw data referring to each tax unit. The third stage is to apply the rules of the baseline and "reform" policies to each tax unit in turn. Its social welfare receipts and its income tax liabilities are calculated, based on its gross income and other circumstances, and the policy parameters which define the baseline and reform packages. This calculation then yields the level of net income for the tax unit and the marginal income tax rate it faces under each policy regime. Stage four combines the information referring to each policy regime and calculates the changes between the two regimes (gain or loss in net income; increase or decrease in marginal tax rate) for each tax unit. The final stage is to summarise this information in the form of tables of policy impacts for tax units classified by various characteristics (e.g., average or aggregate net gain by ranges of net income under the baseline policy; change in marginal tax rate classified by initial marginal tax rate; or aggregate net cost of the policy change, given by aggregating the gains in net income across all tax units).

Figure 3.1: *Structure of the ESRI Tax-Benefit Model*

The critical stage in this process is the calculation of income tax liabilities and social welfare entitlements. It is the nature of this calculation which determines what policy parameters can be changed at the first stage. Thus, a more detailed examination of how income tax liabilities and social welfare entitlements are predicted is needed.

3.3.1 Modelling of Income Tax Liabilities

We begin by examining the way in which income tax liabilities are predicted. As noted earlier, an annual income variable is constructed where possible, reflecting differing incomes during periods at work and out of work. The components of income are distinguished in such a way that gross income can be defined according to the current rules, or in line with certain alternatives such as including long-term social welfare payments or child benefit as part of gross income. A separate module deals with allowances and deductions. The basic personal allowance, age allowance and PAYE allowance are modelled. The special allowances for widowed persons and the child allowances for widowed and single persons are also modelled. The special allowances for blind persons, widows in the year of bereavement, dependent relative allowance and allowances in respect of an employed person to take care of an incapacitated person are not modelled. As regards tax reliefs, the model estimates three of the major items: relief in respect of mortgage interest, life assurance premia and medical insurance premia. The deductibility of pension contributions is also taken into account. Other tax reliefs, such as those for health expenses, rent payments by the elderly, or "investment in corporate trades" (the Business Expansion Scheme) are not taken into account: at the time of the survey these were rather minor items. The model takes into account the "income-splitting provisions" of the present tax code, i.e., that the tax liability of a married couple depends on their joint income, with allowances and rate bands being doubled. Alternatives which treat husbands and wives more independently are possible. The rate bands and tax rates are treated as policy parameters. The operation of the (age-graded) exemption limits and marginal relief for incomes just above those limits are also simulated.

Two methods of testing the reliability of these estimated liabilities are possible: comparison with the available recorded data on taxes in the survey, and comparison with the actual distribution of tax receipts from the Revenue Commissioners' Reports. We consider each of these approaches in turn.

An exact fit between recorded tax payments in the survey and predicted tax liabilities would not be expected. The main reasons for this are:

- (i) For employees, tax payments are recorded only for the current pay period - usually a week or a month. These tax payments reflect an estimated liability over the income tax year to which they relate. This may differ from the actual tax liability over that tax year. A further difference may arise because the income over the relevant tax year differs from the income over the 12 months prior to the date of interview.
- (ii) A significant number of employees reported only their *net* pay; tax payments (and gross pay) had to be estimated for these cases using the rules of the system and the available information on the circumstances of the tax unit.
- (iii) For the self-employed, tax payments made within the previous 12 months are recorded, while profit is recorded for "the most recent 12 months for which information is available". The tax payments made during the previous 12 months may relate to a longer period than a year, or to a different period than that for which income is recorded. Alternatively, no tax payment may have been made during the previous 12 months, while tax on the recorded income will eventually be paid.
- (iv) Detailed information on farm activity was sought so that farm income could be estimated, but information was not sought from farmers on income tax payments.
- (v) Income as reported for tax purposes may differ from that reported in the survey.
- (vi) Allowances claimed may differ from the predicted allowances. This may be because some allowances are not modelled; or because the taxpayer is not using all the allowances available to him/her.

Given the factors outlined above, we do not know how close a fit to expect between recorded tax payments in the survey (where available) and modelled tax liabilities. An alternative approach is to compare the distribution of taxable income and tax liabilities generated by the survey with the actual figures reported by the Revenue Commissioners. This test of the reliability of the data and the modelling process is of greater importance. It is extensively investigated in Chapter 4.

3.3.2 Modelling of Social Welfare Entitlements

At present, the approach adopted to the modelling of social welfare entitlements is the simplest possible; there are corresponding limitations on the policy changes which can be analysed. It is planned to develop this side of the model in order to allow a richer menu of policy options. Here, we begin by describing the simple approach currently used; then outline the next stage of development; and finally sketch a plan which would go close to making maximum use of the information in the dataset.

It is useful to begin by distinguishing between the amount of social welfare to which a person may be entitled, and actual receipt of payments. We can calculate entitlement by reference to the rules of the system. If a person falls into certain category (e.g., is aged 66 or over); satisfies certain conditions (e.g., has no other income); then he or she is entitled to a payment of a certain amount under a particular scheme (e.g., the maximum rate of non-contributory old age pension). Actual receipt of social welfare is not identical with entitlements in practice; some persons are in receipt of payments to which they are not entitled, but it is likely that many more are not in receipt of payments to which they are entitled. The latter phenomenon is broadly referred to as "non-take-up" of benefit.

The survey collected detailed information on receipts of social welfare payments, including the type of scheme and amount of payment. In the present version of the model, entitlements are treated as being *identical* with these receipts for both means-tested and non-means-tested schemes. This has a number of obvious disadvantages. It does not allow for changes in the structure of payments, i.e., the amounts payable as additions for adult or child dependants. For means-tested schemes, the effects of changes in the means tests regulations cannot be taken into account; and the effects of changes in rates of payment cannot be forecast accurately.¹⁵ The approach does, however, have one major advantage, over and above its simplicity. It side-steps the problem of take-up of benefit: those who do not take up benefit are treated as not receiving it, while those who do take it up are treated as receiving it.

Modelling of social welfare entitlements along the lines pursued in the UK is a complex task. It will be necessary to define the full set of eligibility conditions for the various means-tested Social Welfare schemes, and to simulate the complex workings of the various means tests. The set of

¹⁵The effect of a simple proportionate increase in maximum rates of social welfare payments may be captured quite well; but in principle, this would involve greater than proportionate increases for recipients whose payments are attenuated by means-testing.

existing payment rates will also have to be built into the calculation of entitlements to income maintenance transfers. If this development of the model can be successfully completed, policy options which could be examined would include:

- (i) Alterations in the basic rate of payment
- (ii) Changes in the structure of payments, i.e., additions for adult and child dependants
- (iii) Changes in the operation of means-tests which have been modelled
- (iv) Changes in those eligibility conditions which have been modelled

The lack of information on the PRSI contribution records of respondents means that entitlement to contributory benefits cannot be modelled fully. Thus, in the second stage, it is envisaged that options as regards contributory benefits would include only (i) and (ii) above.

3.4 Conclusion

This chapter has set out the main elements of the ESRI tax-benefit model for Ireland. The nature of the data set provided by the ESRI Survey of Income Distribution, Poverty and Usage of State Services were described. Like the Family Expenditure Survey which forms the basis for tax-benefit modelling in the UK, the ESRI Survey has a number of limitations; but on balance, it provides a data set rich in possibilities for tax-benefit modelling. The reliability of the data is, of course, a critical issue: for this reason, it is investigated intensively in Chapter 4.

The structure of the existing tax benefit model was also sketched out. The modelling of the income tax system already opens up a wide and varied menu of policy options for analysis. The representation of the social welfare system is, at present, much simpler, with a correspondingly limited menu of policy options. Plans for further development of the modelling of social welfare entitlement which would broaden the scope of the model were noted. The applications in Chapters 5 and 6 of the present paper will illustrate the value of the model as it currently stands.

Chapter 4

VALIDATION OF DATA AND MODEL

4.1 Introduction

The importance of checking the reliability of the data has been emphasised already. This chapter provides a battery of checks of the reliability not only of the data, but also of the model-based calculations of income tax liabilities under the tax regime in force at the time of the survey. This allows an assessment not only of the validity of the data, but of the validity of the model and data taken together.

A general difficulty in establishing appropriate control totals and distributions for these purposes may be noted here. Most of the interviews (over 90 per cent) were undertaken between February and August of 1987. This period does not correspond exactly with any of the relevant dates for administrative data. Information on income tax receipts relates to the tax years ending on the 5th April; information on social welfare expenditures refers to a calendar year; and information is published on the numbers of social welfare recipients at end-December of each year.

The solution adopted as regards numbers of social welfare recipients is to present the figures for both end-1986 and end-1987 in the detailed tables, while taking a simple average of the two for some broad graphical comparisons. A similar approach is adopted to social welfare expenditure.¹ Establishing appropriate comparisons between official figures on income taxes and survey-based estimates is rather more complex. One simplifying factor is that income tax rates and bands were identical in 1986/87 and 1987/88: the main change in the personal income tax code was a reduction in the proportion of mortgage interest which qualified for relief. Thus, in establishing appropriate comparisons, it is differences in incomes over the periods covered by the survey and official statistics which have to be taken into account. The procedure adopted in the current paper is, where possible, to compare survey-based estimates of *total* revenues with Revenue Commissioners' statistics for both 1986/87 and 1987/88. Analysis of the dates of interview for all households in the survey, and the

¹The fact that social welfare rates rose in July 1987 is implicitly taken into account. About a quarter of the ESRI interviews were conducted after that date. The administrative statistics for the calendar year 1987 are split approximately 50-50 between payments at the pre-July and post-July rates; by averaging with the 1986 administrative statistics this weight is reduced to about 25 per cent.

dates to which non-farm self-employment income refers,² suggests that a simple average of these two years is a good approximation to the relevant control total.³ For *distributions* of incomes and tax revenues across income ranges, however, this procedure would be excessively complex; a comparison with the 1986/87 figures is therefore used.

4.2 *General Reliability Checks: Demographic and Socio-Economic Characteristics*

The available information on the general representativeness of the survey provides a useful starting point. As noted earlier, responding households were reweighted using special tabulations supplied by the CSO so that they were fully representative of the national position as found in the 1986 Labour Force Survey in terms of the following characteristics: household size, urban/rural location, and age and socio-economic group of the head of household.⁴ Independent checks then confirm the representativeness of the sample in terms of the following variables:

1. Age distribution of the population. Table 4.2 of Callan, Nolan *et al.* 1989, shows a comparison with 1986 Census. The ESRI sample has a higher proportion of children than in the population, but overall the differences in distribution across age groups are "not substantial";
2. Distribution of households classified by number of members engaged in paid work (Table 4.1 of Callan, Nolan *et al.* 1989, showing comparison with 1986 Labour Force Survey);

²Analysis of these dates shows that incomes of about half of the self-employed in the ESRI sample would have been assessed to tax in the 1986/87 tax year and half in 1987/88. Thus, a simple average of the 1986/87 and 1987/88 figures is the most appropriate comparison for the non-farm self-employed.

³The simple average gives equal weight to the 1986/87 and 1987/88 results. If the annual income estimates were treated as referring precisely to the 12 months preceding the date of interview, a higher weight would be placed on the 1986/87 year. Given the heavy influence of current employment income on the bulk of the annual income estimates in the sample, it may be more appropriate to treat the estimates as "centred" on the date of interview. In this case the weight attached to the 1987/88 results would be higher than 50 per cent.

⁴Details of the procedure are set out in Callan, Nolan *et al.*, Section 4.5. A similar procedure is used to reweight the responses to the CSO's Household Budget Survey.

3. Distribution of households classified by number of members unemployed;
4. Distribution of entitlements to health services (medical cards, hospital services cards and others) (Nolan, 1990).

4.3 Reliability of Income and Tax Estimates

From the point of view of policy analysis, it is particularly important that the sample adequately represents the social welfare client population and the income tax base. We deal with each of these issues in turn.

4.3.1 Social Welfare: Recipients and Expenditure

Survey-based estimates of the social welfare client population classified by scheme are compared with the numbers actually in receipt at the end of the calendar years 1986 and 1987 in Table 4.1 below. Figure 4.1 gives an overview of the comparison, using a simple average of the end-1986 and end-1987 official figures, and including the number of families in receipt of child benefit as well as the major types of scheme (identified by the sub-heads in Table 4.1). Overall coverage of the major schemes - old age/widows pensions, child benefit, disability benefit/invalidity pension and unemployment benefit/assistance - is rather good. The overrepresentation of children in the ESRI sample leads to an overestimate of expenditure on child benefit, of the order of 10 per cent⁵; the implications in terms of the analysis of taxation of child benefit are treated in Chapter 5.

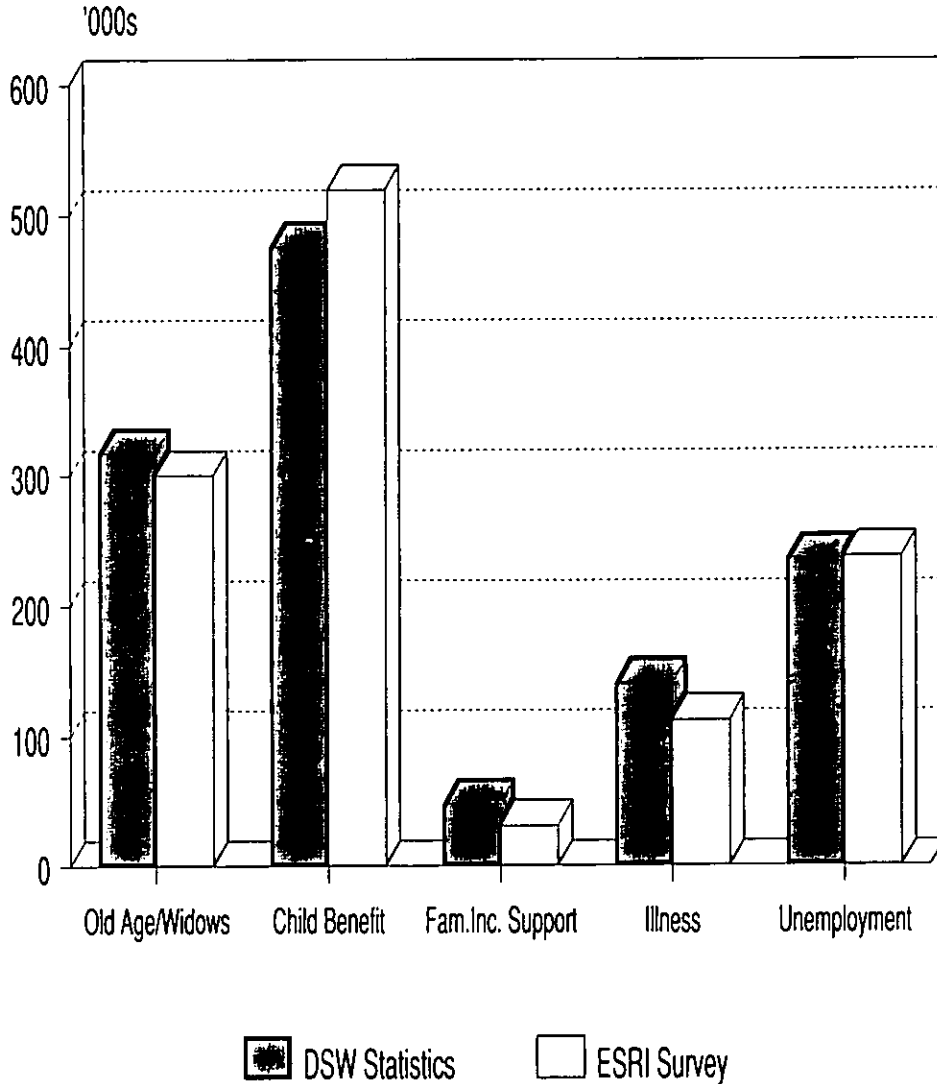
There do seem, however, to be certain problems regarding the classification of payments. The most important of these concerns widow's pensions: it seems likely that many elderly widows have classified themselves as receiving non-contributory old age pensions, when in fact they are receiving contributory widow's pensions. The total number of recipients of widow's and old age pensions is estimated at just under 300,000 by the ESRI survey; the estimate from the administrative statistics of the number of recipients in the private household population is around

⁵Time lags in application for child benefit may account for about 1 to 2 percentage points of this gap.

315,000.⁶ A similar problem arises with respect to disability benefit and invalidity pensions. The total numbers in receipt of such payments are estimated by the ESRI survey at around 83,700; the numbers in receipt at end-December 1987 were 96,800. But some of those in receipt of disability benefit appear to have misclassified it as invalidity pension, so that the numbers recorded in the ESRI survey as receiving disability benefit are lower than would be expected. Misclassification does not seem to be a problem for those in receipt of unemployment benefit or assistance, for whom the survey-based estimates correspond very closely to those based on administrative records.

Given that the sampling fraction is about 1 in 300 of the population, the numbers expected in the smaller schemes would, in any case, be low; but the actual numbers in the sample are somewhat lower than expected for several smaller schemes. In particular, the numbers of recipients for the smaller schemes concerned with lone parents (deserted wives and unmarried mothers) are somewhat underrepresented. It is clear, therefore, that the sample size imposes limitations on the degree of disaggregation which can be undertaken; possible non-response bias must also be taken into account in analysing some schemes. Taking all social welfare schemes together, however, the total number of recipients estimated by the survey is about 93 per cent of the relevant administrative total.

⁶Since the adjustment for the proportion of recipients living in institutions is made only for those in receipt of old age pensions and not for widow's pensions, the estimate from administrative statistics of the number of recipients in private households is likely to err on the high side.

Figure 4.1: *Broad Social Welfare Categories: Numbers of Recipients*

Sources: See Table 4.1

Table 4.1: *Number of Recipients of Social Welfare Schemes*

	<i>Recipients in population</i>		<i>ESRI estimate</i>
	<i>end-1986</i> (<i>'000</i>)	<i>end-1987</i> (<i>'000</i>)	(<i>'000</i>)
<i>Old Age</i>			
Old Age Contributory Pension & Retirement Pension	101.7 ^a	104.8 ^a	97.1
Old Age Non-Contributory Pension & Blind Pension	113.7 ^a	113.2 ^a	136.9
Widow's Contributory Pension	79.8	81.1	50.1
Widow's Non-Contributory Pension	17.3	18.1	14.7
Single Woman's Allowance	2.6	2.6	1.3
<i>Illness</i>			
Disability Benefit	79.1	68.4	49.3
Invalidity Pension	26.1	28.4	34.4
Injury Benefit	0.8	0.7	0.3
Disablement Benefit	6.8	6.8	8.1
Disabled Person's Maintenance Allowance	24.6	24.9	17.4
Domiciliary Care Allowance	7.1	7.3	2.9
<i>Unemployment</i>			
Unemployment Benefit	87.7	84.6	87.0
Unemployment Assistance	146.0	153.6	150.4
<i>Family Income Support</i>			
Orphan's Allowance (Contributory)	0.8	0.7	0.6
Orphan's Allowance (Non-Contributory)	0.2	0.2	0.2
Maternity Benefit	4.7	5.1	2.0
Deserted Wife's Benefit	6.2	7.3	3.5
Deserted Wife's Allowance	4.4	4.9	4.5
Unmarried Mother's Allowance	12.0	13.9	7.0
Prisoner's Wife's Allowance	0.3	0.3	none
Supplementary Welfare Allowance	n.a.	11.8	10.4
Family Income Supplement	4.9	5.5	3.2
<i>"Total"</i> ^b	726.80	744.20	681.30

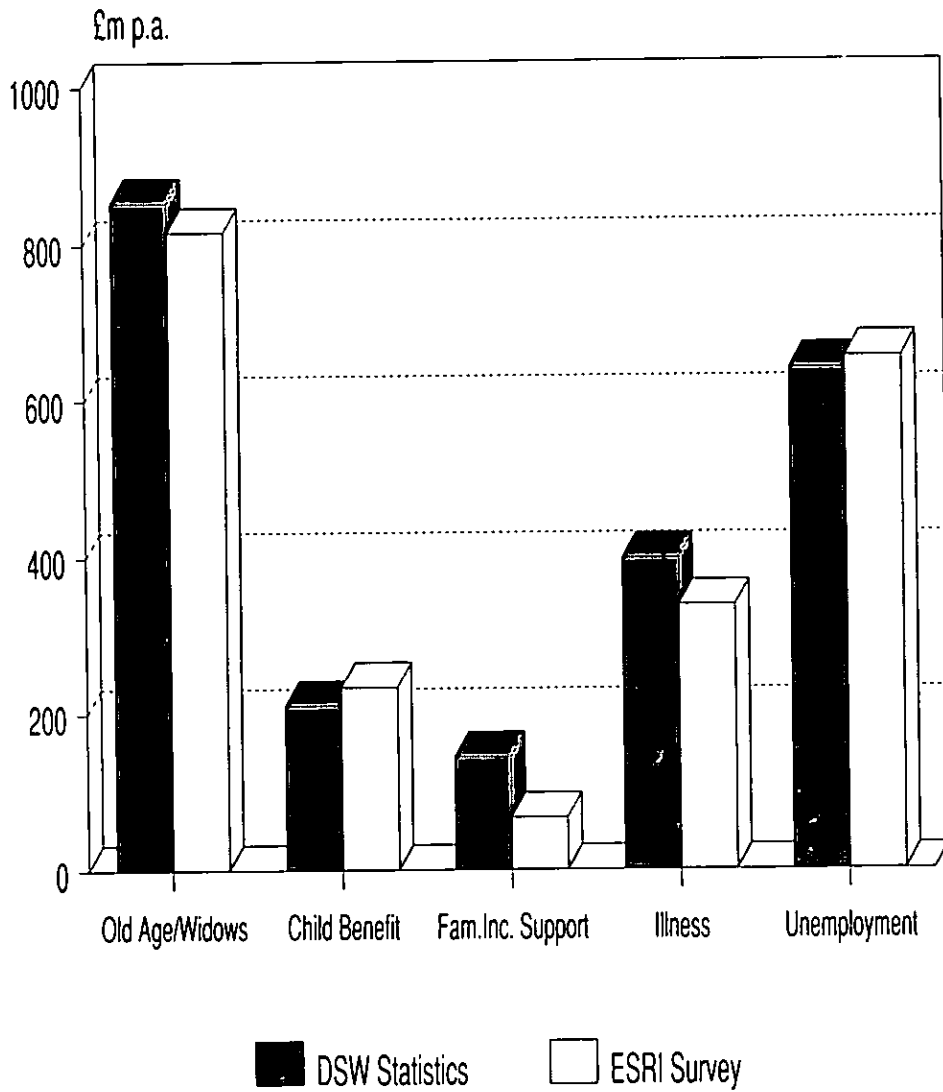
Notes: ^aAdjusted to exclude proportion of age group resident in institutions: if a greater (lesser) proportion of pensioners than of non-pensioners is resident in institutions, these numbers are overestimates (underestimates).

^bSince it is possible to receive payments under more than one scheme, there is some double counting involved in these totals: however, it is calculated as a useful guide to the overall coverage of the survey.

Sources: Statistical Information on Social Welfare Services, 1986, Table 3 and 1987, Table 4; Health Statistics, 1987 and 1988, Table D1.

Table 4.2 and Figure 4.2 perform a similar analyses in terms of expenditure. The survey allows two possible estimates of expenditure. One is derived using the detailed information on payments received over the last 12 months, for those who currently receive a payment or have received one in that period, to construct a measure of the annual receipt of social welfare payments. It is possible that this measure may underestimate receipt of social welfare payments because of what are known as "recall" or memory problems; in particular, those not currently receiving a payment may have forgotten that they received a payment during the relevant period. Thus, an alternative measure may be provided by "annualising" the current receipts of social welfare in the sample. This procedure may misrepresent the incomes of particular households, but it provides a useful alternative measure of social welfare receipts in the sample. Differences between the two survey-based measures may help to identify the extent of the recall problem. As noted earlier, since social welfare payments rose in July 1987 (during the fieldwork for the ESRI survey) the appropriate expenditure figure for comparison lies somewhere between the administrative figures for calendar years 1986 and 1987.

Figure 4.2: *Broad Social Welfare Categories: Expenditure*



Sources: See Table 4.2

Table 4.2: *Expenditure on Social Welfare Schemes*

<i>Social Welfare Scheme</i>	<i>Actual expenditure on scheme</i>	<i>Estimated expenditure based on sample</i>		<i>Actual expenditure on scheme</i>
	<i>1986</i>	<i>annual incomes</i>	<i>current incomes</i>	<i>1987</i>
	<i>£m</i>	<i>£m</i>	<i>£m</i>	<i>£m</i>
<i>Old Age</i>				
Old Age Contributory Pension & Retirement Pension	339.8*	310.1	321.7	363.5*
Old Age Non-Contributory Pension & Blind Pension	258.3*	332.4	341.3	265.1*
Widow's Contributory Pension	210.8	139.0	141.4	223.6
Widow's & Orphan's Non-Contributory Pension	39.5	32.3	33.0	42.7
Single Woman's Allowance	4.5	2.4	2.4	4.5
<i>Illness</i>				
Disability Benefit	223.8	152.1	165.6	218.1
Invalidity Pension	86.2	111.1	112.7	95.9
Injury Benefit	7.7	4.2	1.0	7.8
Disablement Benefit	15.9	26.9	25.1	20.2
Disabled Person's Maintenance Allowance	55.6	41.8	40.7	57.7
Domiciliary Care Allowance	5.3	3.7	3.4	5.5
<i>Unemployment</i>				
Unemployment Benefit	237.1	265.2	281.6	236.3
Unemployment Assistance	391.5	390.2	405.8	417.2
<i>Family Income Support</i>				
Orphan's Allowance (Contributory)	1.3	2.5	0.5	1.3
Maternity Benefit	17.2	9.8	9.0	20.0
Deserted Wife's Benefit	23.5	10.7	11.6	28.0
Deserted Wife's Allowance	14.8	12.9	16.2	17.0
Unmarried Mother's Allowance	36.7	18.0	20.7	44.0
Prisoner's Wife's Allowance	1.2	nil	nil	1.4
Supplementary Welfare Allowance	43.4	12.7	21.9	32.5
Family Income Supplement	3.0	1.4	1.7	4.4
<i>Total</i>	<i>2,017.1</i>	<i>1,879.4</i>	<i>1,955.2</i>	<i>2,106.7</i>

Note: *Adjusted to exclude proportion of age group resident in institutions: if a greater (lesser) proportion of pensioners than of non-pensioners is resident in institutions, these numbers are overestimates (underestimates).

Sources: Statistical Information on Social Welfare Services, 1986, Table 3 and 1987, Table 4; Health Statistics, 1987 and 1988 Table J1.

Looking first at the estimates of total expenditure (other than child benefit), the survey-based estimates are very close to the 93 per cent coverage already indicated for the total number of recipients. As indicated earlier, a simple average of the 1986 and 1987 calendar year figures is used as the control total. The estimate of annual income from social welfare (£1,879m) amounts to just over 91 per cent of that total; while annualised current receipts (£1,955m) amount to just under 95 per cent of the total. The difference between the survey-based estimates of annual receipt and annualised current receipts suggests a small but significant recall problem: the annual receipt figure is just under 4 per cent lower than the annualised receipt. The pattern of the expenditure figures follows quite closely that of the number of recipients, and reflects the misclassification of payments as between widow's and old age pensions discussed earlier.

Overall, therefore, recipients and receipt of social welfare are well covered by the survey responses. There is some under-coverage, but it does not seem to be due to underreporting of those who do record receipt of a social welfare payment. Apart from misclassification of widow's pensions as old age non-contributory pensions, the main problem seems to be lower than expected figures for the numbers in receipt of family income support and sickness benefits and, correspondingly, for amounts received by them. As far as expenditure is concerned, much of the shortfall in family income support expenditure relates to one-off payments under the Supplementary Welfare Allowance scheme; retrospective questioning in particular seems to have been unsuccessful in capturing the use of this aspect of that scheme. Atkinson and Micklewright (1983) found a similar pattern as regards sickness benefits in their investigation of the reliability of Family Expenditure Survey income data in the UK. They found that the survey-based estimate was about one-third below what would be expected. In the case of the ESRI survey, the shortfall is much less marked, at between 12 and 15 per cent of the relevant expenditure, or 17 per cent of the number of recipients.⁷ Atkinson and Micklewright suggested that a low response rate among recipients of such benefits - whose illness might make them less likely to participate - might explain their findings. Another factor which might contribute to explaining such results is that employees in

⁷These figures are derived from the tables above, aggregating over all the sickness schemes: disability benefit, invalidity pension, disablement and injury benefits and disabled person's maintenance allowances.

receipt of disability benefit may still receive most of their pay from their employer; this may make it easier to forget that some money is also being received as disability benefit.

In the current implementation of the model, no attempt is made to "gross-up" the survey responses to the recorded administrative expenditure on social welfare. But further investigation of the sources of the discrepancy may suggest ways in which this can be done. It might, for instance, be desirable to alter the weighting scheme in order to correct for underrepresentation of certain categories of social welfare recipient.

4.3.2 Income Tax Base

Atkinson, King and Sutherland (1983), in their examination of a tax credit scheme remark that "the precise determination of the tax rate required to finance the scheme may be crucial to its distributional impact". It is important, therefore, to ensure that the grossed-up survey information reflects the size and composition of the existing income tax base, so that it will be possible to estimate the net revenue effects of alternative reforms adequately.

There are a number of ways one could examine this issue. One would be to compare predicted tax liabilities with recorded tax payments for individual cases in the sample, where this information is available. As noted in Chapter 3, a close fit on this basis would not be expected; nor would it be a guarantee of the representativeness of the sample in terms of the tax base. A good fit for individual cases might coincide with a high non-response bias which would make the survey results unrepresentative of the national situation. A more direct and important test of the reliability of the survey data, and the model calculations can be provided by a comparison with statistics from the Revenue Commissioners' *Annual Reports*, and other statistics on direct tax revenues. It is to such comparisons that we now turn.

Table 4.3: *Revenue from Income Tax and Social Insurance Contributions*

	<i>Actual revenue 1986 £m</i>	<i>Actual revenue 1987 £m</i>	<i>Estimated revenue from ESRI Survey £m</i>
Income Tax	2,496 ^a	2,531 ^a	2,689
Employee PRSI Contributions	294	307	309
Health Contribution	82	100	98
Employment & Training Levy ^b	91	97	90
Total	2,963	3,260	3,186

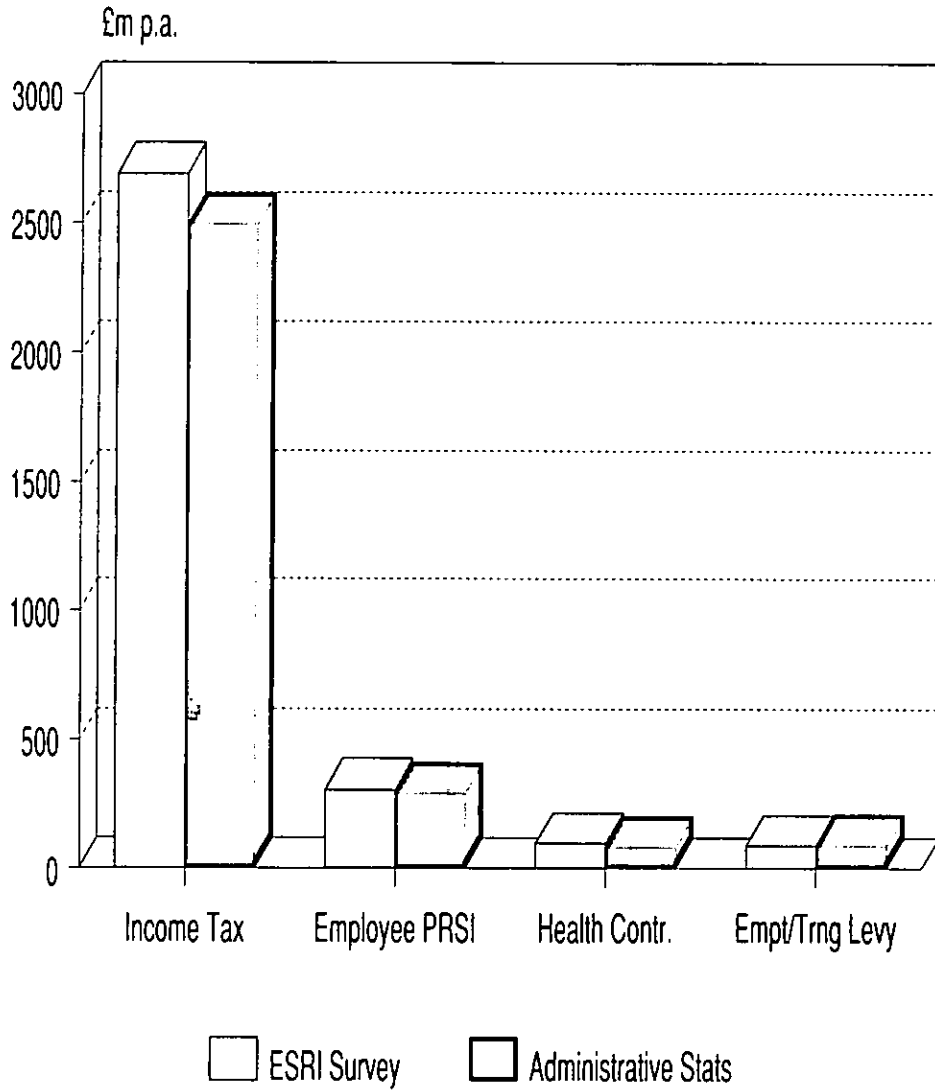
Notes: ^a Net produce of income tax, 1986/87. (Revenue Commissioners' *Annual Report 1988*, Table 71).

^b The 1987 figure is the net produce of income tax in 1987/88 (Table 73 of the Revenue Commissioners' *Annual Report 1989*) adjusted to include the net produce of the deposit interest retention tax (DIRT). Reductions in the extent to which estimated assessments for the self-employed are included in such statistics must be taken into account in comparing the 1986/87 and 1987/88 figures: the 1989 report shows a 10 per cent increase in net produce between 1986/87 and 1987/88.

^c Formerly the Youth Employment Levy.

Sources: Statistical Information on Social Welfare Services 1987, Tables 88 and 89; Health Statistics, 1987 and 1988 Table J2. Budget Booklet, 1988. Revenue Commissioners' *Annual Reports 1988 and 1989*.

Table 4.3 reports the aggregate revenue predictions from the ESRI model and the nearest available official counterpart. It is readily apparent (and illustrated graphically in Figure 4.3) that there is very close agreement between the ESRI figures and the official counterparts in respect of employee contributions to PRSI, health contributions and the employment and training levy. As regards income tax, there are some difficulties in establishing an appropriate official figure on which to base the comparison. The "net produce" figure reported by the Revenue Commissioners is probably the closest in conceptual terms. As noted earlier, the appropriate comparison is with a weighted average of the 1986/87 and 1987/88 official figures. The ESRI figure falls between these two official figures, about 7 per cent above the simple average of the two.

Figure 4.3: Tax Revenues: *ESRI Estimates and Official Statistics*

Sources: See Table 4.3

The fact that the aggregate direct tax take predicted by the model is so close to the official figures greatly increases confidence in the model and the data on which it is based. However, it is important to check that the distribution of income is also representative. In performing these checks, we must note three main features which lead to a divergence between the figures reported by the Revenue Commissioners for the net produce of the income tax and the income tax revenue covered by their income distribution statistics. First, the income distribution statistics are based on PAYE returns available at the time of compilation; this requirement means that a small but significant percentage of PAYE cases are excluded. Second, tax revenue received under the Deposit Interest Retention Tax (DIRT) can only be attributed for income distribution purposes when it is declared; the net produce of the income tax includes all DIRT receipts. Third, while the income distribution statistics include all Schedule D cases (mainly the self-employed), they are not based on the same incomes as are used in calculation of net produce figures; the net produce figures are based on more recent estimates of the incomes of these taxpayers. Thus, while the "net produce" of the income tax in 1986/87 was almost £2,500m, the amount covered by the Revenue Commissioners' distributional analysis is £2,180m. For this reason, the main focus of comparisons is on percentage distributions, though some interesting features in the comparisons of absolute numbers are also noted.

Table 4.4: *Distribution of Income by Range of "Total Income"*¹

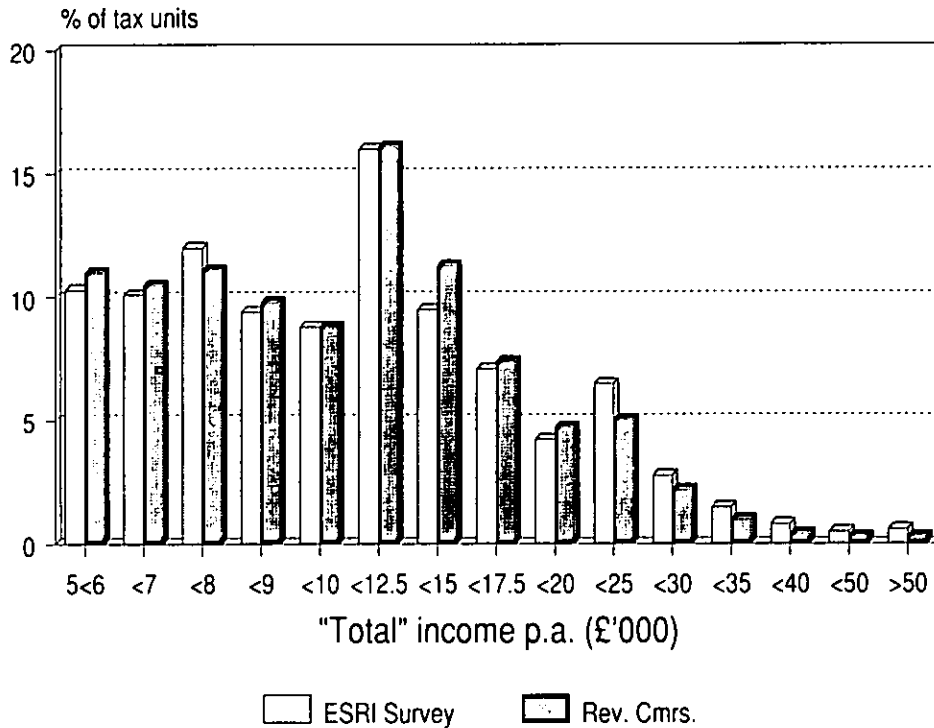
<i>Range of "total income"¹ (£ p a)</i>		<i>Number of tax units ('000s)</i>		<i>Percentage distribution of tax units above £5,000 p a</i>		
		<i>More than</i>	<i>Less than</i>	<i>Rev. Cmrs. 1986/87</i>	<i>ESRI Survey</i>	<i>Rev. Cmrs. 1986/87</i>
	0	1,000	77.1	272.7		
	1,000	2,000	58.4	61.8		
	2,000	3,000	65.4	220.9		
	3,000	4,000	70.2	105.5		
	4,000	5,000	68.0	102.0		
	5,000	6,000	75.5	79.5	11.0	10.3
	6,000	7,000	71.8	78.1	10.5	10.1
	7,000	8,000	76.0	93.1	11.1	12.0
	8,000	9,000	67.1	72.3	9.8	9.4
	9,000	10,000	60.0	68.3	8.8	8.8
	10,000	12,500	110.1	123.4	16.1	16.0
	12,500	15,000	77.1	73.2	11.3	9.5
	15,000	17,500	50.6	54.6	7.4	7.1
	17,500	20,000	31.9	32.1	4.7	4.2
	20,000	25,000	33.9	49.9	5.0	6.5
	25,000	30,000	15.1	22.0	2.2	2.8
	30,000	35,000	7.0	11.5	1.0	1.5
	35,000	40,000	3.0	6.3	0.4	0.8
	40,000	50,000	2.3	4.1	0.3	0.5
	Over	50,000	2.3	4.9	0.3	0.6
<i>ALL</i>			1022.9	1536.2	100.0	100.0

Notes: 1. "Total income" is defined by the Revenue Commissioners as the total income of taxpayers from all sources, "net of items such as capital allowances, interest paid in full, losses brought forward, allowable expenses and superannuation contributions".

Sources: Revenue Commissioners' *Annual Report 1988*, Table 78

We begin our checks of the representativeness of the income distribution in the ESRI survey by comparing the distribution of tax units over ranges of "total income"⁸ (Table 4.4 and Figure 4.4). The ESRI Survey includes many tax units at the lower end of the income distribution which are not included by the Revenue Commissioners. Among these would be found many tax units which have incomes only from social welfare, for example. However, the numbers of tax units in income ranges above £5,000 are quite close to each other. Given that a significant number of PAYE cases are excluded from the Revenue Commissioners' income distribution statistics, the percentage distributions shown in the last two columns may provide a more appropriate comparison. The main differences are that the Revenue Commissioners' statistics show a somewhat higher proportion of tax units in the £12,500 to £15,000 income range, while the ESRI figures show a higher proportion of tax units in the income ranges above £20,000. One factor which may play a role in explaining this discrepancy is that the ESRI figures count each married couple as one tax unit, while the Revenue Commissioners figures count married couples opting for separate assessment as *two* tax units; since separate assessment is usually chosen only by couples with separate incomes, this factor would tend to explain part of the difference in the percentage distributions shown.

⁸The concept of "total income" as defined by the Revenue Commissioners excludes, for example, pension contributions and mortgage interest payments which are eligible for tax relief.

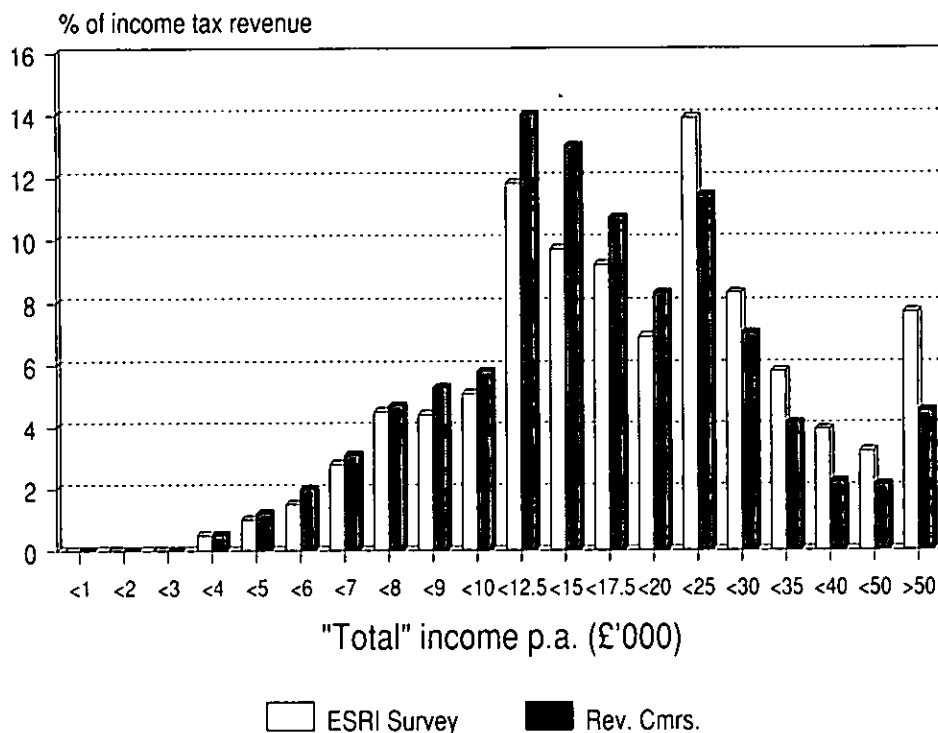
Figure 4.4: *Percentage Distribution of Tax Units by Ranges of "Total Income"*

Notes: Excludes tax units with "total income" below £5,000 p.a.

Sources: See Table 4.4

Figure 4.5 shows a similar comparison of the percentages of income tax revenue from the different income tax ranges. The percentage comparison is now possible over the full income range, since the operation of the tax rules leads to zero tax liabilities for the low income tax units covered by the ESRI survey and excluded from the Revenue Commissioners' statistics. The proportion of tax revenue arising from incomes in the range £10,000 to £20,000, and especially the lower half of that range, are lower in the ESRI survey than in the Revenue Commissioners' statistics. Correspondingly, the proportions arising from tax units above £20,000 are higher in the ESRI survey.

Figure 4.5: *Percentage Distribution of Income Tax Revenue over Ranges of "Total Income"*



Sources: Revenue Commissioners' *Annual Report 1988*, Table 78.

Three factors may help to explain these discrepancies:

- (1) Much of the DIRT tax is not attributed in the Revenue Commissioners' income distribution statistics. One would expect that the income on which DIRT tax is levied would accrue disproportionately to the higher income ranges.
- (2) The differences in the treatment of married couples who opt for single assessment were noted above; these would help to explain the discrepancy in the distribution of tax revenues as well as numbers of cases over income ranges.
- (3) The concept of farm income used in the ESRI survey was family farm income, as defined by Teagasc in its National Farm Survey. This was treated as taxable income within the

ESRI model, ignoring the existence of capital allowances and stock relief which would considerably reduce tax liabilities. Thus, the number of farmers in high *taxable* income categories would be overestimated by the ESRI survey.

Further insights into the relationship between the survey data and actual tax receipts can be provided by classifying income tax units according to tax schedule. Here we concentrate on the distinction between incomes taxed under PAYE and other incomes, which are mainly self-employment or farming incomes taxed under Schedule D. The classification of tax units in the ESRI survey in this way is, of necessity, an approximate procedure. All those who report their main labour force status as farming or other self-employment are treated as non-PAYE tax units; so too are those whose main income is not from employment, pensions or social welfare (which might be thought of as "residual non-PAYE cases"). Tax units whose main income is from social welfare payments are classified as PAYE for these purposes, since if a tax liability does arise it is most likely to refer to previous employment where PAYE was payable.⁹ In cases where a husband is classified as a residual non-PAYE case, and a wife is engaged in employment, self-employment or farming, her classification takes precedence; otherwise the tax unit's classification is based on that of the husband.

⁹These cases can, however, be separately identified.

Table 4.5: *Distribution of PAYE Tax Units over Ranges of "Total Income"*

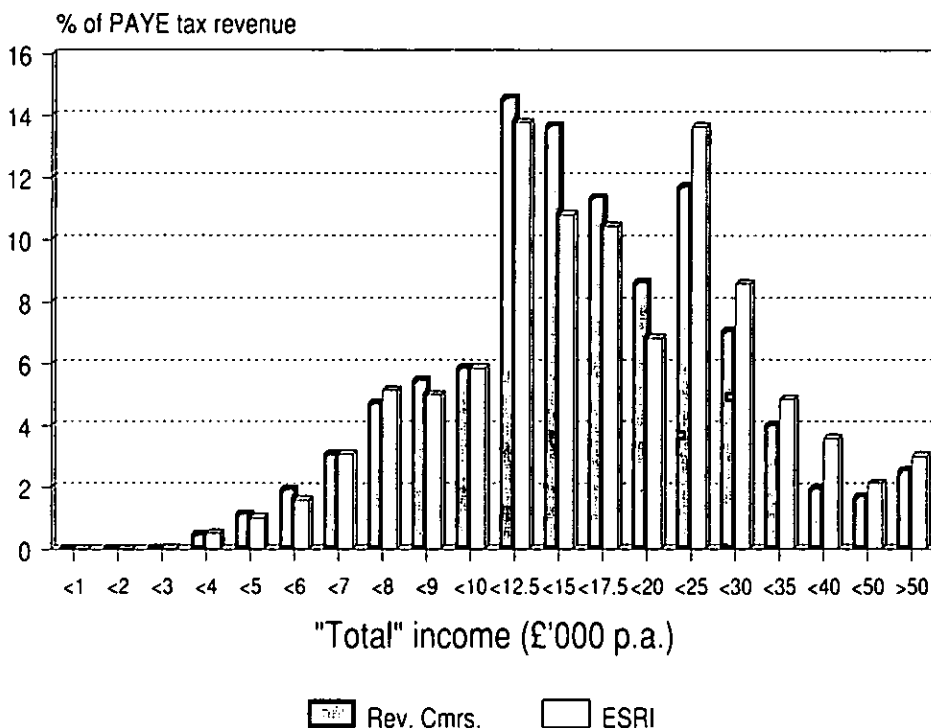
Range of "total income"		RC	ESRI	RC	ESRI
More than £	Less than £	Number of cases ('000s)		Income Tax £m	
0	1,000	53.7	208.6	0.2	0.0
1,000	2,000	54.1	37.8	0.3	0.0
2,000	3,000	56.8	201.4	0.5	0.7
3,000	4,000	60.2	85.9	8.8	10.2
4,000	5,000	56.0	85.9	21.8	20.5
5,000	6,000	60.2	63.9	36.8	31.9
6,000	7,000	61.2	64.5	58.9	62.0
7,000	8,000	67.0	79.8	90.1	103.6
8,000	9,000	60.8	63.1	104.0	100.6
9,000	10,000	53.4	58.9	111.7	117.9
10,000	12,500	100.7	107.6	278.1	277.1
12,500	15,000	70.8	62.1	260.6	217.1
15,000	17,500	47.0	46.8	216.4	209.9
17,500	20,000	29.1	24.1	163.8	137.3
20,000	25,000	30.7	37.5	222.8	274.2
25,000	30,000	13.5	17.1	134.3	172.2
30,000	35,000	6.0	7.4	76.6	97.6
35,000	40,000	2.4	4.4	37.7	72.2
40,000	50,000	1.6	2.1	32.5	43.0
Over	50,000	1.2	2.1	48.4	60.5
<i>Totals</i>		886.3	1260.8	1904.2	2008.5

Sources: Revenue Commissioners' *Annual Report 1988*, Table 81

The results for distributions of numbers of PAYE taxpayers, and their tax liabilities, over income ranges are compared in Table 4.5 and Figure 4.6. Once again, the distributions of numbers above £5,000 are quite close. There are some middle income ranges where the ESRI figures are somewhat lower, while the ESRI figures are rather greater in the upper income ranges. A similar pattern is evident in the receipts from income taxes. The differences in treatment of married couples who opt for separate assessment are once again relevant to the differences in distribution; while the overall numbers of taxpayers and amounts of tax receipts reported by the Revenue Commissioners' income distribution statistics are again affected by the non-allocation of much of the receipts from DIRT and the exclusion of a significant number of PAYE cases. Thus the fact that the ESRI figures are about 5 per cent higher in term of numbers of cases (above

£5,000 per annum) and of revenue may be readily explained by these factors. The proportions of PAYE tax revenue coming from the different income bands, illustrated in Figure 4.6, provide a comparison which is less likely to be affected by the differences in the number of taxpayers covered: this graph shows a much closer correspondence between the ESRI figures and those of the Revenue Commissioners.

Figure 4.6: *Percentage Distribution of PAYE Tax Revenue over Ranges of "Total Income"*



Sources: Revenue Commissioners' *Annual Report 1988*, Table 81.

Similar comparisons for non-PAYE tax units show much greater discrepancies (Table 4.6). The estimated revenue from the non-farm self-employed is about twice the actual level; while for farmers the discrepancy is even greater. As noted earlier, the measure of farm income used in the ESRI survey is family farm income, which does *not* coincide with income for tax purposes; in particular, investment allowances and

stock relief are not taken into account by family farm income. Thus, it is to be expected that a calculation of tax liabilities based on family farm income will exceed actual liabilities.

Table 4.6: *Income Tax Revenue from Non-PAYE Tax Units*

	<i>Farm</i> <i>£m</i>	<i>Non-farm</i> <i>£m</i>	<i>Total Non-PAYE</i> <i>£m</i>
"Official" estimates ¹	35	241	276
ESRI Survey	167	470	637
Adjusted ESRI Survey	33	249	282

Notes: 1. The "official" figures are derived as follows: the total income tax paid by non-PAYE tax units is taken from Tables 79 and 80 of Revenue Commissioners' *Annual Report* for 1988, and refer to 1986/87 liabilities. The figure for income tax paid by farmers is taken from the Department of Finance Databank, and refers to tax actually paid in 1986. Despite the conceptual differences, these figures give some indication of the nature of the discrepancies between the survey figures and the official statistics.

The extent of the differences between the calculated and actual tax revenues from farmers and self-employed raises a number of issues. Estimates of the effects of policy changes might be biased by discrepancies of this magnitude. In order to investigate this question, some simple adjustments to the ESRI income figures for tax purposes have been implemented. These adjustments are outlined here; in later applications the effects of using "adjusted" or "unadjusted" data are considered.¹⁰

So far as farmers are concerned, there is clearly a case for improving the measure of income used for tax modelling by taking into account investment allowances and stock relief: the differences between actual and calculated liabilities may simply reflect differences in concepts. In the absence of a direct measure of such allowances and reliefs, an approximate procedure to bring farm tax liabilities estimated by the ESRI model into line with the actual tax paid is used: a discount of 60 per cent is applied to family farm income in order to yield a gross income to which the ordinary tax rules can then be applied. This figure of 60 per cent was derived as the discount factor required to bring the aggregate survey-based prediction of the tax take from farm incomes into line with the actual figure.

¹⁰The basic reweighting scheme is applied throughout this paper: the adjustments referred to are changes to taxable income not to the weighting scheme.

As regards the non-farm self-employed there are no such discrepancies between the income measure which was sought by the questionnaire and the income measure used for tax purposes; but in practice, respondents may have given somewhat higher answers to the survey interviewers than to the tax authorities.¹¹ For this reason, a similar approach is taken to bring the estimated liabilities of the non-farm self-employed into line with the actual figures. In this case a discount of 40 per cent is applied to reported income before ordinary tax rules are applied.¹² The adjusted results for farmers and non-farm self-employed are shown in the third line of Table 4.6, which shows that the "discount factors" have been chosen to bring aggregate liabilities into line with those recorded by the Revenue Commissioners in 1986/87.

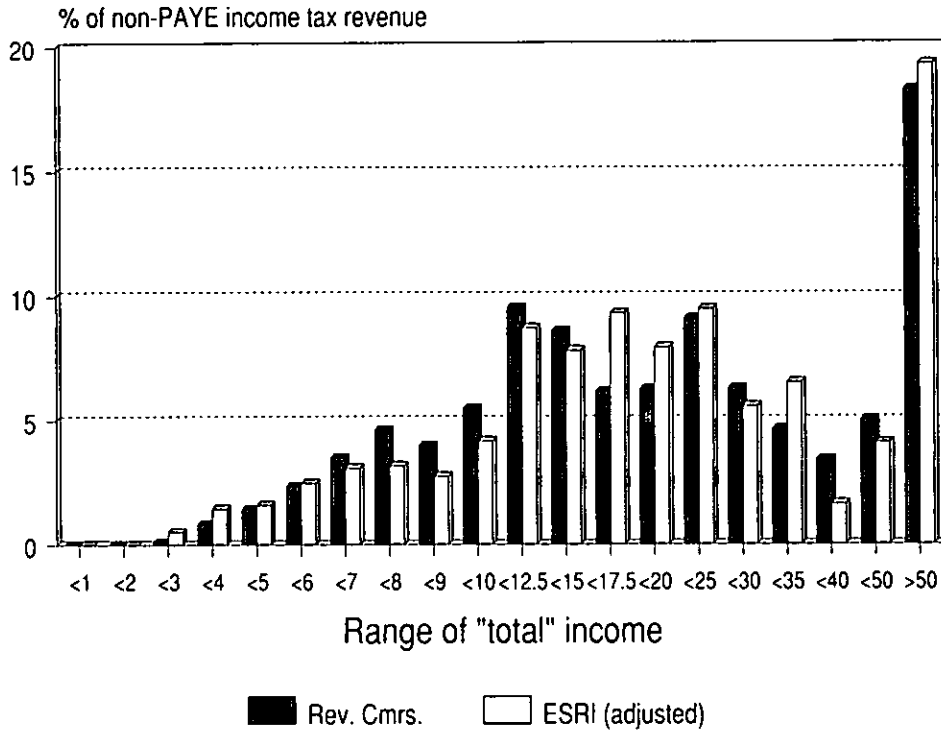
While there is clearly a need for adjustments to bring estimated tax liabilities into line with actual liabilities, this does not imply that corresponding adjustments should be made to the model's measures of disposable income or resources. The adjustments made by Atkinson (1983) to bring self-employment income in the UK Family Expenditure Survey into line with the corresponding National Accounts figures use a lower figure for tax purposes, and a higher figure to rank the family in terms of its resources against other families. This structure is also used here: the "discount factors" which are applied to bring estimated tax liabilities into line with the aggregate totals are used only for the purpose of calculating tax liabilities.

The distribution of non-PAYE income tax revenue over income bands, after these adjustments, is compared with the corresponding distribution from Revenue Commissioners' statistics in Figure 4.7 below. This suggests that the adjusted figures provide quite a good approximation to the distribution of liabilities.

¹¹Differential non-response could also have played a role: but if each respondent gave the same answers to interviewers and the tax authorities, this would require that the higher income self-employed were more likely to respond than the low income self-employed, which seems unlikely.

¹²Again, the figure of 40 per cent was derived as that necessary to bring the survey-based prediction of the tax take from self-employed incomes into line with the official statistics.

Figure 4.7: *Percentage Distribution of Non-PAYE Tax Revenue over Ranges of "Total Income"*



Sources: Revenue Commissioners' Annual Report 1988, Tables 79 and 80.

The battery of checks applied earlier to the unadjusted figures was also applied to the adjusted figures. Very similar results were found. The main exception is that the figures for total revenue, which had been about 7 per cent above a simple weighted average of the 1986/87 and 1987/88 net produce figures, are, after adjustment, about 7 per cent below that total.

Since both adjusted and unadjusted figures will be used in later chapters, it is of interest to examine the distribution of marginal tax rates which each implies, and how they compare to the actual distribution of marginal tax rates in 1986/87. These comparisons are reported in Table 4.7 below. The unadjusted ESRI distribution is very close to that from the Revenue Commissioners' Report; the adjusted distribution has a somewhat higher proportion at the standard rate, and a lower proportion at the higher rates. Since the marginal tax rate can play a key role in the analysis of

reforms, comparison of the results using adjusted and unadjusted distributions will be of interest. Each of the ESRI estimates suggest somewhat higher numbers are entitled to "marginal relief" under the income tax code.¹³ It seems likely that the explanation for this phenomenon is that the exemption limit is set just above the rate for the old-age contributory pension. Pensioners who receive other income which brings them just above this limit have a liability, in principle, which puts them into the marginal relief category; in practice, many of these incomes may not come to the attention of the Revenue Commissioners.

Table 4.7: *Distribution of Marginal Tax Rates*

<i>Marginal tax rate</i>	<i>Rev. Cmrs.</i>	<i>ESRI</i>	<i>ESRI adjusted</i>
		(<i>'000s</i>)	
Marginal relief	34.4	57.4	44.3
35 per cent	451.8	451.0	473.9
48 per cent	187.0	182.2	172.1
58 per cent	165.8	164.9	139.9
Total	838.9	855.5	830.2
		(<i>%</i>)	
Marginal relief	4.1	6.7	5.3
35 per cent	53.9	52.7	57.1
48 per cent	22.3	21.3	20.7
58 per cent	19.8	19.3	16.9
Total	100.0	100.0	100.0

Source: Revenue Commissioners.

4.4 Conclusion

The reliability of the survey data in terms of a variety of demographic and socio-economic checks was reviewed. Detailed investigation of its representativeness in terms of the social welfare client population was then undertaken. The ESRI survey was found to be, if anything, rather closer to the relevant administrative totals than the UK Family Expenditure Survey, on which most tax-benefit modelling has been based.

¹³i.e., have incomes which exceed the income exemption limit by a sufficiently small amount that they would face smaller tax bills if taxed at 60 per cent of this excess, rather than being taxed at the standard rate on the excess of their income over their allowances.

It is possible for models to be very good at predicting the revenue effects of tax changes, but rather poor at predicting the overall level of tax revenue. In the case of the Irish model, however, both the level and the changes seem to be predicted rather well. The model-based predictions of revenue from income tax, employee contributions to PRSI, health contributions and the employment and training levy were all close to the relevant administrative data. As will be seen in later chapters, the predicted revenue effects of policy changes are even closer to those of the Revenue Commissioners. The distributions of tax units over income ranges and over marginal tax rates were also very close to those which Revenue Commissioners' data would suggest.

Certain problems did arise with regard to the estimation of tax liabilities on incomes from farming and other forms of self-employment. It is often expected that surveys will tend to underestimate self-employment income, and consequently the tax liabilities of the self-employed. However, in this case the taxable incomes and tax liabilities of the self-employed and farmers appear to be *overstated* by the survey. A simple adjustment to the farm and self-employment income figures was found sufficient to capture both the level and the distribution of tax liabilities: the effects of using these adjusted figures, or the unadjusted incomes, will be examined in later chapters.

The attention given to cross-checks against administrative tax and social welfare data in this chapter may prompt some to ask why such data should not serve as the basis for a microsimulation model. The limitations of the administrative data in this respect were outlined in Chapter 1. Neither the tax nor the social welfare data, in general, contains the type of information on family and household composition and circumstances which the ESRI survey provides; the data collected reflect the administrative focus of existing schemes.

Chapter 5

TAXATION OF SOCIAL WELFARE BENEFITS

5.1 Introduction

At this point, we turn to some applications of the microsimulation model to policy issues. The particular issues examined reflect a number of influences. Relevance to current or recent debates on tax and social welfare policies is one consideration; the current state of development of the model is another. An underlying theme, however, has been to develop the taxation side of the model in such a way as to make it possible to analyse as much as possible of the Commission on Taxation's recommendations for a first phase of direct tax reform. The Commission's analysis and recommendations have strongly influenced the debate on tax reform in Ireland, as evidenced by the adoption of their "first phase" proposals by the National Economic and Social Council (NESC, 1986).

The Commission on Taxation emphasised that its proposed reforms should be regarded as an integrated package, rather than a menu from which certain items should be chosen. One approach to its analysis, therefore, would be simply to report the results for as much of the package as can presently be modelled. But important insights into what underlies such overall results can be gained by analysing some of the important constituent parts of the Commission's package separately. For this reason, we begin by analysing some of the elements of the package. This chapter deals with the inclusion of short-term social welfare payments (such as unemployment benefit, unemployment assistance, and disability benefit) in the income tax base. It also deals with the effects of making Child Benefit payments subject to income tax: something which the Commission on Taxation opposed, but which has more recently been suggested by NESC (1990), in the context of using the revenue raised to increase the level of Child Benefit. Chapter 6 examines the cash effects of abolition of special reliefs for mortgage interest, medical insurance and life assurance. It then considers packages combining the base-broadening elements of the Commission on Taxation's first phase recommendations with lowering of tax rates and widening of tax bands. These packages include a form of property tax which is broadly in line with that recommended by the Commission. Callan (1991b) examined the design of a property tax in

some detail; the present paper concentrates instead on the overall impact of packages which use revenues raised from a property tax to finance income tax reductions.

For some purposes, we might wish to update the information gathered in the survey to take account of recent changes in incomes and policy parameters. This is common practice internationally in the analysis of short-term changes. But for the analysis of fundamental policy reforms, it is simpler, and quite sufficient to explore the options in terms of the income distribution and policy parameters at the time of the survey. In what follows, the baseline is given by the data gathered in the ESRI Survey of 1987, and the policies in force in July of that year, i.e., the budget changes of 1987 to income taxes and social welfare policies have been taken into account, but not any later changes. Where possible and appropriate, some indication of how the results would be changed by updating is given.

5.2 Taxation of Short-Term Social Welfare Benefits

One of the recommendations for reform of the income tax system suggested by the Commission on Taxation was the inclusion of short-term social welfare benefits in the income tax base. This proposal has aroused considerable controversy.¹ In support of the proposal it can be argued that it would remove a horizontal inequity: the exemption of short-term social welfare payments from tax when persons on similar incomes from other sources have to pay tax. The proposal has perhaps received even greater support on efficiency grounds: taxation of short-term benefits would increase the incentive to take up employment and reduce the incentive to leave work.² Against this, it has sometimes been argued that short-term welfare recipients tend to be concentrated in the lower reaches of the income distribution, so that taxation of the benefits would be regressive. Thus far, very limited empirical analysis of the distributional consequences of the proposal has been possible, for the reasons discussed in Chapter 1. The following analysis will help to clarify the likely revenue effects and distributional implications of taxing short-term social welfare benefits.

¹To some extent this may have arisen from a misperception that it would consist of a tax deduction which would apply to all short-term benefits. But the proposal was simply that benefit income be regarded as *taxable*: a tax liability might not arise on this account, as will be seen.

²Marginal tax rates would be increased, if anything, rather than reduced. For this reason it would be misleading to report simply the changes in marginal tax rates as a summary of the incentive effects of this policy change. One way of coping with this combination might be to report the effects on both marginal tax rates and replacement rates. It has not yet been possible to implement this within the model. It should also be noted that different concepts of replacement rates may be relevant. In particular, one might distinguish between the replacement rates facing those employed or

Before discussing the distributional effects, it is important to establish the magnitude of the total tax take which could be expected from the measure. The Revenue Commissioners' *Report* for 1986/87 (Table 77) estimates of the cost of exemption of certain social welfare schemes is set out in Table 5.1, along with the model-derived estimate of the total revenue effect of taxing short-term social welfare. The ESRI estimate includes not only the schemes named in the table, but all other short-term social welfare schemes. Thus, the ESRI estimate would be expected to exceed the sum of the estimates for the four schemes from the Revenue Commissioners' *Report*, which it does. Adjustment of the incomes of farmers and self-employed makes very little difference to the analysis of this policy option, as might be expected: the social welfare benefits in question accrue almost entirely to the PAYE sector, or to farmers whose incomes would, even without any adjustment, be found to fall below income tax thresholds.

There are two factors which suggest that the ESRI estimate represents a lower bound on the actual tax foregone by exempting short-term welfare payments in 1987. First, the fact that for a significant proportion of respondents the estimates of 12-month income are based simply on annualised current incomes: this misses movements between periods of short-term welfare reciprocity and employment, which would tend to be associated with a tax liability under the options being investigated here. Second, as noted in Chapter 4, there appears to be some underrepresentation of disability benefit, partly associated with a misclassification of payments into invalidity pensions, a long-term welfare payment which is already subject to tax. However, there is no reason to suppose that either of these factors makes a major difference to the *distributional* implications of such a policy change, which are examined below.

unemployed; for the unemployed, one might consider rates calculated on a "backward looking" (last job) or "forward looking" (next job) basis; and one might distinguish between short-term replacement rates and those obtaining on a longer-term basis, when tax liabilities would depend solely on unemployment compensation or wages. Most of these replacement rates would be reduced by the inclusion of unemployment compensation in the income tax base. But the short-term forward looking replacement rate for persons currently unemployed might be *increased*: this could occur if no tax liability arose on the unemployment compensation, while the allowance available against income from employment would be reduced by the change.

Table 5.1: *Estimates of Revenue Effects of Taxing Short-Term Social Welfare*

	<i>Revenue Commrs. 1986/87 £m p.a.</i>	<i>ESRI Model £m p.a.</i>	<i>Adjusted ESRI model £m p.a.</i>
Disability, Unemployment & Injury Benefits, plus Maternity Allowance	77	n.a.	n.a.
Total of above, plus all other short-term social schemes:	n.a.	94	88

Source: Revenue Commissioners (1989) Table 77.

As regards the relevance to current policy options, it should be noted that the figures shown above refer to 1987 and have not been updated to reflect changes in incomes, social welfare payment rates and income tax rates and allowances since then. On the income tax side the most important developments have been the reduction in the standard rate of tax from 35 per cent to 30 per cent and substantial increases in exemption limits, including the institution of child additions to the exemption limits. These factors would substantially reduce the tax take, as discussed in Callan (1991a): the change in the standard tax rate alone would reduce the potential tax take by about 15 per cent.

The distributional effects of the proposal, which have been the subject of much concern and debate, are analysed in two distinct ways. The top half of Table 5.2 reports analysis based on "equivalent income". This is simply net income adjusted for family size and composition, to take into account the fact that, other things being equal, larger families have greater needs than smaller families: it can be thought of as "income per head" where the first head counts as 1, a second adult as 0.66, and all children as 0.33. The bottom half of Table 5.2 reports analysis which is based on net income without any such adjustment. In each case, tax units are ranked from poorest to richest using the criterion of relevant income concept (equivalent income or total tax unit income), and then split into ten groups of equal size ("deciles"). Table 5.2 then reports for each decile, from poorest to richest, the percentage of tax units which would experience a cash loss of greater than 50 pence per week, the average extent of that loss, the percentage loss and the aggregate loss. The adjustment to self-employed incomes makes very little difference to the distributional analysis, so only unadjusted results are reported here.

Table 5.2: *Distributional Effects of Taxing Short-Term Social Welfare*

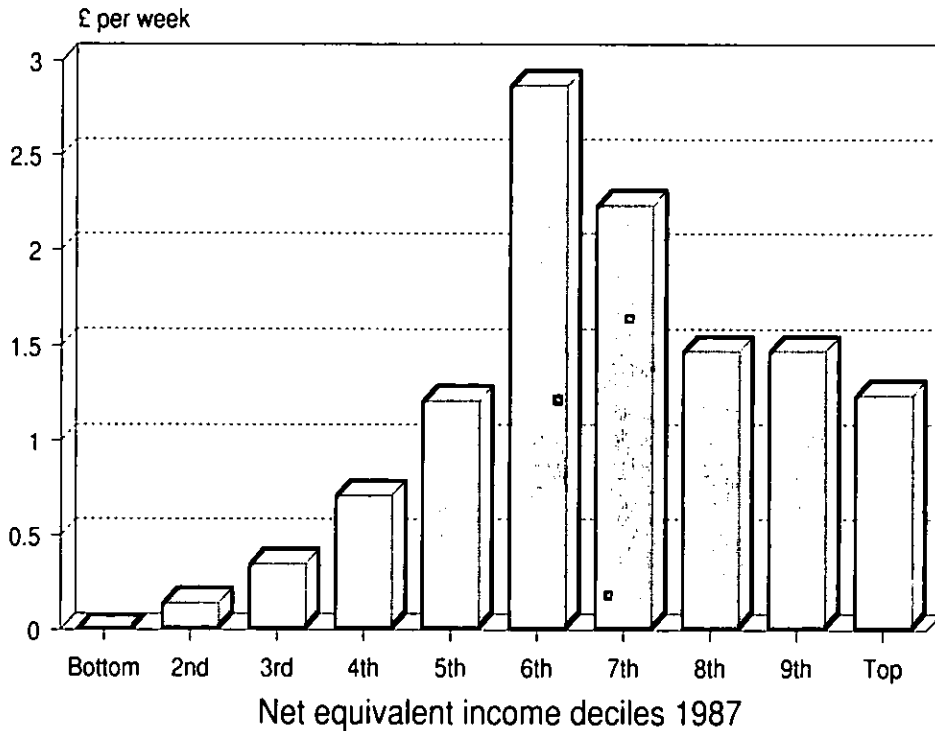
Income		Decile	% of decile who lose (at least 50p p.w.)	Average loss of those affected		Aggregate loss £m p.a.
Less than £ p.w.	More than			£ p.w.	Per cent	
<i>Equivalent income¹</i>						
	31.66	Bottom	0.0	0.0	0	0
31.66	41.22	2nd	4.6	3.24	2.6	1.1
41.22	47.97	3rd	6.2	6.03	4.8	2.8
47.97	53.72	4th	10.5	6.33	4.9	5.7
53.72	63.27	5th	12.8	8.82	6.9	9.7
63.27	75.45	6th	22.6	12.39	9.3	23.0
75.45	90.73	7th	19.1	11.66	8.0	17.9
90.73	109.62	8th	11.8	12.43	6.9	11.8
109.62	134.98	9th	13.6	10.87	5.4	11.8
134.98		Top decile	9.8	12.56	4.6	9.9
		ALL	11.3	10.39	6.5	93.8
<i>Total net income of tax unit</i>						
	35.05	Bottom	0.0	0.0	0	0
35.05	49.31	2nd	0.0	0.0	0	0
49.31	61.16	3rd	4.6	2.66	4.8	1.0
61.16	81.88	4th	13.1	6.48	9.1	6.9
81.88	101.08	5th	5.8	7.58	8.4	3.5
101.08	120.16	6th	14.0	4.12	3.6	4.6
120.16	142.27	7th	19.4	7.51	5.7	11.7
142.27	180.80	8th	20.9	14.19	8.8	23.8
180.80	245.89	9th	19.8	14.64	7.0	23.3
245.89		Top decile	15.0	16.17	4.5	19.0
		ALL	11.3	10.39	6.5	93.8

Notes: 1. Equivalence scale 1 for head of tax unit, 0.66 for spouse, 0.33 for each child

From the first column it is clear that those who would experience cash losses are concentrated in the upper middle area of income distribution. Almost 70 per cent of tax units affected by the change are in the upper half of the equivalent income distribution, and over 70 per cent in the top half of the distribution of total tax unit income. Less than 10 per cent of those affected are in the bottom three deciles using either income concept. The average loss for those affected is quite large: just over £10 per week across all income groups, and £3 to £6 per week in the lower income groups. But less than £5m of the total cost of £94m of exempting short-term social welfare payments from taxation goes to the bottom three income deciles, on either an equivalent or total income basis. Over £70m of this "tax expenditure" goes to the top half of the equivalent income distribution.³ The fact that 12-month income has not yet been constructed for those individuals for whom limited information was collected means that each of these figures is an underestimate of the position in 1987; but there is no particular reason to expect the *pattern* to be markedly altered by this.

Figure 5.1 shows the average loss in each income decile which taxation of short-term welfare benefits would entail. Average losses rise from low levels to around £1 per week in the fifth decile, but then rise sharply in the sixth and seventh decile; average losses in the top three deciles are also above those in the bottom half of the distribution.

³i.e., those with an income per adult equivalent of over £63 in 1987. Over £80m of the "tax expenditure" goes to tax units with *total net* incomes above £100 per week.

Figure 5.1: *Average Losses from Taxation of Short-Term Welfare Benefits*

Even allowing for possible revisions to the exact figures, the distributional pattern shown is striking. In the light of these figures, the distributional argument against taxation of short-term social welfare benefits appears unsustainable: the losses are concentrated in the middle and upper parts of the income distribution rather than at the lower end. This does not mean that social welfare expenditure is itself ill-targeted.⁴ Other analysis has shown that recipients and expenditure are concentrated in the bottom half of the *current* income distribution (see, for example, Callan and Nolan, 1989)⁵. But the distribution of liabilities from the taxation of

⁴The objectives of the social welfare system include income replacement as well as alleviation of poverty; but the idea of "target efficiency", in line with the prevailing usage, refers here only to the latter objective.

⁵A similar analysis in terms of the distribution of 12-month income would be enlightening.

short-term welfare benefits reflects the progressivity of the existing income tax structure. Thus the benefit of exempting short-term social welfare payments from taxation is ill-targeted.

It is useful to clarify how different tax units might be affected by the taxation of short-term social welfare benefits. First, if a social welfare payment was the only income, it is quite probable that no tax liability would arise, or that the tax liability would be small. This would arise, for example, if social welfare income was below the exemption limit of £5,300 for a married couple: about £100 per week, which was equivalent to rate of unemployment or disability benefit for a married couple with 3 children, or long-term unemployment assistance for a married couple with 4 children. Second, if social welfare income is received only for part of a year, and employment or other income for the remainder of year, the increased tax liability would in many cases simply result in the withdrawal of tax rebates paid under the current system, rather than a reduction in the actual social welfare payment received. Third, if other income is received concurrently with social welfare, either by the welfare recipient or his/her spouse the tax bill would now be based on wider income: it is this case which would be most likely to result in a net reduction of the actual social welfare payment.

Table 5.3: *Cash Losses by Size and Equivalent Income Decile*

<i>Equivalent Income</i>		<i>Decile of equivalent income</i>	<i>No. in decile ('000s)</i>	<i>Numbers ('000s) with cash loss:</i>			
<i>More than £ p.w.</i>	<i>Less than £ p.w.</i>			<i>Over £10 p.w.</i>	<i>£5-£10 p.w.</i>	<i>£1-£5 p.w.</i>	<i>All >50p p.w.</i>
	31.66	Bottom decile	153	0	0	0	0
31.66	41.22	2nd	153	0	1.2	3.7	6.4
41.22	47.97	3rd	153	1.9	2.5	3.6	9.0
47.97	53.72	4th	153	4.5	4.4	6.3	17.3
53.72	63.27	5th	153	7.6	5.7	7.5	21.1
63.27	75.45	6th	153	18.2	6.2	10.8	35.7
75.45	90.73	7th	153	15.8	7.5	5.5	29.5
90.73	109.62	8th	153	9.6	3.5	4.7	18.2
109.62	134.98	9th	153	9.2	4.8	6.6	20.9
134.98		Top decile	153	8.3	1.7	4.3	15.0
		ALL	1,536	75.1	37.5	53.1	173.0

Some idea of how many tax units fall into these different categories can be gained from Table 5.3. The total number experiencing a loss (over 50 pence per week) is under half of all those potentially affected, i.e., those currently receiving short-term social welfare, or those who have

received it at some point during the past 12 months. Thus, more than half of all short-term welfare recipients would not be adversely affected by the change. The cash effects on those to whom the change did matter would tend to be quite large. About 75,000 tax units would experience cash losses of over £10 per week: but almost all of these are above the bottom three deciles, and most are in the upper half of the equivalent income distribution. These results are subject to the qualifications mentioned above, but the broad picture is unlikely to be substantially altered by these factors.

5.3 An Increased, Taxable Child Benefit

Evidence of the financial difficulties facing low-income families with children has prompted calls for greater assistance to be directed towards them. However, it is not clear that existing policy instruments (such as Child Benefit, child dependant additions to social welfare payments,⁶ and Family Income Supplement) can achieve the desired objectives at an acceptable cost, or without undesirable side-effects on incentives. For this reason, proposals to reform the Child Benefit scheme, by increasing the payment and making it taxable, have periodically been mooted. McCashin (1988) documents the chequered history of proposals of this type; here we concentrate on the recent history of such proposals.

The Commission on Taxation (1982) advocated the abolition of child tax allowances and social welfare child dependant additions, to be replaced by a unified Child Benefit. The Commission recommended, however, that this Child Benefit payment should *not* be taxable, on the grounds of "horizontal equity" between taxpayers with and without children. The National Plan, *Building on Reality 1984-1987*, argued for a similar integration of all forms of child income support into a single Child Benefit payment, but recommended that it should be taxable. The full cost and distributional implications of the National Plan proposal to integrate all forms of child income support into a single Child Benefit payment were not explored, and the proposal was not implemented. The Commission on Social Welfare (1986) reports that it did not reach agreement on the tax treatment of Child Benefit. It favoured the retention (and rationalisation) of child dependant additions in the social welfare system, as an effective

⁶i.e., additional payments for social welfare recipients who have dependant children.

means of directing resources towards families without other incomes, though with a long-term shift of resources into Child Benefit and away from child dependant additions to social welfare payments.

The Commission on Social Welfare's failure to reach agreement on the tax treatment of Child Benefit, and the contradictions between the recommendations of the Commission on Taxation and the National Plan, may reflect fundamental disagreements on values or objectives. But they may, on the other hand, have been largely due to differences of opinion as to the actual effects of such a measure. An investigation of the effects using an earlier version of the ESRI model (Callan and Nolan, 1988) was designed to provide information which could help to resolve disagreements arising from differing views on the likely effects, rather than more fundamental disagreements on objectives. Here we repeat some of that analysis with the revised model, which is based on annual income estimates rather than annualised current income, and has been more thoroughly tested for representativeness as detailed in Chapter 4.

One feature of those cross-checks against external data was that children were somewhat overrepresented in the ESRI Survey, with the result that expenditure on Child Benefit was overestimated by about 10 per cent. One would not expect this to have a major impact on the analysis of the revenue neutral reform: the additional costs of higher Child Benefit would be offset by a higher tax take from its taxation. But it would tend to lead to overestimation of the cost of packages which involved a net increase in expenditure on Child Benefit. As against this, however, the analysis does not take into account the possible costs of compensating increases in means-tested benefits to which some individuals would be entitled.⁷

The first, and critical, result derived from the analysis is the level of increase of Child Benefit which is consistent with a zero net cost to the Exchequer. Since this answer does depend on the precise distribution of taxpayers across marginal tax rates, it is influenced by whether or not the incomes of farmers and self-employed are adjusted in the manner described in Chapter 4. The answer produced using unadjusted data is that an increase in Child Benefit of over 40 per cent could be financed by making the increased payment taxable; the corresponding figure using unadjusted data is about 37 per cent. Thus, an increase of between £1.30 and £1.50 per week for each of the first 5 children, and between £1.90 and £2.10 per

⁷Entitlements to increased means-tested benefits could arise simply from the structure of various means tests, which take income *net of taxes* as the basis for their calculations. Modelling of these various means tests, as discussed in Chapter 3, would be necessary to take this factor into account.

week for 6th and subsequent children, would be "revenue neutral". That is, an increase in gross expenditure on Child Benefit of close to 40 per cent would be offset by an matching increase in income tax revenue.

Table 5.4 shows the distribution of the percentage gains and losses under an increased, but taxable, Child Benefit. Once again, the use of adjusted or unadjusted self-employment incomes leads to very similar results as regards distributional patterns, so only the unadjusted results are reported here.

Table 5.4: *Distribution of Gains and Losses for Increased, Taxable Child Benefit*

	<i>Gain or Loss</i>	<i>Revenue-Neutral Reform</i>	<i>Standard Rate Taxpayers Compensated</i>
	<i>More than Less than (% of net income)</i>		
Losses	5	0.3	0.3
	3 5	0.4	0.2
	1 3	4.2	3.0
	0 1	18.6	7.6
	No Change	66.2	71.1
Gains	0 1	0.2	7.6
	1 3	4.1	3.0
	3 5	3.5	4.0
	5	2.5	4.4
	Total	100.0	100.0

The most striking feature of the balance of gains and losses under the revenue-neutral reform is the large number of tax units which would experience small losses, as against a smaller number which would experience larger gains (about 1 in 10 gaining more than 1 per cent). This picture reflects the fact that the increase in Child Benefit of £1.50 per week is just below what is required to compensate standard rate taxpayers for making the benefit taxable; they lose around 20 pence per child per week. Such a policy change might well be deemed either undesirable, or politically impossible to implement.

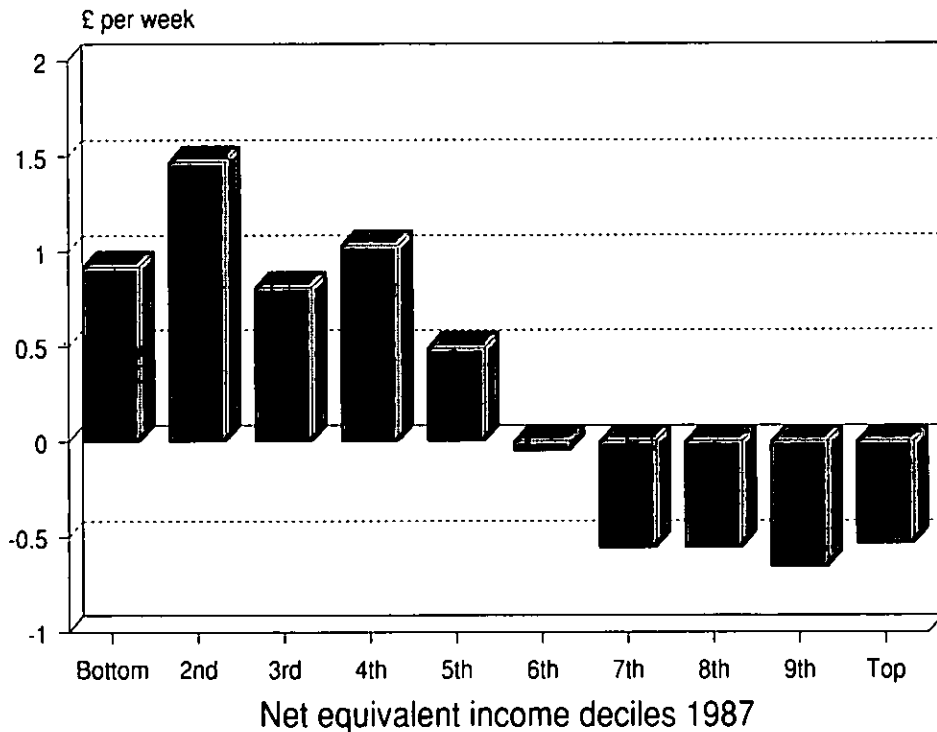
This raises the question of whether "compensation" for standard rate taxpayers might be desirable, and if so, how costly it might be. It could be argued that if standard rate taxpayers are *always* to be compensated, the tax structure might become almost "fossilized" in its present form, since that would impose severe constraints on possible reforms. These constraints would become even tighter as the proportion of taxpayers at the standard rate rose, in line with stated government policy. This argument has considerable force. In the present context, however, it might be justifiable to compensate standard rate taxpayers in order to achieve an change in the structure of child income support: future increases in Child Benefit would automatically be made more selective by this change. For this reason, the cost of raising Child Benefit by the full amount necessary to compensate standard rate taxpayers for making the benefit taxable was estimated. The model estimate is about £20m on the basis of unadjusted incomes, or £27m on the basis of the adjusted self-employment and farm incomes. The distribution of gains and losses (final column of Table 5.4) then shows a more even balance between gainers and losers, with the gainers experiencing rather larger percentage changes in net income.

We now turn to the question of where the gainers and losers from the latter reform (i.e., increasing Child Benefit by enough to compensate standard-rate taxpayers) are located in the income distribution. Table 5.5 reports the aggregate (or mean) percentage gain or loss for each decile of the equivalent income distribution, and the aggregate gain or loss (in millions of pounds per year) for each group. The percentage change column shows a progressive pattern in the net income changes: gains for the bottom half of the distribution, and losses for the top half, as illustrated in Figure 5.2, which shows the average gains/losses by decile. The percentage gains are largest for the bottom two deciles. The aggregate gain and aggregate loss columns show that there are no losers in the bottom decile and very few in the second; while there are no gainers in the top two deciles, and very few in the deciles just below that. An alternative equivalence scale, which makes a more generous allowance for the needs of children yields a similar pattern of results.

Table 5.5: *Distribution of Gains and Losses from an Increased, Taxable Child Benefit*

Net equivalent income ¹ (£ p w)		Decile	% Change in ave. income	Aggregate Gain £m p a	Aggregate Loss £m p a
More than	Less than				
	31.66	Bottom	5.3	7.4	0.0
31.66	41.22	2nd	2.6	12.4	0.6
41.22	47.97	3rd	1.2	7.0	0.5
47.97	53.72	4th	1.3	8.6	0.3
53.72	63.27	5th	0.5	4.7	0.8
63.27	75.45	6th	0.0	1.8	2.2
75.45	90.73	7th	-0.4	0.1	4.6
90.73	109.62	8th	-0.4	0.1	4.6
109.62	134.98	9th	-0.4	0.0	5.3
134.98		Top	-0.2	0.0	4.3
ALL			0.2	42.0	23.1

Notes: 1. Equivalence scale: 1 for the first adult, 0.66 for other adults, and 0.33 per child.

Figure 5.2: *Average Gains/Losses from an Increased, Taxable Child Benefit*

Blackwell (1988) has pointed out that "the taxing of Child Benefit would bring more low income families into the tax net and into the region of the poverty trap....This effect would be magnified, especially for the larger families, if the trade-off for the taxing of Child Benefit were to be an increase in rates of Child Benefit". While a full examination of the poverty trap phenomenon discussed by Blackwell is outside the scope of this paper, we can examine the changes in marginal income tax rates implied by the reform under discussion here. This gives some idea of the magnitude of the possible problem identified by Blackwell.

Table 5.6: *Changes in Marginal Income Tax Rates Arising From Increased, Taxable Child Benefit*

<i>Change (in percentage points)</i>	<i>% of Tax Units</i>	<i>Number of Tax Units ('000s)</i>
-25	0.4	6
0	96.7	1,485
10	0.3	5
13	1.1	18
35	0.8	12
60	0.7	11

Table 5.6 shows the number and percentage of tax units who face unchanged or changed marginal tax rates after the reform. The vast bulk of taxpayers are unaffected by the changes, including, of course, all those taxpayers who do not have children eligible for Child Benefit. About one and a half per cent of tax units are drawn into the tax net by the change: just over half of these move straight on to the standard tax rate (an increase of 35 percentage points), while the remainder are on "marginal relief" (an increase of 60 percentage points).⁸ Another one and a half per cent of tax units are shifted upwards between the 35 and 48 or 48 and 58 per cent tax rates (increases of 13 and 10 percentage points respectively). Marginal tax rates fall for those tax units moving off marginal relief and on to the standard rate (a fall of 25 percentage points).

As well as documenting the effects on incentives, this table points up the numbers of low income tax units who would be adversely affected by the application of marginal relief provisions to their Child Benefit. Those who were initially in the "marginal relief" area, and remain so after the change would have most to lose: their numbers cannot be estimated from this table, but they would face a withdrawal of 60 per cent of their benefit. Those who move into the marginal relief area, or out of it, experience a Child Benefit withdrawal rate of 60 per cent on *some* of their payment.

⁸Marginal relief rate applies to those with incomes just above the income exemption limit: they have a smaller tax liability on the basis of the marginal relief rate applied to the excess of their income over the exemption limit than on the basis of the standard rate applied to the excess of their income over their allowances.

However, the *total* effective tax rate on their payments, or on those who move from being out of the tax net on to the standard rate band can only be calculated at individual level.

The operation of these "marginal relief" provisions on incomes just above the exemption limit may explain why there are some losers in the lower reaches of the income distribution. The aggregate amount of "tax clawback" from this group is, however, quite small, reflecting the low numbers involved. This group of taxpayers may also be eligible for Family Income Supplement: the question of the effective tax-cum-benefit withdrawal rate faced by them is of major importance, but takes us outside the scope of the present investigation. Here it is sufficient to note the operation of marginal relief provisions in the income tax code (which arise essentially from the existence of exemption limits higher than allowances) could lead to what would be widely regarded as undesired side effects. Recent policy changes which have created child additions to the exemption limits would, in all probability, have increased the importance of this phenomenon (Callan and Nolan, 1991).

An obvious, but important point is that the cash effects of a revenue neutral reform must make losers of some people. Breaking the constraint of revenue neutrality within the personal tax/social welfare area will also typically involve indirect costs (such as deferred taxation to service borrowing, or effects via the impact on the corporate sector) which must be taken into account in assessing the overall impact. If, however, a prior decision has been taken which allows a net gain for the personal sector, the model allows for the examination of policies which allocate that net gain in different ways. Thus, the model suggests that if about £25m were available to spend on the Child Benefit scheme, it would have been possible to finance either an increase for all recipients of Child Benefit of around 10 per cent, or an increase of over 50 per cent for those not paying income tax, combined with net reductions of between 14 and 35 per cent for higher rate taxpayers, while leaving standard rate taxpayers unaffected.

The 1989 Budget contained a proposal to make Child Benefit more selective. It generated considerable controversy, which has given rise to suggestions that it is not possible to implement such changes. The nature of the Budget proposal was, however, quite different from the increased, taxable Child Benefit analysed here. It proposed a cut-off income, above which Child Benefit would not be paid. This had a number of drawbacks. First, a cut-off at the levels which post-Budget clarifications suggested would not lead to significant savings in expenditure; the question of the uses to which such savings could be put is therefore of little relevance.

Second, the cut-off or "means-testing" approach imposes a high effective marginal tax rate at or just above the cut-off income. This can best be illustrated by an example. A taxpayer with 4 children and an income just below the cut-off would receive Child Benefit of over £700 per annum. A £1 per year increase in his or her gross income would lead to the benefit being totally withdrawn; and he or she would have to earn about £1500 extra to have the same take-home pay as just below the cut-off. Tapering the withdrawal of the benefit (cf. the marginal relief provisions at low income) would lead to an even lower saving in terms of aggregate expenditure, and expand the range of incomes to which high marginal tax rates applied. Much of the reaction to the budget proposal concentrated on a third perceived drawback: that it would withdraw income from mothers in the home.

An increased, but taxable, Child Benefit represents an alternative form of selectivity which avoids each of these drawbacks. It would redistribute a significant amount of net expenditure from the top to the bottom of the income distribution; it would not introduce any new kinks into the marginal tax-cum-benefit withdrawal schedule; and it would lead to an *increased* payment to mothers in the home, offset in some cases by increased tax payments by their husbands. The horizontal equity argument against taxation of Child Benefit (cited by the Commission on Taxation) has been reconsidered by Nolan and Farrell (1990) and NESF (1990). Both accept that there is a legitimate argument for horizontal as well as vertical redistribution; but both favour making Child Benefit taxable, in order to give greater priority to the vertical dimension of redistribution.

5.4 Conclusions

The present chapter has concentrated on the analysis of reforms which involve interaction between the income tax and social welfare systems. Such changes are the most difficult to analyse in the absence of a microsimulation model.

Perhaps the most clear-cut example of the value of the approach was in the analysis of the proposal to tax short-term social welfare benefits. This proposal has generated substantial controversy. In particular, it is sometimes argued that short-term welfare recipients tend to be concentrated in the lower reaches of the income distribution, so that taxation of the benefits would be regressive. Analysis of the proposal using the ESRI tax-benefit model shows that this is not, in fact, the case. The total

cost of the "tax expenditure" was about £90m in 1987.⁹ Almost £75m of this went to the top half of the equivalent net annual income distribution. A majority of short-term welfare recipients would be unaffected by the taxation of short-term welfare benefits; and less than 10 per cent of those who would lose are in the bottom 30 per cent of the income distribution. The results do not imply that social welfare expenditure is itself ill-targeted; but they do imply that the benefit from exempting social welfare expenditure from taxation is ill-targeted.

A similar analysis of the effects of an increased, but taxable, Child Benefit payment showed that an increase of about 40 per cent in the gross payment could be financed on a revenue-neutral basis. This would be insufficient, however, to compensate standard rate taxpayers for the change. The cost of an increase sufficient to compensate standard rate taxpayers was estimated at between £20m and £27m. It was shown that by increasing and taxing Child Benefit, the net benefit could be more selectively targeted on low income groups in a way which avoided the problems of means-testing or cut-offs.

⁹Reductions in the standard tax rate and increases in the income tax exemption limits have reduced this figure since then; see Callan (1991a).

Chapter 6

BASE-BROADENING, RATE-REDUCING INCOME TAX POLICIES

6.1 Introduction

Chapter 5 analysed one of the main extensions to the income tax base proposed by the Commission on Taxation: the inclusion of short-term social welfare payments. This chapter turns first (section 6.2) to some other extensions proposed by the Commission: the removal of income tax relief on mortgage interest, medical insurance premia and life assurance premia. Recent budgets have reduced the proportions of mortgage interest and life assurance premia which qualify for tax relief. There is therefore some independent interest in assessing the distributive effects of such changes. Section 6.3 deals with the incorporation of the base-widening elements already discussed and other elements of the Commission on Taxation's first phase recommendations into a base-widening, rate-reducing, band-widening package. A property tax is included as a key element of the package; under these circumstances, the Commission recommended that a form of tax relief on mortgage interest should be allowed. Changes in marginal tax rates which the package would bring about are examined. Some more general issues concerning incentives are considered in section 6.4.

6.2 Abolition of Relief for Mortgage Interest, Medical Insurance and Life Assurance

The First Report of the Commission on Taxation (1982) recommended the abolition of special reliefs such as the deductions for mortgage interest, medical insurance and life assurance.¹ Such reliefs, it was argued, distorted decisions in these areas, and by narrowing the tax base required higher tax rates to achieve any given revenue. Furthermore, it was argued that the benefits from such reliefs were concentrated at the upper end of the income distribution.

This section first examines the revenue effects of removing each of these reliefs. Then the distributional effects of removing all three simultaneously are reviewed. Finally, the distributional effects of removing each one of the three are compared.

¹The basic recommendation was for abolition of each of these reliefs without compensation, except in the case of first-time buyers in the early years of their mortgages.

Given the importance of these tax expenditures in debates about income tax reform, the ESRI Survey made special efforts to obtain accurate data which would permit the analysis of different policy options in this area. The requirements included not just accurate income data, but also accurate data on mortgages, medical insurance coverage and life assurance premia. Since most respondents were found in pilot surveys to be unable to provide information on the interest element of repayments, information was obtained on the term, amount and interest rate of the mortgage as an alternative. This allowed the estimation of the interest component of the repayment. Information on which members of the household were covered by medical insurance was also obtained, though not on the amounts of premia or type of scheme.² Premia are estimated by reference to the known total subscription income of the Voluntary Health Insurance organisation, and the family composition of tax units covered by VHI³: the average estimated premium works out slightly below the cost of the VHI's plan B. Direct data on life assurance premia were gathered.

Table 6.1: *Estimates of Cost of Mortgage Interest, Medical Insurance and Life Assurance Reliefs*

<i>Revenue foregone by:</i>	<i>Rev. Comms. 1986/87 £m p a</i>	<i>ESRI Model £m p a</i>	<i>Rev. Comms. 1987/88 £m p a</i>
Mortgage Interest Relief	137 ^a	136	152
Medical Insurance Relief	36	42	37
Life Assurance Relief	32	26	36
Total of above:	205	204	225

Note: ^aAdjusted to take account of restriction of allowance to 90% of interest paid in the 1987/88 income tax year; this 90% restriction was also applied in the derivation of the ESRI estimates.

Source: Revenue Commissioners' *Annual Report 1988*, Table 77 and *Statistical Report 1989*, Table 65.

²The already daunting length of the questionnaires made it impossible to request such detailed information on these topics.

³Nolan (1991) shows that the survey's coverage of VHI membership is reliable.

Table 6.1 sets out the cost of the mortgage interest, medical insurance, and life assurance reliefs as estimated by the Revenue Commissioners and as predicted using the ESRI tax-benefit model. These independent estimates are remarkably similar, suggesting that the survey data are accurate not only in respect of the overall income tax base and expenditures on mortgage interest and life assurance premia; but also in the distribution of such expenditures over marginal tax rates. The ESRI figure for life assurance relief is about 25 per cent below the simple average for 1986/87 and 1987/88 official estimates, while the figure for medical insurance relief is about 15 per cent above the corresponding official estimate; but the estimates of mortgage interest relief, which is the major component of the total, and of the total of all three reliefs are within about 5 per cent of the official estimates. The use of adjusted income figures makes little difference to these calculations: the ESRI estimate of the total cost of the three reliefs is reduced by about 3 per cent. Thus distributional patterns are shown for the unadjusted figures alone.

Table 6.2: *Distributional Effects of Abolition of Reliefs for Mortgage Interest, Medical Insurance Premia and Life Assurance Premia*

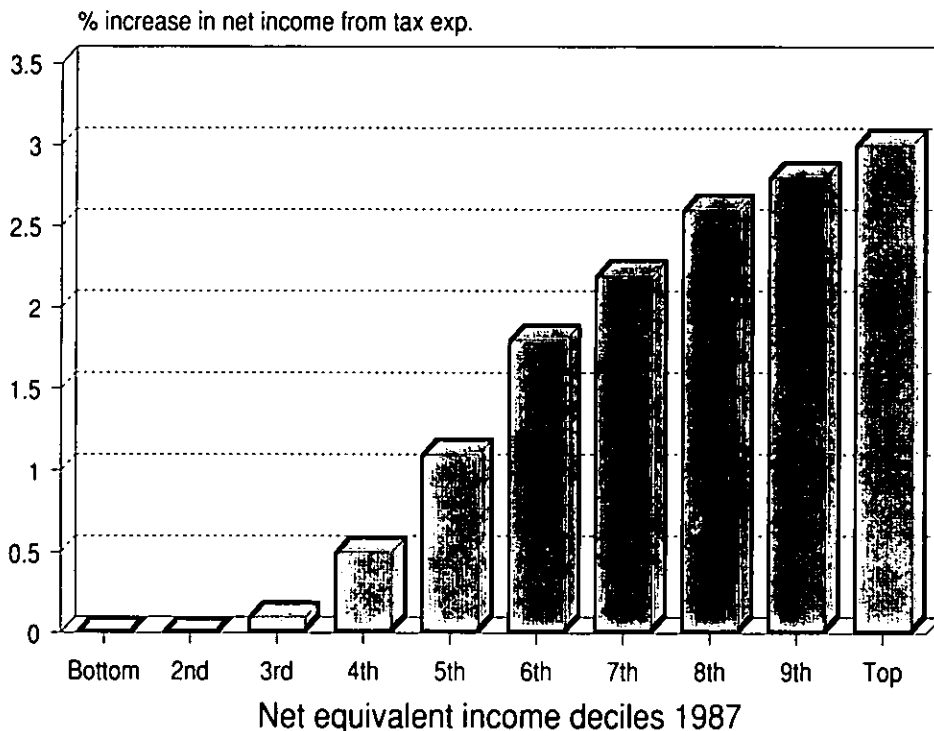
<i>Decile of equivalent income (Equivalence scale 1, 0.66, 0.33)</i>	<i>% of decile who lose (at least 50p p w)</i>	<i>Average loss of those affected</i>		<i>Aggregate loss</i>
		<i>£ p w</i>	<i>%</i>	<i>£m p a</i>
Bottom decile	0	0	0	0
2nd	0.8	3.79	3.1	0.2
3rd	3.2	2.65	2.0	0.7
4th	7.3	3.11	2.3	2.0
5th	19.9	3.70	2.7	6.4
6th	38.3	4.91	3.0	15.5
7th	51.9	6.52	3.7	27.3
8th	54.2	6.35	3.3	27.7
9th	63.7	8.50	4.1	43.4
Top decile	84.3	12.15	4.2	81.8
ALL	32.7	7.83	3.8	205.0

The fact that these tax expenditures are, in aggregate, concentrated on the upper end of the equivalent income distribution is strikingly illustrated by Table 6.2: this is despite the fact that mortgagors tend to be at a stage of the life cycle where the number of child dependants is high, tending to reduce income per equivalent adult. The proportion of tax units benefiting from the reliefs rises sharply with income. The average value of that relief is also particularly high for taxpaying units in the top two deciles. This combination means that the total value of the tax expenditures is very heavily concentrated on the upper income groups: over 60 per cent of the benefit goes to the top two deciles, for example. Figure 6.1 also shows that the percentage increases in net income which these "tax expenditures" give rise to also increase with income. For the 30 per cent of tax units with lowest incomes, the increase is non-existent or negligible; for others in the bottom half of the distribution, the increase is half or one per cent; while at the top of the distribution the increase rises to 3 per cent of net income.⁴

Although the reliefs are skewed towards the top of the income distribution, the fact that substantial numbers of those in the middle of the income distribution also benefit from the reliefs makes it politically more difficult to remove or restrict them. A move to a tax credit scheme (allowing the reliefs only at the standard rate of tax) might therefore encounter less political resistance than outright abolition, even if the latter were to be accompanied by cuts in tax rates. This by no means exhausts the relevant options. In the tax treatment of housing, for instance, abolition of mortgage interest relief would not remove the basic distortion arising from non-taxation of the imputed income from housing (as emphasised in the Commission on Taxation's First Report, 1982). A general property tax on the value of owner-occupied housing, coupled with the retention of some form of mortgage interest tax relief, might well be superior (as is argued by de Buitléir, 1989). It is this option which is explored in the next section.

⁴The "second round" effects of abolition of special reliefs would include reductions in demand for housing and changes in savings behaviour. "Third round" effects would include changes in asset prices such as house prices; but present analysis concentrates on "cash" or "first round" effects.

Figure 6.1 *Distribution of Tax Expenditures on Mortgage Interest, Medical Insurance and Life Assurance*



6.3 A Base-Broadening, Rate-Reducing, Band-Widening Package

Having examined some of the main elements of broadening of the income tax base which the Commission on Taxation envisaged, we now turn to some packages which would use the revenue gains to reduce tax rates and/or widen tax bands. Table 6.3 summarises the main recommendations of the Commission for a "first phase" of tax reform, in the areas of income tax, social insurance contributions and property tax. Recommendations which had already been implemented before 1987, the baseline year for the ESRI model, are not included in the table for clarity. The table also summarises whether the recommendations have been implemented in the ESRI model.

Table 6.3: *Implementation of Commission on Taxation's First Phase Recommendations in ESRI Model*

<i>Recommendation</i>	<i>Net revenue (1986/87) £m p a</i>	<i>Implemented in ESRI model?</i>
<i>Personal Income Tax</i>		
A. Extension of tax base		
1. Taxation of exempt income		
Short-term social welfare	77	YES
Fringe benefits	?	NO
Lump-sum receipts	50?	NO
Foreign pensions	<1	NO, but minor
Artists earnings	<1	NO, but minor
2. Abolition of reliefs/deductions or allowances with no compensatory payments:		
Mortgage interest		
Medical insurance premium	152	YES
Life assurance premium	36	YES
Widowed persons with no child	32	YES
PAYE allowance	?	YES
Permanent health insurance	247	YES
	<1	NO, but minor
3. Abolition of allowances with provision for compensatory payments	≈ 0	NO, but since compensation was envisaged does not affect net revenue
B. Structure of income taxes		
Lowering of tax rates	n.a.	YES
Widening of tax bands	n.a.	YES
Abolish gen. exemption limits	7	NO, see text
Convert personal allowances to tax credits	0	NO, but does not affect net revenue
Indexation arrangements	n.a.	PARTIAL, see text
<i>Social Insurance Contributions</i>		
Integration of social insurance contributions as single rate within income tax system	n.a.	YES
Employer contribution replaced by same single rate on income arising in the first place to companies	negative (£500m?)	NO
<i>Property Tax</i>		
National property tax on all residential, industrial and commercial property [if no local property tax]	£250m?	YES, national tax on owner-occupied residential property: no major effect on net revenue arising from the difference (see text)
Rate of property tax related to average rental yield and single rate of income tax		YES

Notes: Effects on net revenue are taken from Revenue Commissioners' *Annual Report 1988*, Table 77 unless otherwise stated; n.a.= not applicable; ?=unknown or uncertain (not from Revenue Commissioners' *Report*). The estimate for property tax is derived from Callan (1991b).

Overall, the implementation in the ESRI model covers most of the main elements of the Commission's recommendations. Those recommendations which it has not been possible to implement fully using the ESRI model do not, for the most part, have a major impact on the net revenue or the distributive pattern of the reform. The recommendations that certain minor exemptions and reliefs be eliminated would, in total, have very little impact on revenue. The proposal that some other reliefs and deductions be abolished with compensatory payments would, similarly, have very little effect on net revenue or the distributive pattern of the reform: the revenue gained by their inclusion in the tax net would be approximately offset by compensatory payments through new or existing social welfare schemes. The recommendation for abolition of the general exemption limits should also be seen in this light: the Commission's argument was that "to help the poor effectively it is unnecessary to relieve them from taxation but rather to ensure that they have an adequate income by means of social welfare payments". The fact that the ESRI model continues to use personal allowances rather than the non-refundable tax credits proposed by the Commission is basically a technical issue, since the Commission envisaged levels of tax credits which would be closely linked to the levels of the pre-existing allowances. The difference in the specification of the property tax would also have little impact on net revenue: the payments of tax on commercial and industrial property would be allowable against income or profits taxes under the Commission's scheme.

Among the recommendations which it has not been possible to implement in the model, there remains a small number which would have more significant effects. Taxation of lump-sum incomes (principally pension gratuities, redundancy payments and compensation payments for loss of office) might raise of the order of £50m. More effective taxation of fringe benefits might raise a similar, or even somewhat larger amount (de Buitléir, 1983). The other main element of the Commission's proposal which it has not been possible to model is the abolition of employer's social insurance contributions, to be replaced by a social security tax applying to "income which accrues in the first instance to companies". Essentially this involves a move from a tax on payroll to a tax on profits, with full imputation of the tax to shareholders who receive dividends out of taxed profits; and a much lower yield from the tax.

How would a package including these three elements (taxation of lump-sum incomes, more effective taxation of fringe benefits and abolition of payroll-based social insurance contributions by employers) differ from the one actually modelled? The net revenue available for reductions in income tax rates and band-widening would be lower in the full package, since some of the revenue would be needed to finance the abolition of employer's social insurance contributions. Thus, the full package would involve somewhat lower reductions in income tax, together with additional revenue from taxation of lump sum income and fringe benefits, in order to finance substantial reductions and reform of employers' social insurance contributions. The net effects on the distributive pattern of the reform are difficult to assess; but on balance, one might expect a somewhat more progressive pattern, because a flat rate payroll tax is less progressive than the income tax, and fringe benefits are concentrated towards the top of the income distribution.

As Table 6.3 made clear, the main elements of the Commission's first phase recommendations for personal income taxes, social insurance contributions and property tax have been captured within the model. In order to undertake a detailed analysis of these proposals, it is necessary to specify precise values of tax rates, tax bands and all the other relevant policy parameters. The reports of the Commission on Taxation do not set out detailed tax rates and bands for their first phase reform. They emphasised that their concern was with the design of an equitable and simple system, which would be flexible enough to permit different political choices. For example, the degree of progressivity could be altered by changes to the level of tax credits/personal allowances and to the (single) standard rate of tax.

A package which reflects the main thrust of the Commission's recommendations can, however, be formulated. Table 6.4 shows the detailed policy parameters, compared with their baseline 1987 values. Many of these reflect specific recommendations of the Commission (such as the abolition of relief for life assurance and medical insurance premia, and the abolition of the PAYE and PRSI allowances); here we comment only on those values which were not spelled out so precisely in the Commission's recommendations.

The Commission clearly indicated its view that the top marginal tax rate should not exceed 50 per cent: this is the rate used in the simulation. It also indicated that the standard rate should be reduced from its level of 35 per cent at that time; and that social security contributions should be

integrated into the income tax code at a rate of about 5 per cent of income. The final report (Commission on Taxation, 1985, Appendix 13) gave some illustrative calculations of revenues. The one which is of most relevance here⁵ set the level of tax credits by reference to existing allowances; the package here simply retains the current level of allowances. The Commission estimated that a tax rate of 38 per cent was necessary to finance this. In the package modelled here, a rate of 35 per cent is used, within the constraints of revenue neutrality: the main reason why a lower rate is possible here is that the package modelled does not include the abolition of payroll-based employer social insurance contributions. The reform package modelled here represents a reduction of almost 8 percentage points on the rate faced by standard rate taxpayers who are paying full PRSI contributions: details of the numbers of taxpayers experiencing various reductions will be examined below.

The other main choice as regards income tax is the width of the standard rate band. There is a trade-off between the width of this band, and the level of the standard tax rate. The Commission made it clear that a reduction in the number of taxpayers facing tax rates above the standard was a priority: ultimately it was envisaged that the higher rates would be replaced by a direct expenditure tax which would affect quite limited numbers of taxpayers. The expansion of the standard rate band by £2,800 to include all those at the higher, 48 per cent, rate of tax would still leave about 20 per cent of taxpayers at the top rate of tax. This compares with a figure of 17 per cent quoted by the Commission on Taxation as paying tax at the higher rates in 1981/82; it was envisaged that their recommendations would be implemented in such a way as to reduce this proportion. An increase of a further £1,500 in the standard rate band (bringing it to £9,000 for a single person, and £18,000 for married couples) was found to be revenue neutral, given the values of other policy parameters.

The rate of property tax can be seen as reflecting a rate of tax of 35 per cent and an assumed real rate of return of about 5 per cent (the illustrative figure used by the Commission). The treatment of mortgage interest relief follows that suggested by the Commission: only the real interest payments

⁵Two of the Commission's examples allow for shifts between direct and indirect tax rates, involving variation in the single rate of VAT; our attention is focussed instead on the examples which involved approximate revenue neutrality within direct taxes.

Table 6.4: *Comparison of Policy Parameters in 1987 and a "Tax Reform Package"*

<i>Policy parameter</i>	<i>1987</i>	<i>"Tax Reform Package"</i> <i>(Revenue-neutral)</i>
<i>Social insurance parameters:</i>		
PRSI rate: higher rate	5.5%	0
PRSI rate: reduced rate	0.9%	0
Health contribution rate	1.25%	0
Employment/training levy	1.0%	0
<i>Income tax parameters</i>		
Standard rate	35%	35%
High rate	48%	none
Top rate	58%	50%
Standard rate band -single	4,700	9,000
-married	9,400	18,000
High rate band -single	2,800	nil
-married	5,600	nil
PAYE allowance	700	0
PRSI allowance	286	0
Tax short-term social welfare	NO	YES
<i>Qualifying percentages for income tax relief:</i>		
Medical insurance premia	100%	0
Life assurance premia	50%	0
Mortgage interest	90%	50%
<i>Property tax parameters:</i>		
Tax rate	0	1.75%
Income exemption limit -single	d.n.a.	3,150
-married		6,300
Marginal relief rate	d.n.a.	20%

are allowable against tax.⁶ Given a real rate of return of 5 per cent, and a nominal interest rate of about 10 per cent prevailing in 1987, this suggests that about 50 per cent of mortgage interest payments would have been allowable. The Commission also recommended a "waiver" scheme based on income, but did not specify its precise nature. The scheme used would

⁶The Commission on Taxation's First Report (1982) advocated abolition of mortgage interest relief, but did not provide for a property tax. The Fourth Report (1985) proposed a property tax, with "unrestricted allowance of real interest on the mortgage debt outstanding on any property liable to such a tax".

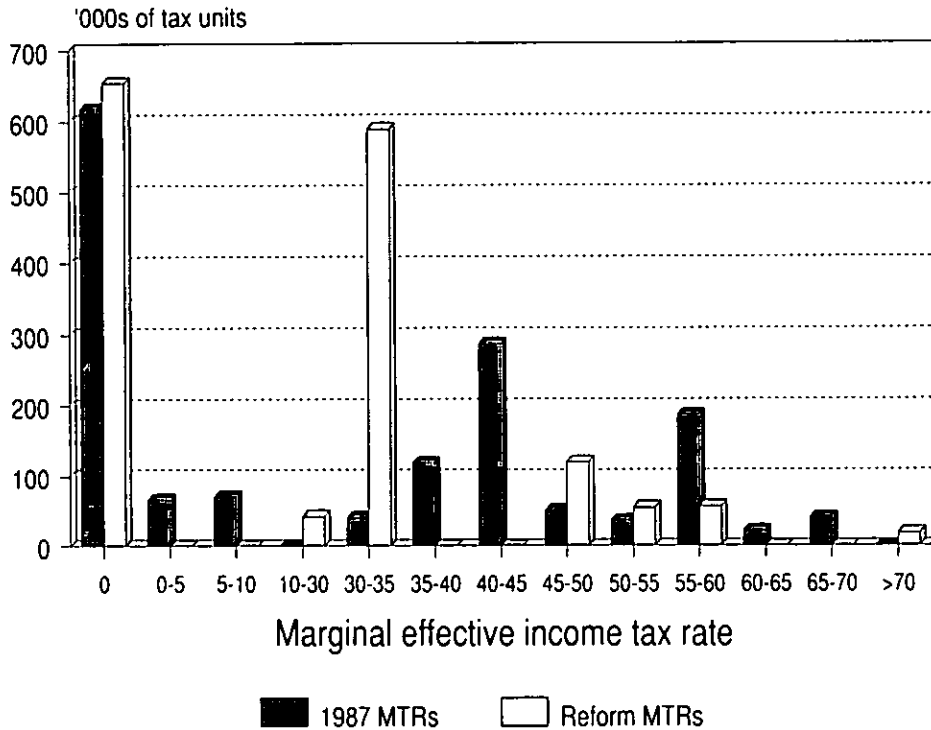
exempt single persons with a gross income below £3,150, or married couples with an income below £6,300 (in 1987 terms) from the property tax: these were the levels of the age exemption limits for the over 75s in the income tax code. Other possibilities of taking "ability to pay" into account in the design of a property tax were examined in Callan (1991b). For present purposes it is assumed that the tax falls on the tax unit of the owner-occupier; and that ownership arrangements are not changed to avoid the tax. The latter proviso can be ensured by the design of the tax; the former is a more substantive issue, but the analysis in Callan (1991b) suggests that the distributional patterns at household level are not very different from those at tax unit level.

The simulations reported here are based on self-employed and farm incomes which have been adjusted downwards, as described in Chapter 4, to ensure that the model's prediction of the aggregate tax take from these income sources is in line with the actual tax take. Given the large changes in tax rates involved, one might expect a greater divergence between results based on adjusted and unadjusted self-employment incomes than in earlier simulations. This is found to be the case, but the differences in tax rate cuts which can be financed by revenue neutral packages are not so great as to warrant separate consideration here. The distributional patterns for revenue neutral packages are quite similar in each case. The results do not depend on any sharp increase in revenue from tax on self-employment or farm incomes.

What are the effects of the package specified in Table 6.4 on effective marginal tax rates? Figure 6.2 shows the numbers of taxpayers at different effective marginal rates under the 1987 baseline policy and the reform package. The effective marginal rate is defined as the marginal rate of income tax (0, 35, 48, 58 or the marginal relief rate of 60 per cent under the 1987 policy) together with the rate of PRSI including levies (which can vary from 0 to 7.75 per cent). In the case of the reform package, the effective rate is also defined to take account of those affected by marginal relief provisions under the "waiver" scheme, which add 20 percentage points to the effective tax rate. The focus here is on the marginal tax rate on an extra pound of earnings by a single person or, in the case of a married couple, by the husband.⁷

⁷In the case of married women, average tax rates on earnings from a full-time or part-time job may be of more relevance: see Callan and Farrell (1991).

Figure 6.2: *Effective Marginal Tax Rates under 1987 Policy and Revenue-Neutral Tax Reform Package*



It is clear that from this figure that the tax reform package would bring about substantial reductions in tax rates for many taxpayers; it would also bring a significant number of those paying PRSI on low incomes out of the direct tax net. Almost 750,000 taxpayers were faced with effective marginal rates of more than 35 per cent in 1987; the revenue-neutral reform would reduce that figure by two-thirds, to about 250,000.

The reductions in marginal tax rates which most taxpayers would experience would be quite substantial, as Table 6.5 shows. Over one-third of a million taxpayers would experience reductions of between 5 and 10 percentage points, while a further 250,000 would experience reductions of over 10 percentage points. A substantial number of tax units which currently do not pay income tax would be drawn into the income tax net,

or would gain marginal relief under the property tax scheme. This accounts for the 160,000 tax units whose marginal tax rates would rise from 0 to either 20 or 35 per cent.

Table 6.5: *Changes in Effective Marginal Tax Rates under Revenue-Neutral Tax Reform Package*

<i>Change in tax rate</i>		<i>'000s of tax units affected</i>	
<i>More than</i>	<i>Less than</i>	<i>Reduction in</i>	<i>Increase in</i>
<i>(Percentage points)</i>		<i>tax rate</i>	<i>tax rate</i>
1	5	151	0
5	10	367	0
10	15	64	20
15	20	67	84
20		116	75

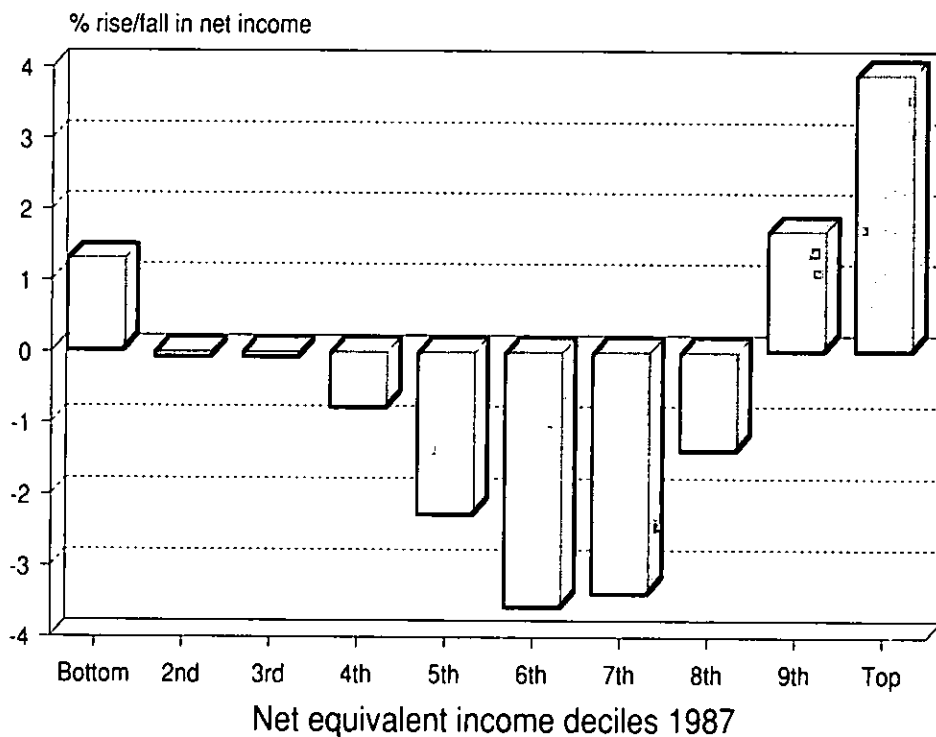
The distributional effects of the reform are quite complex (Table 6.6). There are almost equal numbers of gainers and losers, and equal average gains and losses leading to approximate revenue neutrality.⁸ Gainers outnumber losers in the bottom three deciles of the income distribution, but both the number and the size of gains and losses in the lower end of the income distribution tend to be quite limited. The gains in this region of the income distribution mainly reflect the abolition of employee PRSI contributions. Losers outnumber gainers in the middle of the distribution, and average losses are greater than average gains. The losses reflect the extension of the tax base. Net gains are heavily concentrated in the top two deciles, and particularly in the top decile; there are substantial numbers of losers even in these deciles, though they are outnumbered by the gainers. The concentration of gains at the top of the distribution is a feature of several reforms involving tax cuts, even when financed by measures which eliminate tax expenditures also concentrated at that end of the distribution.

⁸The net gain of £4m per annum is negligible in the context of total incomes and total tax revenue; it corresponds to a gain of 5 pence per tax unit per week.

Table 6.6: *Distributional Effects of a Revenue-Neutral Base-Broadening, Rate-Reducing Package*

<i>Decile of equivalent income</i>	<i>% of decile who lose</i>	<i>Average loss £ p w</i>	<i>% of decile who gain</i>	<i>Average gain £ p w</i>	<i>Aggregate gain/loss £m p a</i>
Bottom decile	0	0.00	15.7	1.30	1.9
2nd	7.9	5.57	14.0	2.41	-0.8
3rd	9.8	5.27	15.7	2.99	-0.4
4th	14.5	6.78	14.6	2.64	-4.8
5th	46.2	5.57	8.2	3.87	-18.1
6th	60.7	8.67	17.0	3.91	-36.9
7th	58.7	10.56	34.8	3.52	-39.8
8th	45.3	11.02	50.0	5.56	-17.9
9th	35.2	12.20	63.0	11.83	25.4
Top decile	30.5	11.89	68.2	22.87	95.3
ALL	30.9	9.35	30.1	9.75	3.9

Figure 6.3 provides an alternative perspective, focussing on the percentage gain or loss in average net income within each income group. It confirms the picture of small gains and losses in the lower income deciles; substantial losses in the middle and upper-middle deciles; and substantial gains at the top of the distribution.

Figure 6.3: *Percentage Gain or Loss in Net Income by Net Equivalent Income Decile*

This overall picture of the distributional effects raises a number of interesting issues. First, a package of this type would involve very substantial net gains and losses within most income groups. The analysis of the Commission on Taxation showed that this would be expected. Under the existing system, families can pay quite different amounts of tax on similar incomes. At every income level, therefore, those who are especially favoured by exemptions and reliefs in the current system must lose if the system is reformed in a revenue-neutral way, while those who are not so favoured will tend to gain from reductions in tax rates. Second, the idea that cuts in tax rates and broadening of bands financed by extension of the tax base would maintain the overall progressivity of the income tax system

does not seem to be borne out.⁹ Revenue-neutral tax cuts are designed to return the same aggregate amount as is raised by the extension of the tax base. But the tax cuts, which were designed to reflect the Commission's recommendations as closely as possible, do *not* return similar aggregate amounts to each income group; rather larger amounts are returned to the top income groups. It was noted earlier that two features of the Commission's first phase recommendations which it has not been possible to model would be likely to reduce the regressivity of the change: abolition of employers' PRSI (a flat percentage of income up to a ceiling) as against the further cuts in income tax rates analysed here, and more effective taxation of fringe benefits. But it is unlikely that these factors would alter the overall conclusions drawn from the present analysis.

The results also point to the importance of the Direct Expenditure Tax¹⁰ proposed by the Commission on Taxation for the overall progressivity of the tax system. The Commission particularly emphasised the role of a direct expenditure tax in the context of its proposals for a single rate of income tax:

The main disadvantage with charging income tax at a single rate is that it removes the major progressive element in the tax system. We believe that an acceptable degree of progressivity can be brought into the tax system partly by tax credits, partly by extending the tax base and removing tax reliefs and reducing the scope for tax avoidance but, in particular, by means of a surtax on expenditure. In these circumstances we recommend the introduction of a direct expenditure tax at progressive rates to apply to individuals with a relatively high expenditure. (Commission on Taxation, 1982, p. 258).

⁹Distinctions between the degree of progressivity of a tax/transfer system and their redistributive impact which depend on variation in the pre-tax income distribution, or the level of the average tax rate are not relevant in the present context: the pre-tax income distribution is being treated as a given, and revenue-neutral reforms must have the same average tax rate.

¹⁰The Direct Expenditure Tax proposed by the Commission was quite different from expenditure taxes currently in operation: the base for a Direct Expenditure Tax would be an individual's *aggregate* expenditure over a year, which VAT and other indirect expenditure taxes are not designed to take into account.

In part, the Commission's advocacy of *expenditure* rather than income as a base for the tax reflected a view that this would reduce the possibilities of tax avoidance, particularly for those at the top of the distribution.¹¹ The analysis undertaken here has concentrated on the first phase proposals, in which two rates of income tax are retained against a background of base-broadening, rate reductions and widening of income tax bands. It shows strong gains for the top income groups. A direct expenditure tax which raised revenue of the magnitude envisaged by the Commission would be likely to more than offset such gains; but abolition of the higher rates of income tax would tend to counteract this effect.

The results indicate that the trade-off between efficiency considerations (low tax rates) and progressivity can persist, even when cuts in tax rates are financed by a broadening of the tax base. The position of the tax system on this trade-off can be strongly influenced by under-indexation of bands and allowances. During the 1970s, the proportion of taxpayers liable at higher rates of income tax rose from under 1 per cent to 27 per cent in 1979-80. This proportion fell to under 12 per cent in 1980-81 as a result of the 1980 Budget changes, which included a doubling of rate bands for married couples and the introduction of a special allowance for PAYE taxpayers. Since then, under-indexation of allowances and rate bands has led to between 35 and 45 per cent of taxpayers being liable at the higher rates in the late 1980s.

¹¹To the extent that such individuals arrange their affairs to reduce their incomes for tax purposes, both the Revenue Commissioners income distribution statistics and the ESRI survey face difficulties in providing a full picture of "command over resources" at the very top of the distribution.

Table 6.7: *Comparison of Tax Policy Parameters in 1987 and "Indexed" 1980 Values*

<i>Policy parameter</i>	<i>1987</i>	<i>"Indexed" 1980 Tax Policy</i>
Low rate	none	25%
Standard rate	35%	35%
First high rate	48%	45%
Second high rate	none	55%
Top rate	58%	60%
Low rate band		
-single	nil	2,000
-married	nil	4,000
Standard rate band		
-single	4,700	8,000
-married	9,400	16,000
First high rate band		
-single	2,800	4,000
-married	5,600	8,000
Second high rate band		
-single	nil	4,000
-married	nil	8,000
PAYE allowance	700	800
PRSI allowance	286	nil

The progressivity or regressivity of a tax reform can therefore be heavily influenced by the baseline chosen. A comparison of the 1987 position (when over 40 per cent of taxpayers were liable at the higher rates) with a reform which simply indexed the income tax parameters from 1980 (when under 12 per cent of taxpayers were liable at the higher rates) strikingly illustrates this fact. In principle, one could choose between an indexation factor based simply on prices, such as the consumer price index, or on nominal incomes, for which gross national product might be regarded as the widest measure. Over the 1980 to 1987 period, however, each of these magnitudes doubled¹². The main changes which indexation of bands and allowances since 1980 would have involved are set out in Table 6.7.

Indexation of 1980 income tax policy parameters would have led to a reduction in aggregate revenue in 1987 of over £500m, or nearly 25 per cent of total income tax revenue. Not surprisingly, almost all taxpayers would have lower liabilities under income tax policies which had been indexed since 1980.¹³ But the aggregate gains would tend to be

¹²The CPI grew by 98 per cent, nominal GNP by 100 per cent.

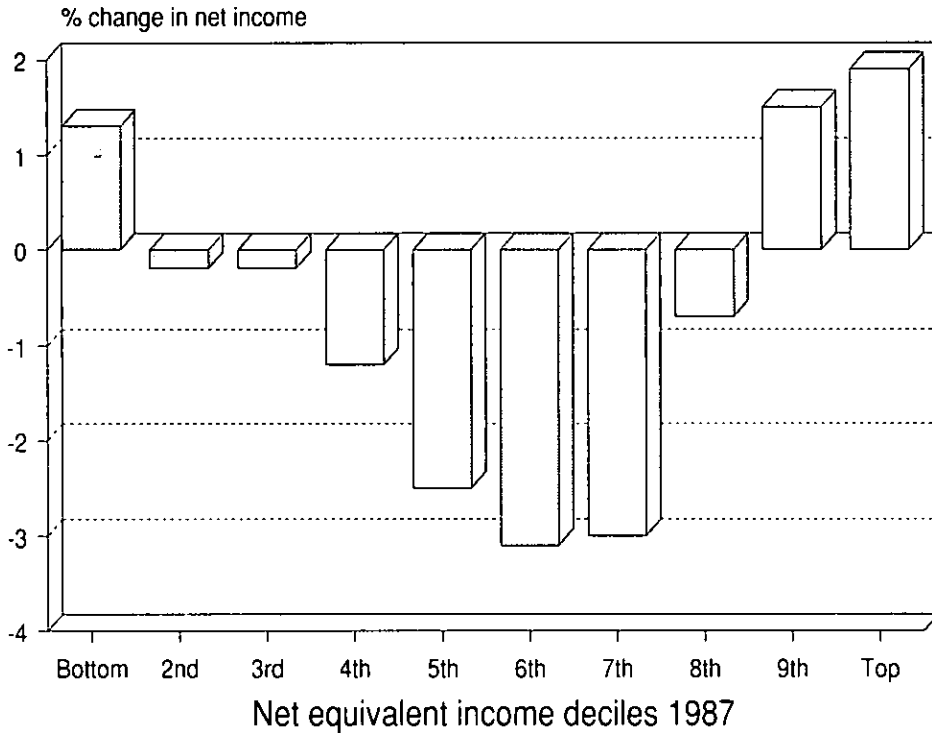
¹³Over-indexation of some special allowances, such as those for widowed persons means that they are better off under the 1987 policies than under 1980 indexed policies.

concentrated at the top of the distribution; proportionate gains are also highest for the top income deciles. Thus, gains to top income deciles which would arise from base-broadening, rate-reducing packages could be regarded as compensating for the under-indexation of policy during the 1980s.

The comparison of 1987 with indexed 1980 tax parameters strongly supports the case for making indexation a mandatory starting point for budgetary calculations.¹⁴ In the absence of increases in allowances and tax bands sufficient to compensate for inflation, a progressive tax system tends to become even more progressive over time without any explicit policy decision that this is desirable. Mandatory indexation, as in the UK, would ensure that explicit decisions are needed to make changes in the progressivity of the tax structure.

¹⁴See, for example, de Buitl ir (1989).

Figure 6.4: *Comparison of "Indexed" 1980 Tax Policy and a Revenue-Neutral Tax Reform: Distributional Implications*



Note: The "indexed" policy retains the 1980 tax structure, simply doubling all income tax bands and allowances. The tax reform package is revenue-neutral with respect to the indexed 1980 tax policy; thus, it is *not* the same as the tax reform package which was designed to be revenue-neutral with respect to the 1987 baseline.

It is possible to vary the baseline used in model calculations. One can, therefore, compare a tax reform package against a baseline of tax parameters indexed from 1980, when the Commission on Taxation was established. The tax reform package in these calculations has the same *structure* as that outlined up to now; but the standard rate of tax is reduced to 27 per cent, the property tax rate reduced to 1.35 per cent, and the standard rate band widened to £10,000 in order to make the package revenue-neutral with respect to the 1980 indexed policy. The distributional implications of this tax reform package as against the 1980 indexed policy are shown in Figure 6.4. It is readily apparent that the overall pattern is very similar to that in Figure 6.3, which illustrated the distributional effect

of a revenue-neutral reform as against a 1987 baseline. There are gains for the bottom decile, small losses for others in the bottom half of the distribution, large losses for those in the upper middle areas of the equivalent income distribution, and gains for the top two deciles. The only substantial difference is that the gains for the top decile are more limited: a rise of about 2 per cent in net income, as against nearly 4 per cent in the earlier analysis.

The general point that the model-based calculations concentrate on "cash" or "first-round" effects must also be noted in this context. It has been widely argued that a tax reform package of the type proposed by the Commission on Taxation would have a favourable effect on effective marginal tax rates (as documented above); and that the response to these changes in terms of increased labour supply and reduced tax avoidance or evasion would tend to increase revenues,¹⁵ or permit further tax reductions. Such "dynamic" effects of the package are not taken into account in the present model-based calculations.

6.4 Income Tax and Incentives: Some Wider Issues

The effects of certain policy changes (a base-broadening, rate-reducing, band-widening package, and the taxation of child benefit) on marginal tax rates has been analysed within the microsimulation framework. This section, however, deals with some more general issues concerning the effects of tax changes on work incentives.¹⁶

There has been much discussion of high marginal tax rates as constituting a disincentive to work. But the effects of this disincentive on economic behaviour depend on the responsiveness of the groups to which they apply. A widespread finding in international research is that married women's participation in the labour market is much more sensitive to the wage offered than that of men; Callan and Farrell (1991) confirm this finding in a study of Irish women's participation decisions. In the Irish context, potential migrants might also be a group with potentially high labour supply elasticities: these tend to be young and single. If these groups are particularly responsive, then concern with incentive effects should focus particularly on the rates of tax faced by these groups.

¹⁵On the issue of the response of top incomes, which is of particular importance, Lindsey (1987) and Dilnot et al. (1988) come to somewhat different conclusions.

¹⁶Tax changes may also affect the incentives to take remuneration in different forms. For example, a tax on the provision of fringe benefits, as proposed by de Buitléir (1989), would remove existing incentives to take remuneration in the form of various fringe benefits.

Such results suggest that a tax system which treats husbands' and wives' incomes independently (thereby setting a low marginal tax rate on initial earnings) will offer efficiency gains over a system which taxes the aggregate income (thereby imposing the same marginal tax rate on the first pound of a non-earning spouse as already applies to the last pound of the higher earning spouse). This has been one of the considerations in the recent UK move towards greater independence of taxation for married couples - part of the "world-wide trend away from joint taxation of married couples" noted by Pechman and Engelhardt (1990).

The present Irish tax structure concentrates high tax rates on two of the most responsive groups: married women and single people. A reform in the direction of independent taxation would shift the high marginal tax rates onto groups which have typically been found less responsive. A move toward independent taxation would, of course, raise wider issues concerning the unit of taxation, the effects of increasing marginal tax rates on many husbands, and the appropriate means of providing support to child rearing. These issues are given further consideration in Callan and Farrell (1991).

6.5 Conclusions

The ESRI model was shown to predict the aggregate cost of the tax reliefs on mortgage interest, medical insurance premia and life assurance premia to a high degree of accuracy. It has been generally recognised that reliefs such as that for mortgage interest are of greatest benefit to those with high incomes. The ESRI model documents the extent to which this is so, using an income distribution which is adjusted for family size. The distribution of benefit from the reliefs for mortgage interest, medical insurance, and life assurance was shown to be highly skewed towards the top of the income distribution: about 60 per cent of the benefit goes to the top 20 per cent of the income distribution, and less than 5 per cent to the bottom half of the income distribution.

A package of base-broadening and rate-reducing measures, along the lines proposed by the Commission on Taxation for a first phase of direct tax reform, was then examined. The distributional effects of an approximately revenue-neutral package were found to be extremely complex. It is sometimes argued that while the present tax system is nominally quite progressive, exemptions and deductions from the tax base greatly reduce its progressivity. This might be taken to imply that elimination of the exemptions, coupled with lower rates and wider bands would achieve at least as great a degree of progressivity. The distributive

analysis in this chapter cautions against such a conclusion. Whether the current degree of progressivity of the income tax system reflects deliberate policy choices is, of course, open to question: it may owe more to a lack of indexation over much of the 1980s than to explicit choices. But comparisons against a 1987 baseline, or against an indexed 1980 policy, showed that a revenue-neutral, base-broadening, rate-reducing package would involve significant redistribution mainly from the upper middle reaches of the income distribution towards the top.

Chapter 7

CONCLUSIONS

7.1 Need for Tax-Benefit Models

In the absence of a microsimulation model, income tax and social welfare changes are evaluated, at best, using a systematic set of hypothetical, but supposedly typical families. The dangers of this approach have been stressed by UK researchers. It is impossible for any manageable set of hypothetical cases to capture the great diversity of household circumstances relevant to the tax and social welfare systems. Such analysis cannot in any case address certain key questions, such as the overall effects of policy changes on work incentives or income distribution.

Microsimulation modelling, by contrast, offers many advantages in analysing policy changes. Perhaps the best way of summing up these advantages is the following. It is difficult enough, without microsimulation models, to know what have been the effects of changes even *after* they have been implemented. It requires pictures of the relevant population before and after the change, and some means of accounting for the effects of contemporaneous changes other than the one of interest. Microsimulation modelling offers the chance to explore policy options *before* they are implemented. Using this tool, it is possible to avoid some of the unintended side-effects which often accompany policy changes. A proposal can be examined, revised in the light of problems shown by this examination, and re-evaluated. This iterative process offers the chance to make significant improvements in the design of policy.

These advantages have led to the construction of tax-benefit models in many countries. International experience has shown the need for models to be structured flexibly, and to be based on data which provides comprehensive coverage of the relevant population.

7.2 Data Requirements, Model Structure and Validation

The data requirements for an Irish tax-benefit model were taken into account in the design of the ESRI Survey of Income Distribution, Poverty and Usage of State Services. This survey, conducted in 1987, provides detailed information on the earnings, pensions, social welfare receipts and labour market activity of more than 8,000 adults in 3,300 households. Information on labour market activity and social welfare receipts over the 12 months prior to interview was sufficient to estimate an annual income

figure which is more appropriate for income tax purposes than an annualised current income figure; however an annualised current figure is used for those respondents for whom it has not yet been possible to estimate annual income. For the purposes of policy analysis, it is important to group the survey respondents into tax units comprising an individual or married couple, together with their dependent children. There are just under 6,000 tax units in the sample, representing the private household population of about 1.5 million tax units.¹

The ESRI tax-benefit model allows for the specification of a baseline policy (which may or may not be the *status quo*) and a "reform" policy. The net incomes of each tax unit in the sample are then calculated for each policy alternative. At present social welfare entitlements are treated as identical to social welfare receipts as recorded in the survey, though the data will allow a richer treatment involving simulation of the rules applied to determine eligibility and payments under certain schemes. Income tax rates, bands and allowances together with the taxable status of certain elements of the possible income tax base are treated as policy instruments which can be varied. Given net incomes under each of the policy regimes, it is possible to analyse the "cash" or "first-round" gains and losses in a number of ways. Changes in marginal income tax rates may also be analysed.

The usefulness of such a model is heavily dependent on the representativeness of the data on which it is based, and its own accuracy in predicting the outcomes of the existing tax system. These issues were investigated in depth in Chapter 4. The reliability of the data in terms of overall demographic structure has already been established.² This investigation focussed on the coverage in terms of the social welfare and income tax systems. Results on both fronts showed that the survey was highly reliable. Its coverage of the social welfare client population and social welfare expenditure was over 90 per cent. Its estimates of revenue from income tax, employee PRSI contributions and health contributions were remarkably close to the actual figures. More detailed comparisons with the Revenue Commissioners' statistics indicated that the overall income distribution was close to that shown there; and the distribution of taxpayers by marginal tax rates was extremely close. The only potentially

¹Revenue Commissioners statistics deal with about 1 million tax units; but this excludes many tax units with low incomes.

²Callan, Nolan *et al.* (1989), Chapter 4.

serious problem which emerged from this analysis was that the tax take from farmers and other self-employed persons may be overestimated by the model. Discount factors were used to scale down these incomes, in order to ensure that the predicted tax take was in line with that actually recorded. Subsequent analyses were conducted using incomes which had been adjusted in this way, and "unadjusted" incomes. The results of many analyses were found to be unaffected by whether incomes were or were not adjusted in this way.

7.3 Applications to the Analysis of Policy Changes

Two possible policy changes involving interactions between the tax and social welfare systems were analysed. The first of these was the inclusion of short-term social welfare benefits in the income tax base. This was one of the base-widening proposals of the Commission on Taxation. It has sometimes been opposed on the grounds that it would be regressive, because short-term welfare recipients tend to be concentrated in the lower reaches of the income distribution. While short-term welfare recipients do tend to have low current incomes, tax liabilities arising from the proposal would instead be concentrated in the upper half of the income distribution. The total cost of this "tax expenditure" was estimated at about £90m in 1987; a lower figure would apply in 1991, mainly because of reductions in the standard rate of tax. Over four-fifths of the tax expenditure was found to be attributable to tax units in the top half of the equivalent income distribution. The majority of short-term welfare recipients would not be affected; and less than 10 per cent of those who would lose were in the bottom 30 per cent of the income distribution.

The second policy option examined was a combination of taxation of child benefit, while using the revenue raised to increase the level of the benefit. The increase which could be financed on a revenue-neutral basis was estimated at about 40 per cent over the 1987 baseline. This would, however, lead to small losses for standard rate taxpayers. An increase of about 54 per cent would be required to leave standard rate taxpayers just as well off as before the change. It was estimated that this would have cost between £20m and £27m in 1987. Either version of this policy option (revenue neutral or 54 per cent increase) would target the net benefit from the scheme more selectively on lower income groups, as shown by the model's distributive analysis.

The distributive effects of abolishing tax reliefs on mortgage interest, medical insurance premia and life assurance premia (or alternatively, the distribution of these tax expenditures) were also examined. Each of these tax expenditures was shown to be highly skewed. The top 20 per cent of the income distribution received about 60 per cent of the benefit, while the bottom 50 per cent of the distribution received less than 5 per cent.

A package of measures which widened the tax base, reduced income tax rates and widened income tax bands was the examined. Base-broadening measures included the introduction of a property tax, abolition of reliefs for life assurance and medical insurance premia, and taxation of short-term social welfare benefits. It was shown that significant reductions in marginal tax rates could be achieved on a revenue-neutral basis, even without allowing for any favourable response in terms of increased labour supply. The distributional effects of a revenue-neutral package were found to be extremely complex. The argument that counterbalancing rate reductions with widening of the base would maintain or increase the effective progressivity of the system were called into question by the analysis. However, the redistributive effect of the tax system in 1987 owed much to the lack of indexation in the early and mid-1980s rather than more explicit policy decisions.

7.4 Future Developments

While each of the analyses summarised above was conducted in terms of a 1987 baseline, many of the conclusions remain relevant today. A high priority in the further development of the model will be, however, to allow updating of that baseline to reflect the current situation. This process will comprise several elements. The simplest is the updating of policy parameters themselves. Uprating of incomes and of the structure of the sample are more complex. Incomes of different types will need to be uprated by different amounts; the demographic structure of the sample will need to be reweighted; and changes in unemployment rates will also have to be taken into account. Procedures of this type are applied to Revenue Commissioners' data in order to derive budgetary estimates; and are widely used in official and academic tax models abroad.³

³See, for example, OECD (1988).

A useful distinction in thinking about other developments of the model and model-based analysis may be drawn between those which "widen" the range of the model and those which "deepen" it. "Widening" could include use of the existing model to assess many policy options not considered here; or extension of the model to deal with policy changes which it cannot at present analyse. "Deepening" would include the measurement of other aspects of the cash effects of policies already modelled, further documentation and assessment of effects on marginal tax rates and replacement rates and, in the longer term, incorporation of estimated or imposed incentive effects in the analysis. While it is possible to make progress on both of these fronts, a balance must be struck between them. Here we give some examples of each type of development.

A possible "widening" development would be to explore some options in relation to the Family Income Supplement scheme. Earlier analysis (Callan, Nolan *et al.* 1989 and Blackwell, 1989) has shown that take-up of this scheme is particularly low. The possibility of making payment of a Family Income Supplement through the income tax system could be investigated using the model. A range of other options could also be explored, such as changes in the parameters of the scheme (the income limits, benefit withdrawal rate etc.) and its interaction with the newly introduced child dependant additions to the income tax exemption limits.

A longer-term widening option would be to explore full or partial integration of the income tax and social welfare codes along the lines of a basic income guarantee or negative income tax. Such an exploration could be done on a "static" basis i.e., without allowance for possible labour supply effects. But much of the interest in such schemes stems from their dynamic effects. There has been extensive work in the US on this topic using experimental data, and a lively debate has ensued. Some recent UK work has also examined these issues, though mainly on a static basis. It would be possible in the longer term to explore such options on a dynamic basis, with either a range of imposed labour supply responses/elasticities, or building on labour supply functions estimated in other work arising from the ESRI Survey.⁴

One deepening option would be to extend the analysis to deal with the distribution of gains and losses over types of tax units. Another would be to extend the analysis of marginal income tax rates by calculating not only "point" rates but also marginal tax rates over relevant intervals. For

⁴This would constitute a long-term "deepening" option.

example, the marginal tax rate on a full- or part-time job by a second earner in the tax unit could be calculated. The uprating of incomes and sample characteristics to different base periods could also be regarded as an example of "deepening" the model. In the longer-term, incorporation of estimated or imposed incentive effects represents a major direction for deepening, in line with international experience. The difficulties of doing so should not be underestimated, as the discussion of international experience in Chapter 2 indicated.

The potential for further development of the model should not, however, obscure the extent of progress already made. For many policy changes of interest, the model can estimate the immediate impact on disposable incomes for a nationally representative set of families, and the immediate effect on work incentives as measured by marginal direct tax rates. Thus, the model as it presently stands represents an important advance in the analysis of income tax and social welfare policy options in Ireland.

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