The Economic and Social Review, Vol. 27, No. 5, October, 1996, pp. 439-456

What Has Happened to Replacement Rates?*

TIM CALLAN
BRIAN NOLAN
The Economic and Social Research Institute

CATHAL O'DONOGHUE
University of Cambridge

Abstract: This paper compares different approaches to measuring changes in replacement rates in Ireland over time. Results based on microsimulation modelling suggest that the average replacement rate facing unemployed persons was roughly constant between 1987 and 1994, with a small rise for those on Unemployment Assistance offset by a decline for those on Unemployment Benefit. The mean predicted wage facing the unemployed is about two-thirds of the average industrial wage. Time-series constructed using average expenditure per unemployment compensation recipient and average earnings do not accurately reflect changes in mean replacement rates. In addition to providing a better measure of the overall trend in replacement rates, microsimulation modelling provides a picture of their distribution, showing that the incidence of cash replacement rates over 80 per cent fell between 1987 and 1994 but the numbers facing rates between 70 and 80 per cent rose.

I INTRODUCTION

Financial incentives to take up and stay in work, and the impact of the tax and social welfare systems on these incentives, have become a major preoccupation of Irish policy-makers. Empirical studies of work incentives generally measure the financial incentive facing individuals in the form of replacement rates, the ratio of income when unemployed to income when in work. Different approaches to deriving replacement rates, relying on

Paper presented at the Tenth Annual Conference of the Irish Economic Association.

*We are grateful to IEA Conference participants for helpful comments.

different types of data, may not tell the same story about the situation at a point in time or changes over time. This paper sets out the alternative approaches which have been used to measure Irish replacement rates, compares the patterns they show over time, and assesses the implications for our picture of how work incentives have evolved and for measurement practice. In Section II alternative approaches to measuring replacement rates are discussed. Section III compares series based on hypothetical cases with those calculated from average unemployment compensation payments and average earnings. Section IV uses a microsimulation-based measure to provide a detailed picture of the distribution of replacement rates in 1987 and 1994 (the latter based on an up-rating of the 1987 sample). This allows us to assess in the concluding section the degree to which measures based on hypothetical households or national averages represent the situation of actual households in a given year, and the extent to which the hypothetical and national average measures can adequately represent the complex patterns of change in the distribution of replacement rates revealed by the microsimulation estimates.

II MEASURING REPLACEMENT RATES

Three distinct approaches have been employed in measuring replacement rates for Ireland:

(1) Social welfare payment rates and average industrial earnings have been used to calculate replacement rates for a set of hypothetical cases, and indices constructed by weighting these different cases. Examples include Hughes and Walsh (1983), Blackwell (1986), and calculations by the Department of Finance reproduced by e.g., NESC (1993). Reliance on such hypothetical cases has been criticised on the basis that they fail to reflect the great diversity in the actual circumstances of sample households and may mislead as to the circumstances of many of the unemployed (Atkinson and Micklewright 1985).[1] This critique may have less force in a time-series than a cross-section context: Nolan (1987) showed that a hypothetical Unemployment Benefit (UB) series derived from Hughes and Walsh (1983) tracked the changes in the average Unemployment Benefit received by claimants over the 1967-1978 period quite well, though it did significantly overstate the effects of the introduction of Pay-Related Benefit in 1974.

1. O'Mahony (1983) compared actual replacement rates from a sample of Irish registered unemployed with those produced by the hypothetical approach and concluded that there was a marked correlation between the two, but as Nolan (1987) showed his results in fact provide support for the argument that hypothetical rates fail to accurately reflect the actual variation in replacement rates across different situations.

(2) The second approach constructs average replacement rates from the average receipt of UB and Unemployment Assistance (UA), calculated from aggregate expenditure and claimant numbers, compared with average earnings per employee. This is the replacement rate variable used by Browne and McGettigan (1993), McGettigan and Browne (1993). It is intended only to provide a measure of the overall trend in replacement rates over time and has to be assessed in that light. However, this figure is not an average of replacement rates themselves: if the replacement rate is defined in its simplest form as B/Y= Benefit/net earnings, the "actual payments" series is [mean B/mean Y], not mean B/Y. Further, any given change in the average payment per recipient could arise from a variety of shifts in the underlying distribution of receipts, and it may be important to know how that overall change has come about.

(3) The third approach involves microsimulation modelling of in-work and out-of-work incomes for a large sample of households to estimate replacement rates for those currently unemployed or employed based on actual or predicted entitlement versus actual or predicted in-work income. For Ireland, the 1987 ESRI large-scale household survey on income distribution, poverty, and use of state services has provided the basis for the construction of a tax/benefit simulation model (Callan 1991). Using this model Callan, O'Donoghue and O'Neill (1994) estimated replacement rates for both the unemployed and employees in the 1987 sample, using modelled Unemployment Assistance entitlements and, for the unemployed, wages predicted by estimated earnings functions for men and women. With sample data for two points in time one could fully evaluate changes in the distribution of replacement rates, but at this point 1987 is the most recent suitable data available.[2] As this paper will demonstrate, much can be learned from the uprating of modelled data from a single sample on the basis of changes in the parameters of the tax and welfare system and in average earnings over time.

Non-cash benefits such as the value of medical card entitlement, fuel vouchers, and differential rent for local authority tenants are not taken into account in these calculations. A comprehensive microsimulation study of incentives would build entitlement to these benefits into the modelling procedure, but our aim in this paper is the more limited one of comparing alternative ways of constructing cash replacement rates.

2. Data from the 1994 Living in Ireland Survey carried out by the ESRI, the first wave of the Irish element of the European Community Household Panel, will be available shortly, as will the 1994 Household Budget Survey.

III COMPARING AVERAGE BENEFITS/EARNINGS AND HYPOTHETICAL REPLACEMENT RATE SERIES

We now construct and compare time-series based on average unemployment compensation/average earnings versus hypothetical cases. The expenditure-based series relies almost entirely on data from the ESRI-Department of Finance Databank, based on the National Accounts. To calculate mean unemployment compensation per recipient, aggregate annual expenditure on UB (including Pay-Related Benefit) and UA are summed and averaged over the number of recipients. The databank series on Pay-Related Benefit relates to the total expenditure without distinguishing that going to recipients of UB versus Disability Benefit: we have therefore estimated the proportion going with UB using figures published by the Department of Social Welfare. Whereas Browne and McGettigan used Labour Force Survey data on the numbers unemployed, given the increasing gap between numbers unemployed in the Labour Force Survey and the Live Register it seems preferable to use administrative data on numbers of recipients for this purpose.[3] For mean net earnings, the National Accounts aggregates for wages and salaries outside agriculture, less revenue from tax on personal non-agricultural incomes and employees' social insurance contributions, are divided by the number of employees outside agriculture as shown in the Labour Force Survey.

The average compensation/average wage series derived in this way for the period 1961-1992 is shown in Table 1, col. (1). The series shows mean unemployment compensation as a percentage of mean net earnings increasing from 22 per cent at the start of the 1960s to a peak of about 40 per cent in the early 1980s, then declining substantially to 36 per cent in 1987 and falling further to 32 per cent by 1992. It should be noted that this differs from the figures produced by Browne and McGettigan (1993, Chart 11) because they averaged unemployment compensation over the LFS unemployed rather than the number of recipients, because they included all PRB rather than the element going with UB, and also because of an error in the computation of their earnings total. The net effect of these factors is that their annual figures were considerably lower than those in Table 1, and though the changes from one year to the next generally show a similar pattern, their series shows a larger overall increase, from 13 per cent in 1961 to 27 per cent in 1992.[4]

In understanding how these trends are produced it is useful to construct sub-series in the same manner for UA and flat-rate UB. This can be done

3. The administrative data in fact refers to the numbers of claimants, but this will not diverge substantially from the number of recipients.

4. We are grateful to Donal McGettigan for assistance in clarifying this point.

Table 1: *Expenditure and Rates-based Replacement Rates, 1961-1994*

	Expenditure-based Replacement Rates			*Rates-based Replacement Rates*	
	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Year	*Overall*	*UA*	*UB*	*UA*	*UB*
1961	22.3	14.6	28.0	21.3	31.2
1962	23.3	16.7	27.9	22.9	28.2
1963	24.2	17.2	29.2	23.7	32.1
1964	24.0	17.4	28.4	23.3	32.0
1965	26.1	20.0	30.2	25.7	30.8
1966	29.6	24.4	32.1	25.2	35.0
1967	27.1	22.4	30.0	27.1	33.3
1968	27.4	22.9	30.0	28.0	33.1
1969	28.7	25.2	30.9	28.9	33.1
1970	28.3	26.0	29.7	29.1	34.5
1971	32.5	30.4	33.7	31.7	34.8
1972	27.7	26.0	29.0	29.4	34.3
1973	29.8	27.9	31.5	30.7	35.1
1974	30.2	23.8	33.2	29.9	35.0
1975	34.0	28.9	32.0	30.8	35.3
1976	35.0	29.0	32.9	31.1	35.9
1977	34.5	28.8	32.2	31.0	35.8
1978	33.7	28.2	31.5	30.4	34.9
1979	33.0	26.7	30.4	28.8	32.4
1980	37.6	29.2	34.0	30.3	34.0
1981	37.2	29.2	32.8	30.7	35.1
1982	40.7	33.0	36.6	35.3	40.6
1983	38.3	33.3	34.9	34.5	38.9
1984	37.0	33.9	34.4	37.1	39.4
1985	36.9	33.3	35.8	35.3	37.3
1986	35.8	33.0	34.8	35.3	35.6
1987	35.7	32.7	36.0	34.2	34.8
1988	36.6	34.8	36.6	35.7	35.7
1989	33.7	32.6	33.7	37.2	32.9
1990	32.9	33.2	30.1	37.4	32.2
1991	32.0	32.3	29.3	37.5	32.1
1992	32.1	32.4	29.2	36.5	31.6

1. Column (1) includes expenditure on PRB; columns (3) and (5) do not include expenditure on PRB.
2. Column (1) incorporates adjustments and corrections to the Browne and McGettigan series as described in the text.
3. The rates based series use information on maximum payment rates for UA and UB and the numbers in corresponding marital status and dependency categories in the Dept of Finance-ESRI databank; they also incorporate a correction to the formulae used in respect of those in receipt of half-rate CDAs.
4. All series use the same denominator: the average net wage defined in national accounts terms as total wages and salaries less income tax and employee PRSI contributions, divided by the number of employees in all sectors (from the Labour Force Survey).

using the series on annual expenditure of UA and UB, dividing each by the average net earnings figure as before. These mean UA/mean earnings and mean UB/mean earnings series are shown in Table 1, col. (2) and (3) respectively. The fall in the overall average from the early 1980s reflects three factors: the decline in average flat-rate UB as a percentage of average net earnings, the very sharp reduction in Pay-Related Benefit paid with UB, and a marked decline in the proportion of all recipients receiving UB, the higher payment at the outset, rather than UA. Estimates show a further decline between 1992 and 1994 in the overall average, implying a fall of about 5 percentage points in that series between 1987 and 1994.

An alternative method which adopts an intermediate route between reliance on average expenditure versus hypothetical rates-based cases is to calculate the average unemployment compensation per recipient by applying the rates of payment for different family types, distinguishing UB and UA, to the numbers in receipt in each category. The ESRI-Department of Finance Databank contains both the payment rates and the numbers in receipt for UB and UA for ten dependency categories, and within the databank these are used to calculate a weighted average rate of payment for UB and UA separately as well as an overall average rate. Dividing the UA and UB rates-based series by mean net earnings as before, one arrives at the figures shown in Table 1 cols. (4) and (5). (The overall average rates-based series does not include Pay-Related Benefit, and so is not shown here because it is not directly comparable with col. (1)).

In both cases the rates-based series are almost always above the expenditure-based ones. This is because the rates-based series effectively assume that all recipients are being paid at the maximum rate of UA or UB, whereas in fact some will receive less — for UA because the payments are means-tested and some recipients (or their spouses) have income from other sources, and for UB because some recipients do not have sufficient PRSI contributions to be entitled to the full rate. The year-to-year changes in the rates-based and expenditure-based series are generally similar, though some differences in the post-1987 pattern are worth noting. The expenditure-based UA series remains stable while the rates-based one rises by 2 percentage points from 1987 to 1992, and while both UB series fall the expenditure-based one falls by 7 percentage points compared with 3 for the rates-based one. The advantage of the rates-based approach is that it provides a basis for comparison of the position of recipients in the various dependency categories, allowing changes in the position of the group with the highest replacement rates on average, those with large numbers of dependants, to be distinguished.

Turning now to the hypothetical cases approach, we construct replacement

rates in the manner employed by Hughes and Walsh (1993).[5] This involves calculating separate replacement rates for a single man, a single woman and a married man with four children, for both UA and for UB. Social welfare payment rates in force at the time are used in calculating the numerator (assuming the maximum rate is paid in all cases), and the average industrial wage net of calculated income tax and PRSI contributions is the denominator. Hughes and Walsh present figures from 1967 to 1978, and we have updated the sub-series to 1994. In arriving at summary series for UA and UB, and for overall replacement rates, Hughes and Walsh applied fixed weights based on the number of males with no dependants/females with no dependants/males with dependants in 1973. This procedure was adopted because the distribution of the unemployed across family types could be endogenous, influenced by the evolution of replacement rates for the different categories. Here, to show how a series constructed on this basis compares with other approaches, we use the same fixed weights throughout. The calculated hypothetical series for UA, flat-rate UB and UB with Pay-Related Benefit are shown in Table 2 cols. (1), (2) and (3).

The hypothetical UA series shows a significant rise in the average replacement rate in the mid-1970s and in the early 1980s, a peak of almost 48 per cent in 1993, and little decline from that peak by 1994. The expenditure-based UA series in Table 1 had shown a lower level than this hypothetical one. This comes about because the hypothetical series not only assumes all recipients get the maximum rate, the averaging procedure also attributes the rate for a married man with an adult and four child dependants to all those with dependants. This was done because the series was intended for use in time-series analysis, but comparison of year-to-year changes with the expenditure-based series also reveals some interesting differences. The expenditure-based series is less volatile than the hypothetical series, ranging from a low of 23 per cent to a high of 35 per cent over the period from 1967 compared to 24-48 per cent for the hypothetical series. Most recently, the expenditure-based series peaked in 1988 and by 1992 was down 2.5 percentage points, whereas the hypothetical UA series continued to rise through the late 1980s and into the 1990s.

The hypothetical flat-rate UB series in col. (2) of Table 2 begins the period slightly above the expenditure- and rates-based UB series in Table 1 but from 1975 the gap grows rapidly as the hypothetical series rises much more rapidly than the other two. By 1983, when the hypothetical series peaks at 52 per cent, it is 13-17 percentage points above the other two series, and the gap remains about that large in subsequent years. In addition, there are

5. Thanks are due to Gerry Hughes for assistance in replicating the original Hughes-Walsh analysis.

Table 2: *Hypothetical Replacement Rates at Average Industrial Wage, Hughes-Walsh Method, 1967-1994*

	(1)	(2)	(3)	(4)	(5)
				Weighted Averages	
Year	*Maximum UA Rate*	*Maximum Flat-rate UB Rate*	*UB with PRB at Average Wage*	*(2) and (3) UB Recipients*	*(1), (2) and (3) UA and UB Recipients*
1967	25.0	32.4	32.4	32.4	28.8
1968	26.2	32.1	32.1	32.1	29.2
1969	27.0	31.9	31.9	31.9	29.5
1970	24.7	32.7	32.7	32.7	28.7
1971	24.7	32.8	32.8	32.8	28.8
1972	23.8	31.8	31.8	31.8	27.9
1973	23.7	32.2	32.2	32.2	28.0
1974	25.8	34.0	51.6	39.3	32.7
1975	30.4	39.8	60.2	45.9	38.3
1976	33.1	42.3	65.3	49.2	41.3
1977	31.3	40.4	64.4	47.6	39.6
1978	31.3	39.7	61.7	46.3	38.9
1979	31.5	39.1	71.5	48.8	40.3
1980	34.4	42.0	74.3	51.7	43.2
1981	35.5	43.0	73.8	52.3	44.1
1982	41.6	50.1	82.3	59.8	50.8
1983	43.4	52.0	72.5	58.2	50.9
1984	44.7	50.9	71.3	57.0	51.0
1985	43.7	49.7	71.9	56.4	50.2
1986	42.8	48.1	69.0	54.4	48.7
1987	41.3	46.6	57.1	49.8	45.6
1988	43.7	46.8	57.3	49.9	46.9
1989	45.5	45.8	55.8	48.8	47.2
1990	47.3	46.6	56.1	49.5	48.4
1991	47.6	46.4	55.3	49.0	48.3
1992	47.1	46.3	54.6	48.8	48.0
1993	47.9	47.3	55.5	49.7	48.8
1994	46.4	47.8	47.8	47.8	47.1

1. The UB series (both flat rate and with PRB) are calculated for single men and women, and for married men with 4 children; the UA series is calculated for single men, and for married men with 4 children. Weights reflect the Live Register dependency breakdown in 1973, as shown in Hughes and Walsh (1983).
2. The denominator in the replacement rate calculations is given by the disposable income for a (man or woman) with average weekly male (female) industrial earnings.
3. Column 4 gives a weight of 0.7 to flat rate UB and of 0.3 to PRB, reflecting the average proportion of UB recipients who obtained PRB in the 1974-1979 period - the years studied by Hughes and Walsh for which PRB was in existence.

differences in the recent trend: whereas the expenditure-based series showed a decline of 7 percentage points between 1987 and 1992, the hypothetical flat-rate UB series shows almost no change over that period. As we have seen, an important issue is the treatment of Pay-Related Benefit (PRB). Table 2 col. (3) shows a hypothetical replacement rate series for recipients of UB with full PRB, which rises by 20 percentage points in 1974 and reaches 82 per cent in 1982 before declining steadily as PRB was cut back up to its elimination (for new claimants) in 1994. An assumption which approximates to the underlying reality in the period covered by Hughes and Walsh is to attribute PRB to 30 per cent of UB recipients from its introduction, and a hypothetical UB replacement rate series based on this assumption is shown in Table 2, col. (4). The increase in 1974 is now much less marked, and the 1982 peak is 60 per cent rather than 82 per cent, with again a decline from that point until the three hypothetical UB series converge in 1994 with the phasing out of PRB.

An overall average hypothetical replacement rate series for all recipients of UA or UB, embodying the same PRB assumption, is shown in col. (5).

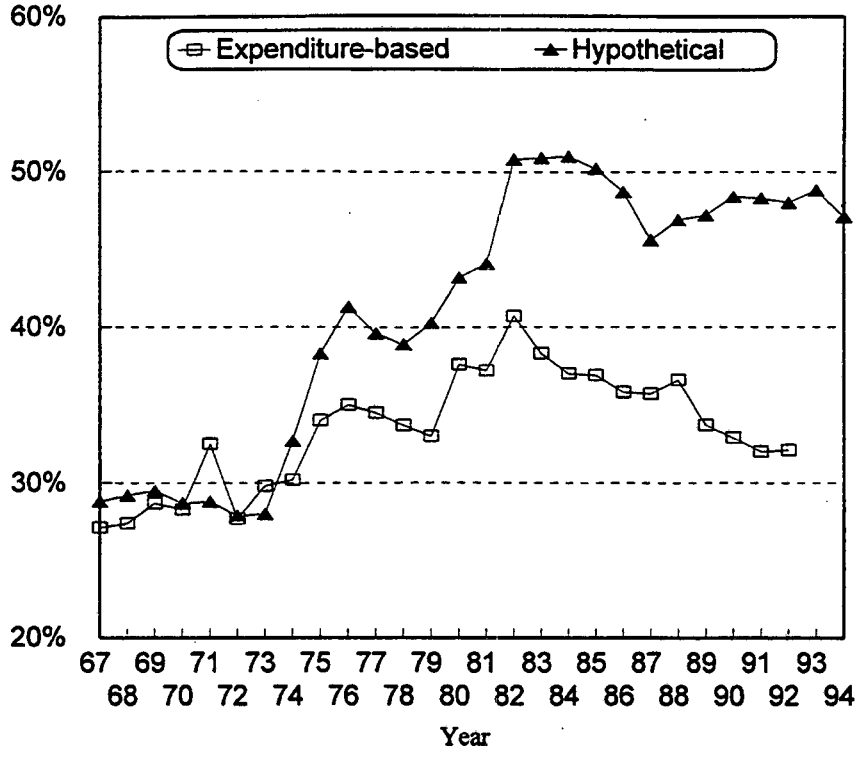

Figure 1: *Expenditure-based Versus Hypothetical Measure of Replacement Rates, 1967-1994*

This can be compared with the overall average expenditure-based series in Table 1, as is done in Figure 1. The hypothetical and expenditure based series start at similar levels (about 28 per cent), but begin to diverge in 1974, when the hypothetical series starts to rise above the expenditure based series. By the early 1990s when the figures are 32 per cent versus 48 per cent the gap has grown considerably. Once again the trend from 1987 is rather different, with the hypothetical series rising but the expenditure-based one falling from that point.

IV MICROSIMULATION EVIDENCE

Microsimulation modelling provides a third, and quite different, approach, simulating the replacement rates facing the unemployed on the basis of detailed micro-level data gathered in a large-scale household sample. Micro-level modelling of replacement rates allows one to take account of the full diversity of the population, in terms of the characteristics relevant to their tax and benefit position when in and out of work, and to examine the distribution of replacement rates, rather than simply summarising all those in a particular category by the mean. Replacement rates facing the unemployed can be highly sensitive to the wage rate which they are assumed to be able to command. For this reason, we have undertaken calculations for three different wage scenarios:

Average industrial earnings: unemployed men (women) are assumed to obtain a job at average male (female) weekly earnings.

Predicted wages: wages for single and married men and women are predicted by four human capital type wage equations for single and married men and women (Callan and Wren, 1994), including information on educational qualifications and on past labour market experience, including years spent unemployed or out of the labour force.

Two-thirds of average industrial earnings: The average predicted wage using wage equations comes to about two-thirds of average industrial earnings. For this reason, we also consider a scenario in which unemployed men and women each face a wage of two-thirds of the corresponding average industrial wage.

The tax and social welfare policy changes between 1987 and 1994 are captured by changes in the relevant parameters (tax rates and bands, social welfare rates, etc.) in the microsimulation model. The 1987 data has also been uprated to approximate 1994 levels by a combination of static ageing techniques: for a full description of the uprating procedures, see Callan, O'Donoghue and O'Neill (1996). Increased incomes are taken into account by

separate uprating factors for wage and salary income, self-employment income, and farm income. The average industrial wage increased by about 35 per cent between 1987 and 1994, but National accounts data, together with information from the Labour Force Survey on numbers in employment, suggest that pay per person employed rose by approximately 41 per cent. It is this more broadly based figure which is used in uprating *predicted earnings* in the wage-equation based analyses which follow — given that more than 70 per cent of men and 80 per cent of women are employed outside of manufacturing industry, we use the more broadly based earnings growth figure in most work with the model. The lower earnings growth figure is, however, implicit in the microsimulation analyses based on (two-thirds of) average industrial earnings.

Essentially, the replacement rates are estimated as follows. First, the tax-benefit model is used to simulate the disposable income of the tax unit when unemployed. This involves simulation of the relevant social welfare benefit (UB or UA) and of income tax liabilities, as well as the universal child benefit. The counterfactual situation, where the unemployed person is attributed a job at one of the wage levels specified above, is then modelled. Again, the tax-benefit model is used to estimate the disposable income the tax unit would have in that situation, taking into account changes in social welfare entitlements and tax liabilities, and, where relevant, entitlement to Family Income Supplement (FIS) — the social welfare benefit targeted at low income families depending on wage earnings. The replacement rate is then calculated as the ratio of family income when out of work to family income when in work.

Under the average earnings and two-thirds of average earnings scenarios, the unemployed person is attributed a wage at (two-thirds of) average industrial earnings (for men or women, as appropriate). This means that the uprating parameter for wage and salary income is of little relevance in these scenarios: the wage growth in the microsimulation estimates is the same as that for the hypothetical analyses, as far as the unemployed person is concerned.[6] But under the predicted earnings scenario, the uprating parameter comes into play, and the growth in the income for unemployed people in the in-work scenario is faster than that of average industrial earnings. While Family Income Supplement has been given a key role in policy development between 1987 and 1994, take-up of the scheme appears to be low. For this reason, we consider a variant of the predicted wage scenario in which only 1 in 3 of those entitled to FIS actually receives it. In all other analyses, we assume full take-up of the benefit by all those qualified to receive it.

6. The uprating parameter does affect the income of the spouse of an unemployed person.

Table 3 shows microsimulation estimates of the mean replacement rate for all those in receipt of unemployment compensation payments, and the means classified by the type of payment. The overall figures show that the hypothetical (Hughes-Walsh) means are close to the corresponding microsimulation estimates at the average industrial wage. However, the expenditure-based estimates are quite different, showing a large fall in the average replacement rate between 1987 and 1994 while the hypothetical and microsimulation series at the average industrial wage show a small rise. (The use of fixed weights in the hypothetical and microsimulation series, as against weights based on the current composition of the unemployed in the expenditure based series explains only a small part of this divergence). A second major feature of these comparisons is that the microsimulation estimates of the mean replacement rate at the *predicted* wage for the unemployed is substantially higher than at the average industrial wage. This reflects the fact that the average predicted wage for the unemployed is only about 2/3 of the average industrial wage. The trend at the predicted wage is

Table 3: *Alternative Measures of Replacement Rates, 1987 and 1994*

Measure	*1987*	*1994*	*Change*
		Overall	
Expenditure	35.7	30	-5.7
Hypothetical	45.6	47.1	1.5
Microsimulation @ average wage, full take-up	45.6	46.8	1.2
Microsimulation @ predicted wage, low take-up	62.3	61.0	–1.3
		Unemployment Assistance	
Expenditure	32.7	30.3	-2.4
Hypothetical	41.3	46.4	5.1
Microsimulation @ average wage, full take-up	39.2	42.6	3.4
Microsimulation @ predicted wage, low take-up	56.4	57.9	1.5
		Flat-rate Unemployment Benefit	
Expenditure	36.0	27.3	–8.7
Hypothetical	46.6	47.8	1.2
Microsimulation @ average wage, full take-up	52.4	52.9	0.5
Microsimulation @ predicted wage, low take-up	68.3	65.8	–2.5
		Unemployment Benefit with PRB	
Expenditure	n/a	n/a	n/a
Hypothetical	57.1	47.8	–9.3
Microsimulation @ average wage, full take-up	63.7	56.2	–7.5
Microsimulation @ predicted wage, low take-up	79.9	67.1	–12.8

also somewhat different from the trends at the average wage. The overall replacement rate shows a small fall at the predicted wage as against a small rise at the average industrial wage; the same applies to the sub-series for those on UB or PRB; and for UA, the rise in the mean replacement rate at the predicted wage is less than that at the average wage. These differences are due in part to the faster growth factor applying to predicted wages than to the average industrial wage; but also to tax and social welfare policy changes targeted on those with below average earnings.

As noted earlier, developments in *mean* replacement rates tell us only a part of what is going on. A relatively constant mean is consistent with little change throughout the distribution, or with a fall in the replacement rates at the highest levels, offset by a rise in replacement rates by those initially facing rather lower levels. In order to examine this question we must rely on the microsimulation based estimates. Tables 4 and 5 show distributions of estimated replacement rates for the unemployed, at alternative earnings assumptions, for 1987 and 1994. The 70 per cent cut-off is the one most often used in identifying "high" replacement rates in UK discussion of these issues and, coincidentally, tends to be a marker for roughly equal proportions of the unemployed population in both 1987 and 1994 i.e., the proportions of the unemployed population facing replacement rates above (below) 70 per cent, tend to be approximately constant in Tables 4 and 5. Under the average earnings assumption, about 13 per cent of the unemployed faced a replacement rate of over 70 per cent. At two-thirds of average earnings, this propor-

Table 4: *Distribution of Replacement Rates at Average and 2/3 Average Industrial Earnings, 1987 and 1994*

	Average Earnings		*2/3 Average Earnings*	
	1987	*1994*	*1987*	*1994*
0<10	2.0	2.9	1.3	2.1
10<20	4.9	4.6	3.5	2.7
20<30	20.1	7.2	3.5	3.9
30<40	19.2	24.3	25.4	5.5
40<50	12.7	15.1	3.0	24.1
50<60	18.0	19.3	16.3	10.3
60<70	10.8	13.4	9.7	14.5
70<80	6.5	8.8	20.4	27.9
80<90	3.6	2.5	8.5	2.7
90<100	2.3	1.9	5.9	5.5
Over 100	0.0	0.0	2.6	0.7
Total	100	100	100	100

Table 5: *Distribution of Replacement Rates Estimated Using Predicted Wages, 1987 and 1994*

	Full Take-up of FIS		*33 per cent Take-up of FIS*	
	1987	*1994*	*1987*	*1994*
0<10	1.0	1.7	1.0	1.7
10<20	1.7	2.4	1.7	2.4
20<30	4.3	3.3	4.3	3.3
30<40	9.3	8.5	9.3	8.5
40<50	11.6	11.7	11.7	11.8
50<60	16.5	15.3	16.4	15.3
60<70	18.9	21.6	19.1	19.6
70<80	16.6	28.4	13.9	22.0
80<90	14.4	4.5	13.1	9.1
90<100	4.0	2.4	5.4	4.6
Over 100	1.7	0.1	4.0	1.6
Total	100	100	100	100

tion rises to about 37 per cent and a similar level obtains for the predicted earnings variants. Thus, while about 1 in 8 of the unemployed would face a replacement rate of over 70 per cent, more than 1 in 3 would face a replacement rate of this magnitude at the wage level they could expect to command based on their qualifications and labour market experience.

Figure 2 summarises the figures for the predicted wage, full take-up scenario, showing the proportion of the unemployed facing replacement rates below the interval cut offs (equal to 10 percentage point intervals). A scenario in which some replacement rates fell, while none rose, would give rise to a curve for 1994 which lay entirely above the 1987 one, and vice versa; more complex changes could give rise to crossing curves, somewhat analogous to crossing Lorenz curves. Figure 2 makes it clear that in the case of the predicted wage scenario, changes are concentrated towards the top of the replacement rate distribution, where the 1994 curve lies above the 1987 one. Figure 3 focuses on this change at the top of the distribution, and shows sharp falls in the numbers facing replacement rates of over 80 per cent, accompanied by a roughly equal rise in the numbers facing replacement rates of 70 to 80 per cent.

Similar distributional changes, indicating some reduction in the incidence of the highest replacement rates, are found for those on wages below the average industrial wage. At the earnings levels predicted for each individual by the wage equations, the incidence of replacement rates above 80 per cent falls from about 20 per cent to about 7 per cent, if full take-up of FIS is

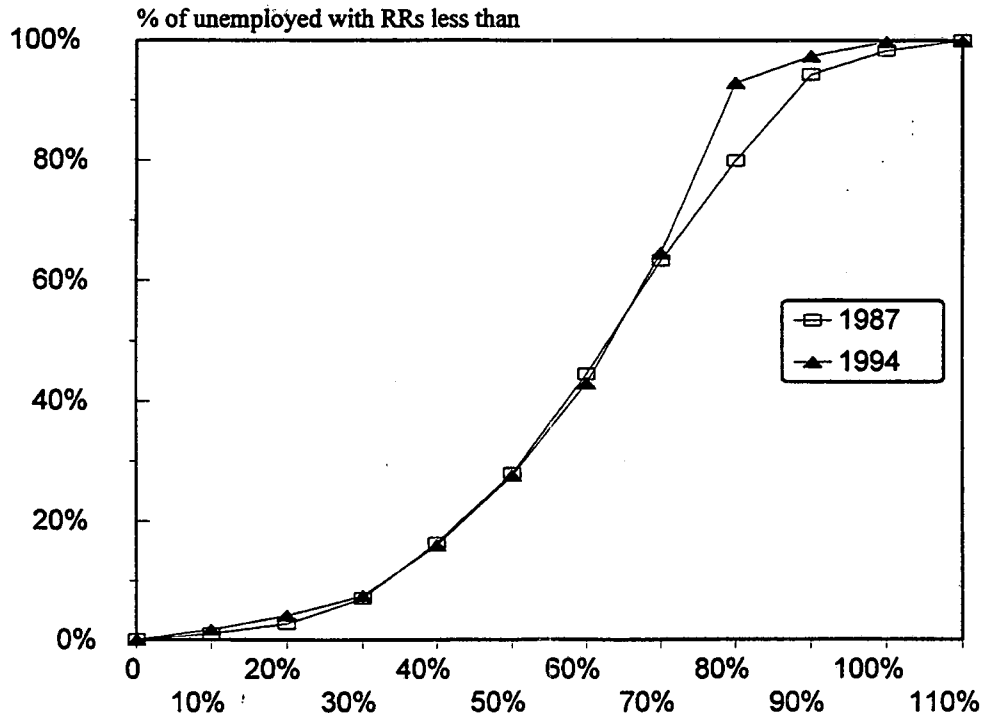

Figure 2: *Distribution of Replacement Rates, 1987 and 1994; Microsimulation Estimates at Predicted Wage, Full Take-up of FIS*

assumed; and from about 23 per cent to 15 per cent, under a low take-up assumption. Similarly, at two-thirds of average earnings, the incidence of replacement rates above 80 per cent falls from 17 per cent to 9 per cent (when take-up of FIS is assumed to be complete). In each case, the fall in the numbers facing replacement rates above 80 per cent is accompanied by a roughly equivalent rise in the numbers facing replacement rates of between 70 and 80 per cent. These tendencies are not evident at the average industrial wage (the incidence of replacement rates above 80 per cent falls only from 5.9 per cent to 4.4 per cent); but the incidence of such replacement rates at average earnings is already rather low.

The evidence on changes in the distribution of replacement rates below 70 per cent is more mixed. At the average industrial wage, or two-thirds of that figure, there is evidence of an upward shift in replacement rates below the 70 per cent cut off. But the faster earnings growth incorporated in the predicted wage analyses suggests that there has been little change in the distribution of replacement rates below 70 per cent. Thus the predicted wage

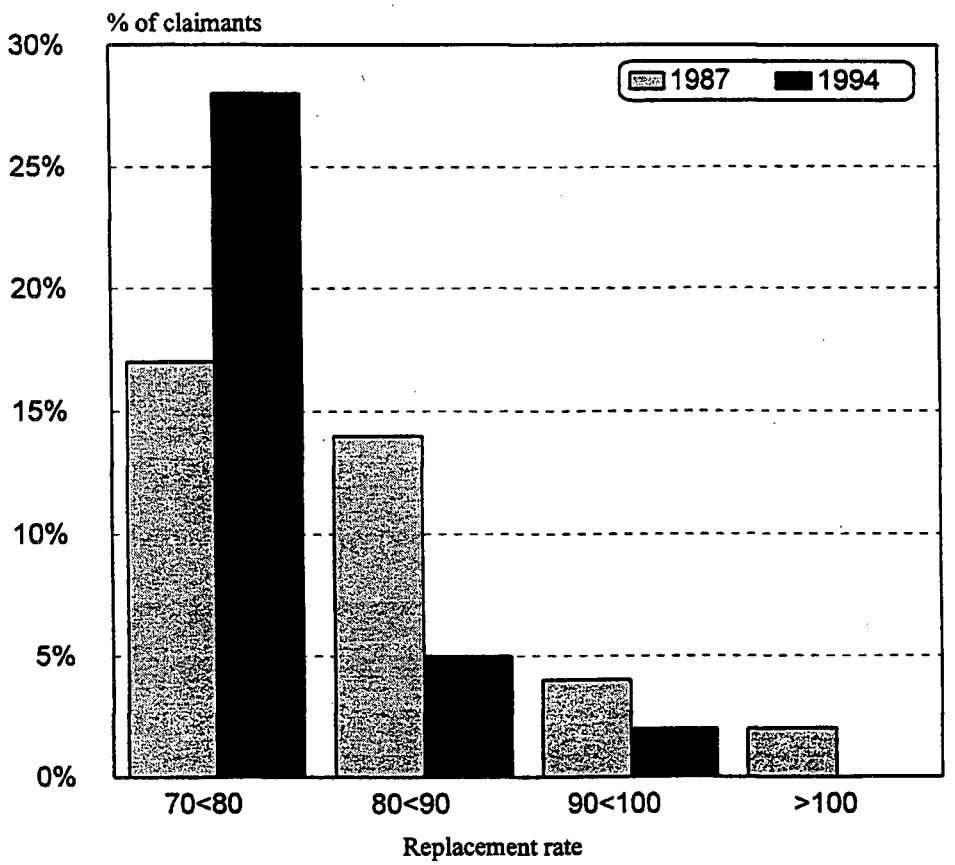

Figure 3: *Distribution of Replacement Rates over 70 Per Cent, 1987 and 1994; Microsimulation Estimates at Predicted Wage, Full Take-up of FIS*

analyses suggest that the major change in the overall distribution has been a reduction in the incidence of very high replacement rates (over 80 per cent), to levels of 70 to 80 per cent; while the average wage and two-thirds of average wage analyses suggest some upward shift in replacement rates below the 70 per cent level.

V CONCLUSIONS

Our exploration of replacement rates gives rise to conclusions on the substantive question of what has actually happened to replacement rates, particularly in recent years, and on the issue of how the evolution of replacement rates can best be tracked in future. During the 1987 to 1994 period, our microsimulation results suggest that the average replacement rate facing unemployed persons was roughly constant, with a small rise in the average for those on Unemployment Assistance offset by other changes, notably the

reduction in replacement rates caused by the abolition of Pay-Related Benefit. Similar findings obtain for the replacement rate measures based on (weighted averages of) hypothetical cases, as developed by Hughes and Walsh (1983). But the expenditure-based series and rates-based series, which use aggregate data sources such as the national accounts, produce rather different findings — a sharp fall in the overall figure, and a fall in each of the component series (UA, UB and PRB). While other explanations are possible, the most likely seems to be that the expenditure and rates based series focus on mean unemployment compensation divided by mean employment income per employee: this bears no necessary relationship to the mean of replacement rates for either the employed or the unemployed. During the 1987 to 1994 sub-period, it seems to behave rather differently from series which focus on average replacement rates for either selected hypothetical cases or the large number of unemployed persons in the ESRI's 1987 Survey. While some other results may be sensitive to possible changes in the distribution of wages, and to the precise change in mean wages between 1987 and 1994, this finding is unlikely to be affected by such considerations.

The microsimulation analysis also suggests that the relevant wage for the unemployed is a good deal lower than the average industrial wage — the mean predicted wage being about two-thirds of that average figure. This has implications both for the level of replacement rates facing the unemployed, and the changes wrought by policy and other developments in the 1987 to 1994 period on the entire distribution of replacement rates. As regards the level, the mean replacement rate at predicted wages (or at the average predicted wage) is about 15 percentage points higher than that at the average industrial wage. Many policy developments since 1987 (including improvements in FIS as well as alterations to income tax bands, allowances and exemption limits) have been focused on those with incomes below the average. The impact of such changes does not always show up in calculations which focus exclusively on the average industrial wage; but analyses based on two-thirds of that figure, as well as analyses based on predicted earnings for the unemployed, taking account of their qualifications and labour market experience, suggest that such policy measures have served to reduce the incidence of replacement rates above 80 per cent, while the incidence has increased for those in the 70 to 80 per cent replacement rate category.

Turning to the question of best practice for measuring replacement rates in future, it is clear that regular collection of survey data, which can take account of changes in the distribution of wages and other characteristics relevant to replacement rates, would provide the ideal base for measurement of changes in the distribution of replacement rates. Uprating procedures applied to a relatively recent data source can, however, provide useful

information on the impact of policy changes on incentives as measured by replacement rates. A detailed matrix of hypothetical cases can be of some help in identifying trends in mean replacement rates, but is not likely to be able to identify shifts in the distribution of replacement rates of the type that policy may be aimed at achieving — a rise in unemployment compensation for those on the lowest incomes, while reducing replacement rates for those facing the greatest disincentives to work. Microsimulation based measures offer the best chance of monitoring the achievement of such targets, and can, indeed, be used to assess the likely impact of policy changes on work incentives in advance of their implementation.

REFERENCES

ATKINSON, A.B., and J. MICKLEWRIGHT, 1985. *Unemployment Benefits and Unemployment Duration,* London: ST/ICERD, London School of Economics.

BLACKWELL, J., 1986. *Unemployment Compensation and Work Incentives*, Background Paper No. 2, Report of the Commission on Social Welfare.

BROWNE, F.X., and D. McGETTIGAN, 1993. *Another Look at the Causes of Irish Unemployment*, Technical Paper 1/RT/93, Central Bank of Ireland.

CALLAN, T., 1991. *Income Tax and Welfare Reforms: Microsimulation Modelling and Analysis*, General Research Series Paper No. 154, Dublin: The Economic and Social Research Institute.

CALLAN, T., and B. NOLAN, 1994. "Unemployment and Poverty", in B. Nolan and T. Callan (eds.), *Poverty and Policy in Ireland*, Dublin: Gill and Macmillan.

CALLAN, T., and A. WREN, 1994. *Male-Female Wage Differentials: Analysis and Policy Issues*, General Research Series Paper No. 163, Dublin: The Economic and Social Research Institute.

CALLAN, T., C. O'DONOGHUE, and C. O'NEILL, 1994. *Analysis of Basic Income Schemes for Ireland*, Policy Research Series Paper No. 21, Dublin: The Economic and Social Research Institute.

CALLAN, T., C. O'DONOGHUE, and C.J. O'NEILL, 1996. *Simulating Welfare and Income Tax Changes: The ESRI Tax-Benefit Model,* Dublin: The Economic and Social Research Institute.

DEPARTMENT OF SOCIAL WELFARE, 1991. *Statistical Information on Social Welfare Services 1990*, Dublin: Stationery Office.

HUGHES, G., and B.M. WALSH, 1983. "Unemployment Duration, Aggregate Demand and Unemployment Insurance: A Study of Irish Live Register Survival Probabilities, 1967-1978", *The Economic and Social Review*, Vol. 14, No. 2, pp. 93-118.

McGETTIGAN, D., and F.X. BROWNE, 1993. "The Causes of Irish Unemployment: Trends and Explanations", *Studies*, Vol. 82, pp. 35-52.

NATIONAL ECONOMIC AND SOCIAL COUNCIL, 1993. *A Strategy for Competitiveness, Growth and Employment*, Dublin: NESC.

NOLAN, B., 1987. "More on Actual Versus Hypothetical Replacement Ratios in Ireland", *The Economic and Social Review*, Vol. 18, No. 3, pp. 159-172.

O'MAHONY, D., 1983. "A Study of Replacement Ratios Among a Sample of Unemployed Workers", *The Economic and Social Review*, Vol. 14, No. 2, January, pp. 77-91.