

## Preliminary estimates of regional gross domestic product

The Central Statistical Office has been looking into ways of preparing satisfactory regional estimates of gross domestic product (GDP). This article describes the method adopted and presents the first very preliminary results in the accompanying tables. It should be remembered that they are first estimates and work is currently in hand to improve them. They are thought, however, not significantly to distort the comparative positions of the regions or the changes in them that have occurred in the period covered.

### Introduction

The negotiations that have been taking place in Brussels on the formulation of a Community Regional Policy have identified the need for estimates of GDP for each of the regions in the member countries. It has, therefore, been necessary to produce, fairly rapidly, official regional estimates of GDP for the United Kingdom for the first time. A previous attempt to undertake such a task was published as *Regional Social Accounts for the United Kingdom* by V. H. Woodward in 1970. Woodward's estimates, however, applied only to the years 1961 and 1966. Despite the preliminary nature of these new estimates, it is felt that they should be published with a brief description of the methods used, even though the CSO is still working to improve the methods of estimation.

In *National Income and Expenditure* (the Blue Book), GDP at current prices is measured both from estimates of final expenditure, and from factor incomes. For the regional breakdown, the factor income approach has been used. It is a relatively straightforward way of tackling the problem since it raises fewer conceptual difficulties. It is not possible at present to prepare regional estimates which employ actual regional data

corresponding to each of the national figures, so a considerable amount of estimation and pro-rating has had to be used. It is recognised that there is a greater risk of error attached to the regional estimates than is associated with the national figures. The continuous work on the production of more reliable regional accounts will eventually produce assessments of the regional situation for which the margin of error should be reduced.

The starting point for the calculations was the United Kingdom GDP at factor cost and current prices for each year disaggregated into three broad categories. These categories were respectively, income from employment, trading profits and surpluses and income from self-employment, and rents. They represent income to factors of production and do not include such items as income derived from the ownership of financial assets or state transfers, for example, social benefits, and are consequently not a complete measure of relative living standards in a region. The relative magnitudes of these categories are shown in Table A below: the estimation of each of them was approached separately and the methods adopted are described in the following paragraphs.

### Income from employment

The measure of income from employment in the national accounts represents the aggregation of returns to labour as a factor of production. The most obvious source of such income is wages and salaries, but to this must be added employers' contributions to national insurance and other superannuation schemes.

TABLE A

	£ million					
	1966	1967	1968	1969	1970	1971
Income from employment .. .. .	22,786	23,706	25,341	27,033	30,179	33,331
Trading profits and surpluses and income from self-employment <sup>(1)</sup> <sup>(2)</sup> <sup>(3)</sup>	8,502	9,012	9,797	9,870	9,997	11,231
Ownership of dwellings: Rent .. . . .	1,598	1,769	1,957	2,177	2,450	2,706
Gross domestic product at factor cost <sup>(2)</sup>						
Income-based estimate .. . . .	32,886	34,487	37,095	39,080	42,626	47,268
Adjustment from SNA to UK definitions .. . . .	133	143	158	194	219	244
Residual error .. . . .	38	205	10	-106	-57	647
Gross domestic product at factor cost						
Expenditure-based estimate .. . . .	33,057	34,835	37,263	39,168	42,788	48,159

<sup>(1)</sup> Less stock appreciation.

<sup>(2)</sup> Adjusted to SNA (United Nations System of National Accounts). This adjustment involves replacing the estimate of imputed rent to government owned premises by an estimate of capital consumption.

<sup>(3)</sup> Includes rent of trading concerns in respect of the ownership of business premises which they occupy.

Estimates of wages and salaries for the whole of the United Kingdom can be derived from the totals of tax returns; however, there are no comparable data available on a regional basis. The only direct estimates obtainable from Inland Revenue are those arising from the Survey of Personal Incomes, published annually. The difficulty with using these data is two-fold. Firstly they are sample data based on an annual coverage of only about 0.5 per cent, except in quinquennial years when the sample size is increased to around 4 per cent. The second drawback is that, prior to fiscal year 1969/70, the regional data from this survey were not classified according to region of residence of the individual taxpayers but by region of assessment. Consequently there is a severe problem of regional allocation. For example, where employees of a large firm employing people throughout the country are assessed for tax purposes in a single place, the entire wage bill for that commercial concern is assumed to be paid in the region of assessment. Thus prior to 1969/70 the Inland Revenue survey gives no reliable indication of wages and salaries earned in particular regions and could cause considerable distortion to the overall GDP figures if used. The residential classification is important because we have adopted the convention that the part of the GDP of a region arising in the form of income from employment should be on the basis of residence by analogy with the definition for the country as a whole. However, the survey for the fiscal year 1969/70 is one of the larger quinquennial surveys and has been analysed by region of residence of individual taxpayers and thus provides a starting point for estimation and a benchmark against which indicators for other years can be calibrated.

A method of estimation was adopted to enable the figures to be based upon region of residence throughout and to reduce the problems associated with small sample size. The indicators of movements in wages and salaries between fiscal years are obtained by combining figures of average earnings with figures of employees in employment. The basic data on average earnings are those compiled by the Department of Health and Social Security and published in the *Abstract of Regional Statistics*. These figures are available for men and women separately and for each of the eleven standard regions, classified according to region of residence. The statistics on earnings are produced from information on tax deduction documents about the gross annual earnings of persons covered by the income tax PAYE scheme through which national insurance graduated contributions are collected. The analyses are derived from a 0.5 per cent sample. The figures for employees in employment on a fiscal year basis are derived from quarterly statistics published by the Department of Employment by region, and were used taking men and women separately, in conjunction with average wages and salaries figures to get a 'total regional wage bill' series for each fiscal year. These data were then converted into rates of change from one year to another after the totals for each fiscal year had been adjusted to agree with the national figures. Having derived a series of rates-of-change, the results of the Inland Revenue Survey of Personal Incomes for 1969/70 were used as the bench mark. This year was chosen, as mentioned earlier, both because it was the first year that tax cases

had been assigned to region of residence and because of the large sample size used in this quinquennial year.

The survey displays regional totals of income from employment for those assessed for tax under Schedule E, and these were used to pro-rate the national total for the 1969/70 fiscal year between the regions. This procedure for obtaining regional estimates involves the assumptions that incomes not assessed for tax, which are not included in the survey, are distributed regionally in proportion to wages and salaries; it also implicitly distributes those wages and salaries in Public Departments which are not assigned to a region and the Merchant Navy in the same manner. The relative magnitudes of the latter two items are illustrated by the figures shown below, taken from the Survey of Personal Incomes 1969/70.

#### Employment income (Schedule E)

Principal source 1969/70		£ million
United Kingdom (regional total)	.. ..	21,547
Merchant Navy	.. ..	102
Public Departments—Civilian	.. ..	18

Using the estimated regional distribution of wages and salaries for the benchmark year, it was a simple procedure to discount back and project forward using the rate-of-change series previously computed. The final time series this produced was converted back to a calendar year basis and adjusted to align with the Blue Book totals for each year.

To these data had to be added employers' contributions and wages and salaries of the Armed Forces which had been previously excluded. Employers' contributions were distributed regionally in proportion to the wages and salaries totals. For the Armed Forces, information was obtained on their physical distributions throughout the standard regions: figures were available for each of the years calculated. The wage and salary bill for the Armed Forces (including their relevant employers' contributions) were then computed for each region and the totals added to the regional wages and salaries bill and the regional distribution of employers' contributions to obtain the final regional breakdown of income from employment.

Since income from employment accounts for about 70 per cent of total GDP, it is important that the regional distribution of this item be accurate and unbiased. It is thought that the procedure used is satisfactory on both of these counts.

#### Profits and self-employment income

This category includes the trading surpluses of public corporations and other public enterprises. It is difficult to estimate a regional breakdown of profits because of the complex interplays within industry across regional boundaries especially in intermediate goods. Industrial statistics suffer from the lack of a market price for those intermediate goods transferred between two local units of the same firm in different regions.

As a first approximation it was decided to distribute profits by pro-rating within each industrial order group according to the regional distribution of the labour force. This has disadvantages, since within a single

industrial order group, the regional distribution of employment may reflect more the local labour market conditions than the true effect of variations in the quantity and quality of capital stock between the regions. But by considering each industrial order separately, inter-industry variations in labour intensity are allowed for, leaving only the possibility of inter-regional variations within a particular industry. The procedure was to distribute total profits whether they arose in the private or public sector and whether from self-employment or not. The industry order groups used in Table 17 of the 1972 Blue Book\* were adopted for the breakdown, with manufacturing further disaggregated. A fairly complicated procedure was required within the manufacturing sector to achieve a reasonable level of sensitivity. Use was made of the input-output matrices for the years 1963 and 1968 to obtain profit data for the order groups within this sector. A simple interpolation procedure was used for the intermediate years, while for years after 1968 the proportionate share of total manufacturing profits accruing to each order group was considered to be constant.

One refinement used was that the item Adjustment for net interest, which appears under Insurance, banking and finance in Table 17 of the 1972 Blue Book with a negative sign†, was first distributed throughout the entire range of industries in ratio to the profits of those industries and subtracted from them before calculation began. Available information on stock appreciation by industry was taken into account and deducted before pro-rating. Having obtained time series for gross profits and other trading income by industry and manufacturing order group, adjusted for stock appreciation, these totals were distributed regionally using the available employment data for each region.

Having computed profit figures for the eleven standard regions, one further adjustment was performed. For several years, the Scottish Office, the Welsh Office and the Ministry of Finance, Northern Ireland have been publishing their own estimates of GDP. For the estimation of profits they have had access to more detailed information, consequently their estimates are considered to be more reliable. Therefore the Welsh, Scottish and Northern Irish estimates of profits have been substituted for those previously computed and the net residual distributed across the English regions. For Northern

Ireland, however, the published profits figures are calculated as a residual in their GDP estimates; there is a risk in substituting these figures and some small distortions may have been introduced into the Northern Ireland figure as a consequence.

### Rents

The national accounts include as part of factor incomes the income derived from rent paid on dwellings and business premises as well as an imputation of the rentable value of owner occupiers. Since these data are compiled as national aggregates, there is no readily available source for their regional equivalent. It was decided to use an indicator for the regional allocation of the national totals. The publication *Rates and Rateable Values in England and Wales* issued by the Department of the Environment and the Welsh Office was the source employed and it was assumed that rents are proportional to rateable value. On this assumption totals of rent income imputed both for ownership of dwellings, shown separately in Table A, and other kinds of buildings, usually business premises, were prepared separately for each region. Data for Northern Ireland and Scotland were supplied by the Ministry of Finance, Northern Ireland, and the Scottish Office. A figure for the adjustment to the United Nations System of National Accounts for the whole of the United Kingdom is available and this figure was distributed relative to the regional levels for business rents, which, in turn, have been included within the category Trading profits, etc. in Table A.

### Results

The final figures for GDP for each region are shown in the accompanying tables. It is again emphasised that these figures result from preliminary calculations and need to be treated with some caution. Where they are considered to be improvements to the estimates additional small adjustments have been made beyond those described above. In an exercise of this nature it is important that all eleven standard regions of the United Kingdom be treated in the same way for purposes of estimation. There has only been one instance where we have departed from this rule, in the case of profits, for the sake of better estimates. The estimates of GDP for Scotland, Northern Ireland and Wales, which result from the procedures described above are not intended to replace figures previously published by the Scottish and Welsh Offices and the Northern Ireland Ministry of Finance. Even at this stage the discrepancies between the data presented here and those previously published are relatively small.

\* The data presented in the tables have been revised in the 1973 Blue Book.

† This item was presented separately in the 1973 Blue Book.

*Central Statistical Office*

# APPENDIX

## Gross domestic product At factor cost: current prices

£ million

TABLE 1

	1966	1967	1968	1969	1970	1971
United Kingdom .. .. .	32,886	34,487	37,095	39,080	42,626	47,268
North .. .. .	1,662	1,733	1,855	1,952	2,155	2,392
Yorkshire and Humberside .. .. .	2,754	2,854	3,026	3,190	3,461	3,814
East Midlands .. .. .	1,911	2,016	2,150	2,287	2,479	2,751
East Anglia .. .. .	900	954	1,055	1,108	1,224	1,346
South East .. .. .	11,829	12,480	13,522	14,222	15,445	17,193
South West .. .. .	1,985	2,085	2,241	2,366	2,598	2,928
West Midlands .. .. .	3,209	3,318	3,545	3,739	4,060	4,465
North West .. .. .	3,849	4,008	4,297	4,523	4,882	5,368
Wales .. .. .	1,422	1,487	1,583	1,645	1,829	2,050
Scotland .. .. .	2,789	2,927	3,152	3,327	3,662	4,018
Northern Ireland .. .. .	577	626	670	720	832	946

## Gross domestic product per head At factor cost: current prices

£

TABLE 2

	1966	1967	1968	1969	1970	1971
United Kingdom .. .. .	602	627	671	704	765	850
North .. .. .	502	521	555	584	641	726
Yorkshire and Humberside .. .. .	578	596	630	663	719	793
East Midlands .. .. .	585	612	647	683	737	811
East Anglia .. .. .	569	592	644	669	731	798
South East .. .. .	696	729	785	822	892	995
South West .. .. .	546	569	606	634	690	772
West Midlands .. .. .	642	658	697	727	784	872
North West .. .. .	573	595	636	668	719	796
Wales .. .. .	526	548	582	604	669	752
Scotland .. .. .	536	563	606	639	702	770
Northern Ireland .. .. .	390	420	446	476	546	616