

# FULL-EMPLOYMENT OUTPUT IN IRELAND: 1954–1970

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## 1. *Précis*

This paper is intended as the third in a series dealing with full employment in Ireland. The first (Slattery (1976)) was concerned with determination of a pressure of labour demand which could be regarded as consistent with full employment (of labour) and with “acceptable” rates of wage and price inflation: the second (Slattery (1977)) translated this constrained full-employment demand pressure into numbers seeking employment.

Since policy measures intended to promote full employment, operate in the main by influencing aggregate supply and demand a target of full employment requires a corresponding target for output. The purpose of the present paper is to assess the output implications of full employment<sup>1</sup>.

## 2. *Full-Employment (Potential) Output*

By definition full-employment (potential) output (P) is observed only when the economy operates at the full-employment level: at all other times it must be estimated. The level of P estimated at any given time is not however unique since as Okun (1962) (see also Pesek (1963), Denison (1967)) has pointed out it may be defined as a short- or long-term concept. The former taking as data existing quantity and quality of productive resources and technology and differing from actual output (A) only by utilising these resources more fully is appropriate here — the analyses in Slattery (1976) and (1977) were concerned with the short-term.

Because short-term P depends only on a change in utilisation of resources, the levels of which are given, it has proved amenable to relatively simple estimation provided a reliable and common indicator of labour (L) and capital (K) utilisation is available – usually the unemployment rate. See for example Okun (1962), Paish (1962), and Shepherd (1968) each of whom estimated P from an observed relation between A and the unemployment rate by setting the latter to a predetermined rate deemed consistent with full employment.

The results cited in Slattery (1977) suggest however that such an approach is not appropriate for the Irish economy. Fuller L utilisation normally leads to an increase in numbers seeking employment because of higher participation rates. However Slattery (1977) found that during the 1950s and 1960s fuller utilisation would also have increased L stock by reversing or reducing net migratory outflow. Consequently while, as is customary, Slattery (1976) and (1977) used the non-agricultural unemployment rate (U) as a pressure of L demand indicator, it would not be appropriate as an L utilisation indicator. Since by definition U excludes those who emigrate but would remain/return if sufficient jobs were available it will over-estimate utilisation which, because it implies an actual-potential comparison, would be measured more accurately by an actual to potential employment ratio.

Furthermore use of a common (to L and K) utilisation indicator would seem inappropriate. Following Slattery (1976) that because of prolonged L under-utilisation employers and employees have come to regard as normal a pressure of L demand which by international comparison is low ( $U = 7\%$ ) it is likely that K would also be adjusted to prevailing conditions: because unlike L the stock of K cannot be increased in the short term it would be less under-utilised relative to potential than L and therefore prove insufficient in the event of a rapid movement toward substantially higher unemployment levels. The point is underlined by noting that because of the long-term decline in agricultural employment the required employment growth would be directed towards non-agriculture and that on average (1954 to 1970) the requirement was equivalent to  $12\frac{1}{2}$  per cent of non-agricultural employment (Slattery (1977))<sup>2</sup>.

It was not possible to determine *a priori* the extent to which full L employment might be thus constrained or prevented. In any event since the object was to determine the output level consistent with full resource utilisation it was appropriate to assume that full L employment could be achieved in the short-term; the fact that reality might prove otherwise does not preclude using the (P–A) shortfall as a measure of the cost of resource under-utilisation.

However, the unlikelihood of K expanding *pro rata* with employment, necessitated a separate K utilisation indicator. Direct measures are not readily available but the very deficiency of U as an L utilisation measure commended its use for K since this measure should relate to domestic stock only and not incorporate a prospective inflow. It was not ideal: increased K utilisation involves bringing into use stock previously idle and more intensive use of stock and while U may measure the former it is unlikely to indicate the latter. Nevertheless as an indicator of the relative short-term inability of K to expand it was felt that U would not involve major error.

On this basis and assuming the available stock of K was adjusted to prevailing conditions, then like L normal under-utilisation would be regarded as 7 per cent and full-utilisation as 3 per cent. Thus K actually used in a given year was estimated by reducing available K by a percentage equal to U and full-employment K as 97 per cent of available <sup>3</sup>.

Comparison over time of the L and K utilisation indicators<sup>4</sup> (see Table 1) showed that up to 1961 the two tended to remain around 3 percentage points apart, thereafter widening as labour under-utilisation grew more quickly due mainly to working-age population and hence potential employment growth — actual employment rose steadily up to 1964/5 before turning down. To the extent that greater labour under-utilisation reflected increasing potential rather than decreasing actual employment (see Table 1) widening of the gap is appropriate — K utilisation should reflect actual employment movements.

**Table 1: Labour and Fixed Capital Indices of Under-Utilisation**

Year	Actual Employment (E)	Full Employment (F) <sup>1</sup>	Non-agricultural unemployment rate (U)	Labour index <sup>2</sup>	Capital index <sup>3</sup>
	('000)	('000)	%	%	%
1954	1163.0	1254.5	8.1	7.3	5.3
1955	1146.0	1228.1	6.8	6.7	3.9
1956	1125.0	1207.6	7.7	6.8	4.8
1957	1084.0	1206.8	9.2	10.2	6.4
1958	1068.0	1169.3	8.6	8.7	5.8
1958	1060.0	1154.2	8.0	8.2	5.2
1960	1055.0	1133.6	6.7	6.9	3.8
1961	1052.5	1115.0	5.7	5.6	2.8
1962	1060.0	1131.7	5.7	6.3	2.8
1963	1066.0	1148.0	6.1	7.1	3.2
1964	1071.0	1137.6	5.7	5.8	2.8
1965	1069.0	1157.6	5.6	7.7	2.7
1966	1066.0	1145.9	6.1	7.0	3.2
1967	1060.0	1155.9	6.7	8.3	3.8
1968	1063.0	1164.0	6.7	8.7	3.8
1969	1066.0	1165.7	6.4	8.6	3.5
1970	1053.0	1168.5	7.2	9.9	4.3

<sup>1</sup> Source: Slattery (1977) Table 5

<sup>2</sup> equals  $100(1 - E/F)$

<sup>3</sup> equals  $(U - 3)/0.97$

### 3. Empirical Results

The next step was to establish an empirical relation between A on the one hand and actual L and K inputs on the other which on substitution of potential input levels would yield estimated P; the explicit introduction of K providing a means of allowing for a capital constraint.

Some experimentation was undertaken with an aggregate Cobb-Douglas production function in which numbers employed, hours worked per head per year, K adjusted for utilisation as described above and an exponential trend were used as input variables. A number of variants were examined but not surprisingly in view of the crudity of much of the data and the approximate nature of the exercise in general the results did not prove useful. Further experimentation with formal production functions was discontinued and an alternative sought<sup>5</sup>. [A summary of results is available from the author].

The alternative chosen was that used by Denison (1967) in which output growth contributions of factor inputs were assessed using corresponding shares in national income (NI)<sup>6</sup>. Because there is no satisfactory means of measuring returns to scale they were assumed constant: since examination of short-term effects of increased utilisation rather than of long-term growth rates was the object it was felt that any error would be minor.

The method assumes that factor earnings are proportional to the value of marginal products. This is more likely to be (at least approximately) true where an economy operates at or near full utilisation of all productive resources since the incentive to use factors in the most efficient (least cost) combination will then be greatest. To the extent therefore that the exercise is concerned with full employment, use of factor shares may be justified.

The next step was to measure the respective shares of L and K in National Income during 1954 to 1970. Details of estimation are given in the appendix and the results are summarised in Table 2 where for present purposes only L and K income shares were relevant. Use of income shares in this manner assumes unit elasticity of substitution between the factors at least over the observed range of shares. However Nelson (1965) has shown that erroneous use of unit elasticities is unlikely to result in major error in estimating output effects and Denison (1967) has shown that such error as arises may be minimised by temporal disaggregation into sub-periods and use within sub-periods of shares reflecting average income distribution.

**Table 2: Percentage Distribution of National Income<sup>1</sup>**

Year	Labour	Dwellings	Factor Income from abroad (net)	Rent element in land annuities	Other property income				Total national income
					Sub- total	Fixed capital <sup>2</sup>	Stock- holdings	Non- residential land	
%									
1954	70.3	2.3	6.5	0.7	20.2	13.0	2.0	5.2	100
1955	71.2	2.4	6.5	0.6	19.3	12.4	1.9	5.0	100
1956	72.7	2.5	6.3	0.6	17.9	11.6	1.7	4.6	100
1957	72.0	2.7	6.1	0.6	18.5	11.9	1.8	4.8	100
1958	70.6	2.8	6.7	0.6	19.2	12.4	1.9	5.0	100
1959	70.6	2.8	6.1	0.6	20.0	12.9	1.9	5.2	100
1960	70.5	2.7	6.0	0.5	20.2	13.0	2.0	5.2	100
1961	71.0	2.6	6.0	0.5	19.9	12.8	1.9	5.1	100
1962	72.1	2.5	5.6	0.4	19.4	12.5	1.9	5.0	100
1963	72.3	2.5	5.2	0.4	19.6	12.6	1.9	5.1	100
1964	74.3	2.2	4.8	0.4	18.3	11.8	1.8	4.7	100
1965	75.0	2.2	3.2	0.4	19.2	12.4	1.9	4.9	100
1966	76.7	2.4	2.8	0.4	17.7	11.4	1.7	4.6	100
1967	76.0	2.4	2.7	0.3	18.6	12.0	1.8	4.8	100
1968	75.5	2.3	3.1	0.3	18.8	12.1	1.8	4.9	100
1969	75.6	2.3	2.4	0.3	19.4	12.5	1.9	5.0	100
1970	77.5	2.2	2.2	0.2	17.8	11.5	1.7	4.6	100
Averages									
1954-61	71.1	2.6	6.2	0.6	19.4	12.5	1.9	5.0	100
1962-65	73.4	2.4	4.7	0.4	19.1	12.3	1.9	4.9	100
1966-70	76.3	2.3	2.6	0.3	18.5	11.9	1.8	4.8	100
1954-70	73.9	2.4	4.3	0.4	18.9	12.2	1.8	4.9	100

<sup>1</sup>Due to rounding, elements may not sum precisely to totals and sub-totals

<sup>2</sup>Machinery, equipment and non-residential buildings

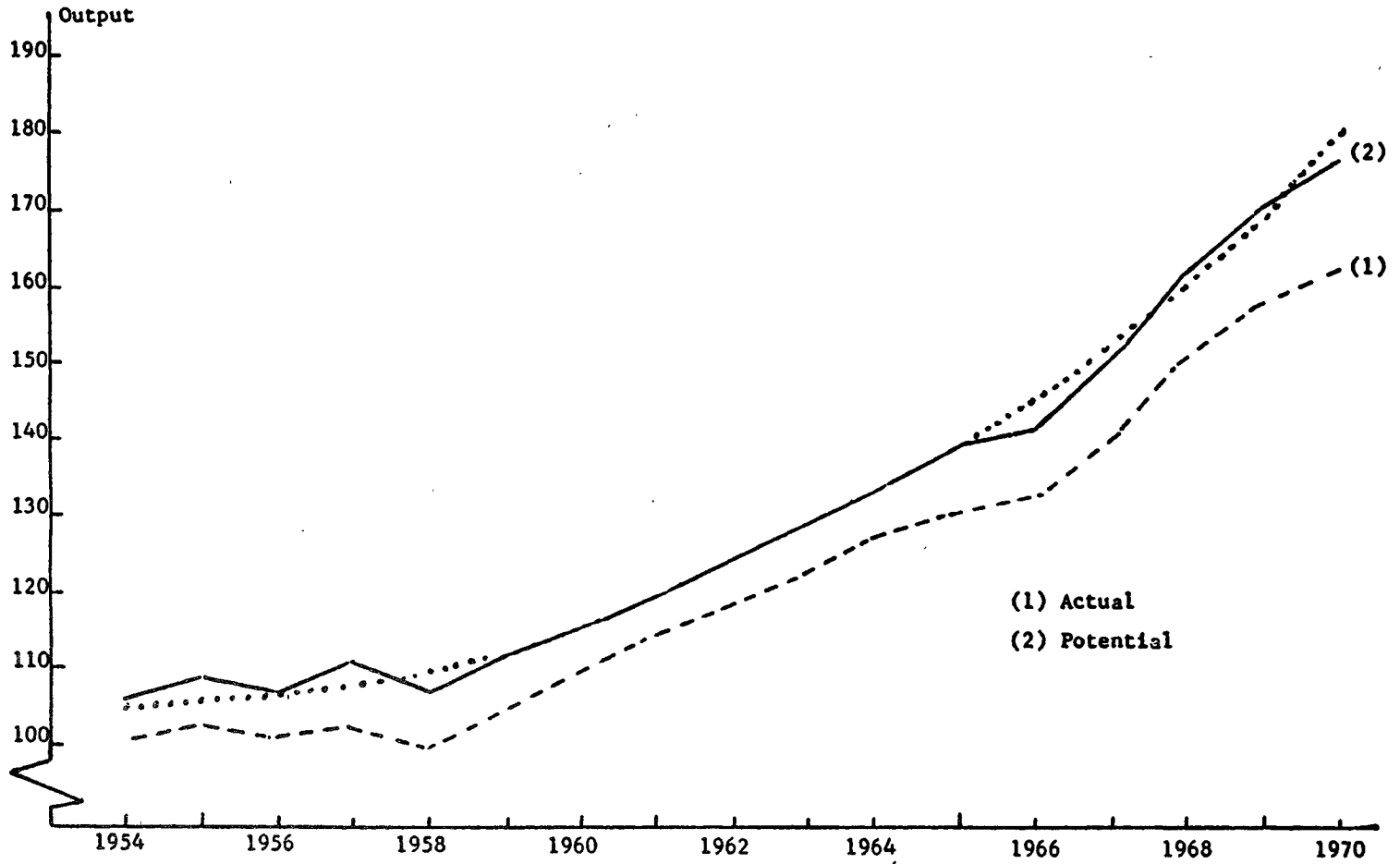
Inspection of Table 2 suggested, particularly with regard to L, using three sub-periods: 1954 to 1961, 1962 to 1965 and 1966 to 1970. Average shares for sub-periods and the whole period are shown at the bottom of the table. L's share showed a gradual increase while K's share tended to decline. Within sub-periods however shares remained fairly close to respective averages.

It was now possible to estimate the output increase due to increases in L and K as a result of fuller utilisation. For each year in a sub-period percentage increases in L and K were weighted by respective average shares and then summed to give the percentage output increase<sup>7</sup>. Results are shown in Table 3 below<sup>8</sup>. The estimated output increase in each year was then applied to A to obtain estimated P. The results along with A are also shown in Table 3 and in Figure 1.

**Table 3: Actual and Potential Output (1958 Prices)**

Year	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Increase in employment %	Increase in fixed capital %	Effect on output %	Actual output (A) 1958 = 100	Potential output (P)	P/A %	(P-A) £ million (1958 prices)
1954	8.0	5.6	6.4	100.8	107.3 (105.7)	104.9	29.4
1955	7.2	4.1	5.6	102.7	108.5 (106.3)	103.5	21.6
1956	7.3	5.0	5.8	101.6	107.5 (107.3)	105.6	34.3
1957	11.4	6.8	9.0	102.6	111.8 (108.4)	105.7	34.9
1958	9.5	6.2	7.6	100.0	107.6 (110.1)	110.1	60.7
1959	9.0	5.5	7.1	104.9	112.3	107.1	44.5
1960	7.5	4.0	5.8	109.6	116.0	105.8	38.5
1961	6.1	2.9	4.7	115.0	120.4	104.7	32.4
1962	6.8	2.9	5.4	118.5	124.9	105.4	38.5
1963	7.7	3.3	6.1	122.7	130.2	106.1	45.1
1964	6.2	2.9	4.8	128.4	134.6	104.8	37.3
1965	8.3	2.8	6.4	131.5	139.9	106.4	50.5
1966	7.6	3.3	6.2	133.5	141.8 (146.2)	109.5	76.3
1967	9.1	4.0	7.4	140.6	151.0 (153.5)	109.2	77.5
1968	9.5	4.0	7.7	151.7	163.4 (161.7)	106.6	60.1
1969	9.3	3.6	7.5	158.5	170.4 (171.0)	107.9	75.1
1970	11.0	4.5	8.9	162.5	177.0 (181.4)	111.6	113.6

Figure 1: Actual and Potential Output



As may be seen from Figure 1 during 1959 to 1965 P grew smoothly but pre-1959 fluctuated markedly and fell in 1956 and 1958. Similar though less marked fluctuations occurred post-1965. These fluctuations were regarded as due to imperfections in the estimation method rather than as genuine irregularities in potential growth which by its nature is more likely to develop along a relatively cycle-free path. It was decided therefore to smooth the earlier and later years using the underlying trend growth rate of A backward from 1959 and forward from 1965 – see dotted lines in Figure 1 and figures in parentheses in Table 3 – and future reference to P will relate to trended values. (Okun (1962) noted a similar problem). Over the whole period the difference between trended and non-trended estimates is slight and in any event it is probably better not to rely on comparisons for individual years.

#### *4. Interpretation*

Column (6) of Table 3 shows P/A which indicates that on average 1954 to 1970 the output shortfall was equivalent to 6.8 per cent of A or at 1958 prices an annual average of £51.2 million (column (7)). That is, attainment of full employment in any year would have required output to rise by a further 6.8 per cent; the highest annual increase during the period was 7.9 per cent in 1968. With the exception of 1958, shortfall was below average during the first half of the period, increasing in later years as under-utilisation particularly of L increased. Aggregated over the period, the gap between the volume of goods and services which could have been produced had full employment been attained and that actually produced amounted to £870 million (1958 prices) equivalent in terms of A in 1970 to 10½ months production.

Output shortfall provides a measure of cost in terms of production foregone in the short-term of failing to fully utilise productive resources<sup>9</sup>. To the extent that the potential estimates were developed within constraints of acceptable wage and price inflation and maintenance of international competitiveness (see Slattery 1976) the cost is a net one: the additional output could have been achieved while remaining within constraints imposed by other and conflicting policy targets. In policy terms, therefore, it would appear that during 1954 to 1970 there was considerable scope for short-term demand management aimed at stimulating higher employment. This is consistent with Kennedy (1975) that persistence of high unemployment in Ireland reflects failure of economic policy to give priority to the goal of full employment. (For a detailed discussion of demand management during the period see Kennedy and Dowling (1975)).

The precise extent to which such demand management would have been successful however is open to question. A notable feature to emerge from quantification of full employment is the extent to which by any of the criteria proposed – unemployment, new job requirement, capacity utilisation – the Irish economy consistently fell far short of potential during 1954 to 1970. By comparison, in Great Britain for example during the same period full employment was identified with unemployment of around



2 per cent with actual unemployment fluctuating closely about this rate. As a result the appropriate short-term policy action for full employment was anti-cyclical demand management. In Ireland, however, while demand management might provide a means of anti-cyclical adjustment about a long-established low level of activity, it could scarcely be regarded as the prime means of furthering full employment.

To the extent that only such longer-term policy measures as industrial and regional development which affect economic structure would in practice be likely to promote full employment, the present estimate of P while providing a yardstick for assessing output shortfall incurred by resource under-utilisation, would probably require some downward revision in determining short-term policy targets: while allowance was made for the short-term inability of K to increase *pro rata* with L, it was nevertheless assumed that job creation would match the growth of L<sup>10</sup>. Ex-ante revision would however tend to be arbitrary even in a larger model (see for example Henry (1974)) and to some extent would involve reversion to net emigration as a solution to unemployment.

The assumption that job creation would match the growth in labour supply has implications for income distribution in the short-term. Using period averages as relatively cycle-free estimates the results indicate that full employment would have increased L by 8.3 per cent and output by 6.8 per cent: in addition (see Slattery (1976)) money wages would have risen 12.6 per cent and prices 4.6 per cent<sup>11</sup>. Thus total labour income (assuming other component elements rose similarly) would have risen some 22 per cent and current price output 11.7 per cent giving a 9% increase in labour's share of national income (strictly GNP).

Finally, the results may be used to obtain an indication of the short-term K insufficiency by estimating the increase in K necessary to maintain K/L. With L increasing 8.3 per cent and increased utilisation producing the equivalent of an average 4.2 per cent increase in K, an increase of 4.1 per cent in K stock would have been required. On average this represents £46.2 million at 1958 replacement cost or 6.2 per cent of A at 1958 prices<sup>12</sup>. The calculation is crude assuming, as is unlikely, an industrial mix in new job creation broadly similar to that in existence. Nevertheless it suggests insufficiency on a scale rectifiable only by prolonged build-up. (See for example Henry (1974)). It is likely that some of this would be financed by net capital inflows from abroad and while the precise contribution is impossible to predict some balance of payments deterioration could be expected.

## APPENDIX

Since the official national accounts (see National Income and Expenditure, Tables 11 and A1) disaggregate National Income to show the forms in which income arises — remuneration of employees, etc. — it was necessary to adapt the data to represent returns to factors of production. The results shown in Table 2 of the text require explanation.

L income was regarded as comprising wages and salaries, employers' social insurance contribution and a part of income from self-employment and other trading income in agriculture and other (than corporate bodies and the Post Office) trading profits and professional earnings. The latter items were included because they comprise a return to proprietors from investment and a return for work performed by proprietors and possibly unpaid family members. There is insufficient evidence from which to judge how to allocate between a return on investment and a return to labour and it was decided to follow Denison (1967) who faced with a similar information gap for each of eight West European countries assumed (using US experience) that in all cases 63 per cent of such income was a return to labour during 1950 to 1962.

Income from dwellings was obtained directly from the official statistics and represents actual and imputed rent of dwellings. Net factor income from the rest of the world and the rent element in land annuities were also obtained directly from the official statistics. The remaining income (including adjustment for stock appreciation) was regarded as other property income comprising income from capital equipment, buildings other than dwellings, land other than for dwellings, and stock holdings. (It could also include excess profit but there is no means of extracting this element). Since the interest lay in the output effect of a change in K (capital equipment and buildings other than dwellings) it was necessary to further disaggregate other property income to remove income accruing to land and stock holdings.

Assuming that rates of return on investment in each of the three assets were equal — which would arise in equilibrium — other property income could be distributed if absolute or relative levels of each asset were known. There did not appear to be information on the stock of land in use, nor of the level of stock holdings, and it was

decided therefore to estimate relative stock holding, and K levels using the (real) change in stocks and (real) net K formation, assuming that averaged over a period the changes ratio would indicate the levels ratio. For 1954 to 1970 it was found that the stocks change was equivalent to some 15 per cent of net K formation and the same was assumed of levels. Some corroboration was obtained from UK data where a levels comparison for the same period showed stock holdings represented the equivalent of 15 per cent of K. For purposes of allocating other property income, therefore, it was assumed income accruing to stock holdings was equivalent to 15 per cent of that accruing to K.

It was not possible to conduct a similar exercise for land. However examination of Denison's results suggested that as a reasonable average, income accruing to non-residential land could be taken as equivalent to 40 per cent of that accruing to K<sup>13</sup>. Thus other property income was disaggregated as follows: 64.5 per cent to K, 9.7 per cent to stock holdings and 25.3 per cent to non-residential land.

While the disaggregation involved considerable guesswork, K's share of National Income estimation of which was the prime object, was not particularly sensitive to variations in the distribution of other property income because it accounted for only 19 per cent of National Income. Thus if the above estimates understated the shares of stock holdings and land by as much as 50 per cent, K's estimated share of National Income would be overestimated by only 17 per cent.

As an approximate check on the estimates as a whole, the results averaged over 1954 to 1970 were compared with Denison's (1967) for the US and Western Europe for 1950 to 1962. (See Table A1 overleaf). As may be seen, with the exception of stock holdings and net property income from abroad, the two sets are broadly similar. Since no two countries will display identical income distributions, the comparison is of limited value, nevertheless the similarity of orders of magnitude provides some reassurance. Indeed Denison noted that the general similarity of income distribution among countries and over time supported the hypothesis that income shares gave a reasonable basis for growth contribution analysis.

**Table AI: Percentage Distribution of National Income: International Comparison<sup>(a)</sup>**

Country	Labour	Dwellings	Net factor income from abroad	Other property Income				Total national income
				Sub-total	Fixed capital	Stock holdings	Non-residential land	
Ireland	73.9	2.4	4.3	19.3 <sup>(b)</sup>	12.2	1.8	5.3 <sup>(b)</sup>	100
U.S.	78.6	3.5	0.6	17.3	11.2	3.2	2.9	100
Belgium	72.9	6.1	0.4	20.5	13.2	3.8	3.6	100
Denmark	75.2	4.1	- 0.2	20.9	12.2	3.8	4.9	100
France	77.0	0.8	0.2	22.0	13.8	4.0	4.2	100
W.Germany	73.7	1.3	- 0.3	25.3	16.2	4.6	4.5	100
Netherlands	74.0	1.7	1.4	22.9	14.2	4.2	4.5	100
Norway	74.1	1.0	- 0.8	25.7	16.4	4.7	4.6	100
UK	77.8	2.2	1.8	18.2	11.9	3.4	2.9	100
Italy	72.0	3.1	- 0.1	25.0	14.1	4.5	6.4	100

(a) Sources: Ireland, see text; other countries Denison (1967) *op. cit.*, p.38

(b) Includes rent element in land annuities

## DATA AND SOURCES

### *Capital Stock and Stockholdings (UK)*

National Income and Expenditure (NIE), HMSO (London)

### *Employment*

Census of Population (CP) category number at work published annually in Trend of Employment and Unemployment (TEU)

### *Non-Agricultural Unemployment Rate*

Published in TEU

## FOOTNOTES

1. Output is GNP at 1958 market prices. GDP series at constant factor cost or market prices and GNP at constant factor cost are not available pre-1958. On valuation, Denison (1967), showed that the factor cost/market price difference is of little quantitative significance since its effect on annual growth rates is minimal.
2. It will be noted that following Klein (1960) capital and capacity utilisation are being differentiated. See also Hilton (1970).
3. Even in full-utilisation some unutilised stock will exist just as some unemployment will exist. See for example Paish (1962), Pearce and Taylor (1968).
4. Defining the utilisation index as the percentage actual/potential ratio so that the under-utilisation index is obtained by subtraction from 100. A value of zero for the latter indicates full employment.
5. Because of interdependency among variables the function should properly be estimated in the context of a larger model. However single equation estimation may be, partly at least, justified on the grounds that this is a valid precursor to model development. Because the interest lay in examining the output effect of increasing L, numbers employed and hours worked were specified as separate inputs in some variants to allow for possible differences in output elasticities. For this purpose Feldstein (1967) concluded there was no clearly superior alternative to the Cobb-Douglas (CD) function. Nelson (1965) also argued that at macro-level the difference between CD and Constant Elasticity of Substitution functions for explaining growth is of little relevance. See also Nerlove (1967).
6. In principle the two methods are the same. See for example Correa (1970).
7. Denison (1967) found that the sum of estimated contributions of inputs differed from actual output growth because of "interactions" among inputs but that when calculations were based on changes rather than levels the error was small. L increases were based on equivalent man-years with average hourly earnings as a relative productivity measure for males and females, (see for example, Fabricant (1959)). In practice movement to potential from a sub-potential level is characterised by faster than potential growth with cyclical increases in hours and productivity augmenting the L increase. However when the output growth path reverts to potential hours and productivity revert to trend so that in estimating P from A these expansionary effects should be disregarded and the L increase can be based on man-years. See for example Kuh (1966).
8. The percentage K increases in Table 3 are slightly higher than the index shown in Table 1 because the latter is based on potential utilisation and the former on actual.
9. Evaluation of longer-term cost would also require evaluation of the extent to which present failure to fully utilise productive resources resulted in diminution of future P. See for example Pesek (1963).

10. For a discussion of longer-term objectives and possible policies see for example Kennedy and Bruton (1975).
11. The analysis in Slattery (1976) indicated that prices were determined in relation to long-term labour productivity changes so that it is unlikely that the productivity fall would affect the growth rate of prices and hence wages — the analysis found that prices influenced wages but did not find a direct relation between wage and productivity changes.
12. The K stock estimate is adjusted for utilisation and derives from Slattery (1975). During 1954 to 1970 K formation accounted for 15 per cent of GNP.
13. Denison estimated a range between 45 per cent (Italy) and 24 per cent (UK). While non-residential land is not solely agricultural the percentages were highest where agriculture accounted for large proportions of employment and GDP and in each case declined during the period, presumably reflecting declining relative importance of agriculture. Use of 40 per cent was impressionistic reflecting three considerations: the importance of agriculture suggesting a figure at the upper end; allowance for declining importance; some allowance had been made for a return to land under rent element in land annuities which *in toto* gave a figure of 43.4 per cent.

## REFERENCES

- Correa, H, 1970. "Sources of Economic Growth in Latin America", *Southern Economic Journal*, vol 37.
- Denison, E F, 1967. *Why Growth Rates Differ*, The Brookings Institution (Washington).
- Fabricant, S, 1969. *Basic Facts on Productivity Change*, Columbia University Press (New York).
- Feldstein, M S, 1967. "Specification of the Labour Input in the Aggregate Production Function", *Review of Economic Studies*, vol 34.
- Henry, E W, 1974. *Irish Full Employment Structures, 1968 and 1975*. Dublin: Economic and Social Research Institute, paper no 74.
- Hilton, K, 1970. "Capital and Capacity Utilisation in the UK, Their Measurement and Reconciliation", *Bulletin of Oxford Institute of Economics and Statistics*, vol 32.
- Kennedy, K A, 1975. "Population and Development: Ireland since Independence", *Central Bank of Ireland*, Annual Report.
- Kennedy, K A, and Bruton R, 1975. *The Irish Economy*, Studies, Economic and Financial Series no 10, Commission of the European Communities.
- Kennedy, K A, and Dowling, B R, 1975. *Economic Growth in Ireland 1947-1972*, Dublin: Gill and Macmillan.
- Klein, L R, 1960. "Some Theoretical Issues on the Measurement of Capacity", *Econometrica*, vol 28.
- Kuh, E, 1966. "Measurement of Potential Output", *American Economic Review*, vol 56.
- Nelson, R R, 1965. The CES Production Function and Economic Growth Projections, *Review of Economics and Statistics*, vol 47.
- Nerlove, M, 1967. "Notes on the Production and Derived Demand Relations Included in Macro-Econometric Models", *International Economic Review*, vol 8.
- Okun, A, 1962. "Potential GNP: Its Measurement and Significance". Proceedings of the Business and Economic Statistics Section of the American Statistical Association.
- Paish, FW. 1962. *Studies in an Inflationary Economy*, Macmillan.
- Pearce, D D and Taylor, J, 1968. "Spare Capacity: What Margin is Needed"? *Lloyds Bank Review*, July.

Pesek, B P, 1963. "Growth, Capacity Output and the Output Gap", *Review of Economic and Statistics*, vol 45.

Shepherd, J R, 1968. "Productive Potential and the Demand for Labour", *Economic Trends* no 178, CSO, (H.M.S.O., London).

Slattery, D G, 1975. "Fixed Capital Stock Estimation: An Empirical Exercise Using Irish Data", *Journal of the Statistical and Social Inquiry Society of Ireland*, vol 23, part 2.

Slattery, D G, 1976. "Towards a Definition of Full Employment in Ireland". *Journal of the Statistical and Social Inquiry Society of Ireland*, vol. 23, part 4.

Slattery, D G, 1977. "The Full-Employment Labour Supply in Ireland, 1954—1970". *The Economic and Social Review*, July, vol 8 no 3.