

# Components of Growth in Current Public Expenditure on Education and Health\*

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*Abstract:* This paper examines the growth in the GDP share of current public expenditure on national, vocational and university education in Ireland between 1961 and 1979 in terms of four factors: transfer changes, demographic changes, enrolment changes, and movements in relative "costs". The change in the relative cost of hospital care between 1966 and 1979 is also estimated.

## I INTRODUCTION

Total public sector expenditure accounted for 56.4 per cent of GDP in 1981, compared to only 42.9 per cent in 1974 and 28.8 per cent in 1962. While non-exhaustive expenditure (e.g., transfer payments) is the largest component of the total and has grown most rapidly, exhaustive expenditure amounted to 26.6 per cent of GDP in 1981, having almost doubled its share in GDP in the previous twenty years. The growth in current expenditure on education and health accounted for much of the growth in exhaustive expenditure (O'Hagan, 1979/80). The purpose of this paper – using identities developed by the OECD (1976 and 1977) – is to attribute changes in the growth of this expenditure to transfer, eligibility, demographic and "cost" changes, with special emphasis on the last mentioned. In the case of education, such an exercise could only be applied to expenditure on

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national (primary), vocational and university education between 1961 and 1979. Lack of data also precluded a similar analysis of expenditure on health, but the magnitude of the relative cost change in hospital care (a major component of total health expenditure) in the period 1966 to 1979 is estimated.

## II EMPIRICAL FINDINGS

The starting-point of the analysis of public expenditure on education is the identity:

$$E/Y = (E/TE) \times (TE/B) \times (B/I) \times (I/N) \times (N/Y)$$

where  $E$  = public expenditure on education,  $TE$  = total expenditure on education,  $Y$  = Gross Domestic Product,  $B$  = number of students,  $I$  = the size of the relevant population and  $N$  = total population. The second and fourth terms in the identity can be merged into what is called the "cost ratio", i.e., the ratio of expenditure per student to nominal GDP per capita.<sup>1</sup> Changes in public expenditure ( $E/Y$ ) can now be attributed to four factors – transfer ( $E/TE$ ), demographic ( $B/I$ ), enrolment ( $I/N$ ) and cost  $\left(\frac{TE/B}{Y/N}\right)$  changes.

Table 1 provides a breakdown of the contribution of each of these factors to the expansion in national, vocational and university education in Ireland between 1961 and 1979. As may be seen, expenditure on national education as a proportion of GDP increased by 29.4 per cent: the corresponding figures for vocational and university education were 155.4 and 188.4 per cent, respectively. Thus, developments differed markedly depending on educational level: this was also true in relation to the importance of the different contributing factors. For national education, the increase in  $E/Y$  was totally accounted for by a rise in the cost ratio. Both the enrolment and demographic ratios declined, albeit by small amounts, and since  $E = TE$ , transfer changes were not a factor. The rise in the cost ratio was particularly marked in the 1970s, rising by 32.2 per cent in the period 1971-79. For vocational education, the overall situation was rather different. A doubling of the enrolment ratio between 1961 and 1979 was the dominant factor in the increase in  $E/Y$ : the demographic ratio increased by 12.7 per cent and the cost ratio increased by 9.3 per cent – the transfer ratio was unchanged. It is noteworthy, though, that the change in the enrolment ratio occurred almost totally in the 1960s: it increased by only 8.1 per cent in the 1970s. In contrast, the cost ratio increased by 14.9 per cent in the 1970s – having decreased in the 1960s – making it the dominant factor underlying changes

<sup>1</sup> Bradford, Malt and Oates (1969) compared changes in  $TE/B$  with changes in the wholesale price index.

in E/Y in the period 1971-79. All four factors contributed significantly to the huge increase in E/Y for university education for the period 1961-79.<sup>2</sup> The demographic ratio increased most – by 36.6 per cent – the enrolment, transfer and cost ratios increasing by 32.5, 28.7 and 24.0 per cent, respectively. However, most of these increases took place in the 1960s: the enrolment ratio decreased in the period 1971-79 and the increase in the other three ratios in this period was around 9 per cent.

Table 1: *Changes in public current expenditure on education, 1961-1979*

	Due to:				of which:		
	$E/Y^1$	Transfer changes $E/TE$	Enrolment changes $B/I$	Demographic changes $I/N$	Cost changes $(TE/B)/(Y/N)$	relative prices	real relative inputs
National <sup>2</sup>							
1961-79	1.294	1.000	0.943	0.997	1.376	1.291	1.066
1961-71	1.029	1.000	0.967	1.023	1.041	1.159	0.898
1971-79	1.257	1.000	0.975	0.975	1.322	1.115	1.186
Vocational <sup>3</sup>							
1961-79	2.544	1.000	2.060	1.127	1.093	1.291	0.846
1961-71	1.929	1.000	1.906	1.063	0.952	1.159	0.822
1971-79	1.319	1.000	1.081	1.060	1.149	1.115	1.031
University <sup>4</sup>							
1961-79	2.346	1.287	1.325	1.366	1.240	1.291	0.960
1961-71	1.229	1.181	1.411	1.245	1.133	1.159	0.978
1971-79	2.884	1.090	0.939	1.097	1.094	1.115	0.982

Sources: *Census of Population, Department of Education Statistical Report, HEA Annual Reports, National Income and Expenditure, and Statistical Abstract*, various issues, and data kindly provided by the Central Statistics Office and the Higher Education Authority.

1. (E/Y) for 1979 divided by (E/Y) for 1961, etc. This column equals the product of the next four columns.
2. Excludes expenditure on teacher training colleges.
3. Full-time pupils only included. Includes Regional Technical Colleges.
4. Includes Trinity and the NUI Colleges only.

It is evident from the above, and Table 1, that while the most important factor explaining the increase in E/Y for national, vocational and university education combined for the period 1961-71 was the change in the enrolment ratio, the dominant factor in the 1970s was the increase in the cost ratio. Indeed, large increases in E/Y arising from changes in the transfer, enrolment or demographic ratio are unlikely for the foreseeable future. Thus, any fur-

2 For a more general discussion on the financing of third-level education, see Barlow (1981).

ther upward pressure on E/Y for education is likely to emanate from increases in the cost ratio. For this reason, it is worth looking more closely at this factor.

The cost ratio can be subdivided as follows:

$$\frac{TE/B}{Y/N} = \frac{TE/B \cdot P_E}{Y/N \cdot P_Y} \cdot \frac{P_E}{P_Y}$$

where  $P_E$  and  $P_Y$  are deflators for expenditure on education and GDP, respectively. Thus, changes in the cost ratio can usefully be attributed to changes in real expenditure on education relative to changes in real GDP per capita and movements in the price of education relative to movements in the price deflator for GDP. The latter is of particular interest, since it may have the largest influence on the cost ratio in years to come: largely because movements in it are probably least susceptible to control (see below). Indeed, a prediction of Baumol's model (1967) is that, because of the limited potential for productivity growth in services such as education, the ratio  $P_E/P_Y$  will increase without limit. A further prediction of this model (see Spann, 1977) is that the cost ratio will also rise without limit, if the income elasticity of demand for these services is greater, in absolute terms, than the price elasticity.

It is not possible, unfortunately, to test these propositions. Reliable estimates of price and income elasticities of demand for education simply do not exist. This largely arises from the fact that no satisfactory measure of  $P_E$  is available, which in turn means that the cost ratio cannot, in practice, be satisfactorily subdivided in the manner outlined above. In the national accounts,  $P_E$  is calculated on the assumption that no productivity gain takes place in the provision of education: an implicit acceptance by national accounts statisticians of Baumol's basic premise. The important point is that an hypothesis *cannot* be tested using data which are constructed on the assumption that the hypothesis is correct.

This problem is not unique to Ireland as the methods of deflating public consumption in other countries are very similar. Ideally an attempt should be made to assess performance and real output within the public sector, thus obtaining indices of real output that would account for changes in productivity. This exercise, though, poses almost insurmountable problems, and, thus, for practical purposes the present methods of deflating expenditure on public consumption are likely to persist for some time. However, in the case of education, these may not be all that inaccurate.

Education is a classic example of a "non-progressive" sector as defined by Baumol (1967), where labour is itself, for all practical purposes, the end product. Class size, or number of teaching hours expended per student, is often

taken as the critical index of quality and this implies limited acceptability of innovations such as teaching machines and closed circuit television. The teacher-pupil ratio in national education increased from 0.029 in 1961 to 0.0321 in 1979 (from 0.0615 to 0.0786 for vocational education) and one has to assume a commensurate increase in the quality of education provided to avoid the assumption of productivity decline in teaching. It is possible, though, that the changes in the teacher-pupil ratio were accompanied by more than commensurate changes in the quality of education or that, even with a constant teacher-pupil ratio, the appointment of more highly qualified staff and the introduction of new techniques lead to improvements in quality. None the less, the hypothesis of a marked adverse relative price effect for the provision of education cannot be discarded lightly.

Table 1 contains a breakdown of the cost ratio using the available data, i.e., data constructed on the assumption of no productivity growth in the provision of education. According to these data, movements in relative prices accounted for most of the changes in the cost ratio, with real relative inputs for vocational and university education showing an actual decline over the period 1961 to 1979. (These findings are in line with the evidence compiled for other countries by the OECD, 1976.) In this regard, two points should, perhaps, be stressed. First, the declines were in real *relative* inputs, not in the real absolute expenditure per student. Second, for reasons noted above, the relative price effect could be overstated, with a corresponding understatement of the real relative input effect.

Expenditure on public health care can be analysed in a similar fashion to that on public education, but data for Ireland are sparse and only adequately cover hospital care. None the less, the increase in the most important component of the identity for the purposes of this discussion — the cost ratio — can be estimated. Table 2 presents the relevant information for 1966 and 1979.

The data in Table 2 show that in every hospital type but one there were large increases in numbers of patients, accompanied by more than commensurate reductions in average length of stay. Thus, the total number of patient days fell. However, the increase in the nominal cost per patient week rose considerably in every hospital type. More significantly, the average cost per patient week relative to GDP per capita increased from 3.386 in 1966 to 6.929 in 1979, an increase of 104.6 per cent. This is a quite dramatic increase in the cost ratio, considerably greater than that for any of the sectors of education. It is not totally out of line, however, with the experience in some other countries: between 1960 and 1974 it increased by 107.8 per cent in West Germany, 71.8 per cent in Sweden (1963-74), 81.1 per cent in the UK (1962-75) and 65.8 per cent in the United States (1960-74). On the

Table 2: *Cost of hospital care, 1966 and 1979*

Hospital type	Number of patients (000s)		Average duration of stay (days)		Cost per patient week (IR£)	
	1966 <sup>1</sup>	1979 <sup>2</sup>	1966	1979	1966	1979
Voluntary General	84.9	167.6	15.1	10.1	29	306
Special	63.5	87.8	19.0	8.6	21	287
County	78.0	129.9	24.5	8.3	23	287
District	27.1	23.5	12.1	7.8	15	103
Fever	8.7	6.7	19.4	35.3	18	240
Orthopaedic	4.8	10.7	19.4	14.8	19	216
Regional	52.9	93.5	42.5	17.8	19	357
Average (weighted) <sup>3</sup>					23	295
Cost per week/ GDP per capita					3.386	6.929

Sources: 1966 data from *Outline of the Future Hospital System* (Report of the Consultative Council on the General Hospital Services), Stationery Office (pr. 154), Dublin [1968]. 1979 data from *Statistical Information Relevant to the Health Services* (Department of Health), Stationery Office, Dublin, 1981.

1. (Daily number of beds occupied) x (365) ÷ (average duration of stay).

2. Number of patients discharged.

3. By number of patients.

other hand, the cost ratio decreased in Australia (1962-75), Austria (1962-74) and Finland (1962-75) (see OECD, 1977).

Increases in the cost ratio, then, are likely to have been the major factor underlying the very large increase in Ireland in the share of public expenditure on health in GDP in the last fifteen years. It would be interesting to know how the rise in the cost ratio can be apportioned between increases in relative price and real relative inputs. As with education, however, no satisfactory price indices for health care exist, and, as such, the cost ratio cannot be subdivided. Even assuming – for reasons similar to those for education – a marked adverse relative price effect, though, the increase in real relative inputs to hospital care may have been very large, a phenomenon that needs careful examination and explanation.

### III CONCLUSION

This paper has identified what the contributions of transfer, enrolment, demographic and cost changes were to the increases in the shares in GDP of current public expenditure on some major areas of education between 1961 and 1979. This, clearly, is only a starting-point to the analysis of the

growth in the share of educational expenditures in GDP. However, it is an important starting-point, since it matters considerably to an explanation of the growth in this share whether the increase was due to an increase in the transfer, eligibility, demographic or cost ratio or some combination of these.

The data suggest that since 1971 changes in the expenditure share for education have been largely explained by changes in the cost ratio: this was probably the case for the expenditure share for health care as well. Increases in the cost ratio are likely to continue as the major source of increase in these expenditure shares in the decades ahead and this raises a number of interesting questions, the answers to which require further study. First, how is the increase in the cost ratio apportioned between increases in relative price and real relative inputs? Second, is the increase in relative price unavoidable, i.e., is slow productivity growth in the provision of education and health care inherent in the nature of these services or does it result from institutional barriers to change? Third, what factors explain the increase in real relative inputs to education and health care?

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