The Cost of Residential Care for the Elderly: The Effects of Dependency, Design and Social Environment+

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ABSTRACT

Despite the important role played by cost considerations in policy decisions regarding services for the elderly there has been relatively little reliable research on this topic. A large nationally representative survey of old people's homes conducted by the Personal Social Services Research Unit in England and Wales in 1981 provides a firm foundation for the careful examination of the cost of residential care. Focussing on residential homes in the public sector, the cost function analyses reported in this paper have a number of policy implications. The empirical results help to explain cost inflation and allow the prediction of future cost trends, they inform "balance of care" discussions and inter-authority and inter-sectoral comparisons, and they provide evidence on the cost implications of scale, group-living design, day care and sheltered housing. Finally, the relationship between cost and social environment (a central component in any quality of care assessment) is examined. The results suggest that there is no significant association between the two.

Introduction

The real cost of residential provision for the elderly has risen steadily throughout the post-war period in a number of countries, with particularly dramatic increases being experienced in the last ten years. In some countries these recent high rates of cost inflation were an almost inevitable consequence of the failure of service provision generally to grow as fast as the dependent population. For example, Webb and Wistow[1] argue that the British government's present allowance of two per cent annual growth in public expenditure on the personal social services (of which the largest single component is expenditure on residential care for the elderly) is insufficient to provide even a constant level of service outputs within the present demographic context. The private sector has expanded very rapidly in the last five years, but has not made up the deficit. Furthermore, it is not clear that the present range of alternatives to residential provision has yet developed coherence or cost-effectiveness. In the USA the introduction of Medicare and Medicaid, and a generous and lax reimbursement system, have been rather more immediate sources of cost (or price) inflation,[2] particularly since over sixty per cent of nursing homes are proprietary,[3] although these influences are also the combined effects of an ageing population and an economic recession.

Despite these high rates of cost inflation, and despite gloomy projections of resource constraints for at least the next few years, there is a surprising dearth of reliable and relevant research on the costs of caring for the

dependent elderly. Indeed, the growing cost information needs of policy makers in many countries have been fed, although by no means fully met, by firms of management consultants and acountants, and not always with the level of commitment or understanding that policy making requires. This neglect of the cost needs of policy makers by social researchers is all the more suprising given the recent interest in the evaluation of care. The analysis of costs follows immediately from the evaluation of effectiveness, and the evaluation of what is and what is not an effective arrangement of care (in so far as it has an identifiable influence on client and other outcomes) is central to so many research studies.[4] The production of welfare perspective on care demonstrates how the often vexed question of cost-effectiveness can be framed in such a way as to place quality of care and client quality of life at the forefront of an analysis.[5] The production of welfare perspective is both comprehensive and flexible and has previously been described in the pages of this Journal, and used to place the examination of costs in context, and we do not propose to repeat that detailed description here.[6] Briefly, the production of welfare approach starts from the observation that resource inputs (staffing levels, capital and other physical resources) combine with non-resource inputs (characteristics of the social environment, of clients and of staff) to "produce" final outputs (changes in the well-being of clients and their "significant others" over and above those changes that would have occurred in the absence of care). Resource inputs have associated costs, whilst the non-resource factors are essentially costless, although often highly correlated with the resources.

In this paper we apply this conceptual framework to the question of differences in the cost of residential care between homes and areas, basing our empirical investigation on a nationally representative sample of local authority (public sector) old people's homes. This allows us to provide answers to a number of crucial questions for policy and practice. What, for example, are the cost implications of the steadily increasing dependency of old people's homes' residents? To what extent are the high costs observed in some areas of the country attributable to factors beyond their immediate control? What effect will changes in the design recommendations for new homes have upon operating costs? If the group living design is felt to be a more satisfactory arrangement for the well-being of residents, what effect does it have on cost? Are smaller homes necessarily more expensive? Does it make sense to try to keep homes at full occupancy? As old people's homes take on further responsibilities for non-residential provision (by providing facilities for day care, supervision of sheltered housing facilities, acting as "meals centres" and so on) are they receiving adequate "resource compensation" to ensure that resources are not taken away from residential care? Can local authority homes cut their costs by recruiting more volunteer staff? Is high cost associated with high quality care? In providing answers to these questions, we are not suggesting that cost considerations should dominate social care policy. However, if available services are to be employed efficiently and equitably in the pursuit of client well-being then the cost implications of policy and practice decisions must not be ignored any longer.

The Theory of Cost Variations

The very wide cost variations observed between homes and between local

authorities, commented upon with increasing regularity by social services committees and by the Audit Commission, do not appear to have narrowed. The statistics published annually by the Chartered Institute of Public Finance and Accountancy provide an indication of the extent of cost variations between English and Welsh authorities. A selection of cost figures for three different years is presented in table 1. We should first note immediately that such highly aggregated figures provide a poor basis for policy, for they are incomplete and possibly unreliable "accounting costs". Certainly they do not measure the full opportunity costs of services.[7] Slight variations in accounting conventions and the inevitable errors of calculation undoubtedly explain some of these inter-authority cost differences but they do not explain the full range of variation. Why is it, for example, that residential care in one authority can be less than half as expensive as the apparently equivalent service in another? Is it the case that one is giving better "value for money" or is it that they are providing markedly different types of care in markedly different local circumstances? As Herbert Laming, former President of the Association of Directors of Social Services, remarked upon reading a recent report commissioned by the Audit Commission: "We need to be sure like is being compared with like... We are attempting to understand more fully the reasons for differences in costs".[8]

TABLE 1 ABOUT HERE

There are clearly a great many possible explanations for these wide variations in average cost. It might be argued that some local authorities are forced to pay higher salaries because of shortages of suitable staff, or that they require higher staff-resident ratios because of high levels of resident dependency, or because they have a number of small homes which are "uneconomical" to run. How then can we test these hypothesised influences on the cost of care and how are we to reconcile the apparently conflicting influences? There exist a number of different techniques to explain cost variations,[9] but easily the most powerful and manageable technique to use in studies of social care is statistical cost analysis, which directly and informatively provides an empirical representation of the cost function.

A cost function is the estimated relationship between, on the one hand, the cost of providing a service and, on the other, the outputs of that service and the prices of the resources employed. Other factors such as the "size" of the care unit, the characteristics of clients, the arrangements and organisation of care will also have cost-raising implications and can be included in the empirical relationship. The basic aim of a cost function analysis is to estimate the relationship between total or average cost per resident and the hypothesised influences in an attempt to 'explain' the observed variations in cost. 'Explanation' is achieved through the statistical technique of multiple regression analysis, applied to a sample of observations on care units, clients or local authorities. Given the level of output, the input prices, the state of technology and so on, the function gives the "expected" cost of production, that is, the average level of either total or average cost given these particular levels of the cost-determining factors. The form of the function is determined by the interaction of a priori theoretical considerations and empirical experiences.[10]

The empirical work reported in this paper was based on data collected in a survey of old people's homes conducted in the autumn of 1981. The survey is only described in outline here; a full description is provided by Darton.[11] The PSSRU survey was an omnibus study, designed to provide information about a number of aspects of residential care for the elderly. Whereas considerable interest has been shown in the economics of education and health, this has not been the case for the personal social services. Studies of the costs of British old people's homes have all had to graft separately collected cost information on to data collected in studies concerned with other aspects of care.[12] The PSSRU study dovetailed comprehensive collections of cost and home information in order to undertake the most thorough cost function analysis yet conducted for old people's homes, or indeed for other social care services.[13]

Information was collected from old people's homes and local authority departments using postal questionnaires. The questionnaires included topics covered in the 1970 DHSS Census of local authority and voluntary homes[14] and in the (unpublished) 1971 DHSS sample survey of private homes. The questionnaires were tested in a pilot study in Suffolk in 1980[15] and in a pilot study of private homes in East Kent in the winter of 1980-81.

In the spring of 1981, 110 of the 116 local authorities in England and Wales with responsibilities for providing personal social services were approached to ascertain interest in participation in the survey. The six authorities excluded were Suffolk (our pilot authority), the City of London and four authorities

known to be involved in another study at the same time. Forty-two of the 98 authorities replying to our invitation expressed interest in participating. A stratified sample of thirteen of these 42 authorities was selected on the basis of a classification of local authorities contained in Local Authority Planning Statement returns to the DHSS.[16] The sample selected comprised five London boroughs, four metropolitan district councils and four non-metropolitan county councils. One of the selected London boroughs was forced to withdraw during the fieldwork stage. With the assistance of local authority liaison officers, information relating to 31st October 1981 (the "survey date") was obtained from all local authority homes and from as many voluntary and private homes in the twelve areas as could be persuaded to participate.

The local authority social services department provided baseline information about other (non-residential) services provided for the elderly by the authority. Cost data conforming to the categories of information contained in the Revenue Outturn returns by local authorities to the Department of the Environment were provided by finance departments for the financial years 1980-81 and 1981-82. Other information collected for the survey data base included ward library data from the 1981 Population Census, information about National Health Service hospital provision in the health districts covered by the authorities participating in the survey, and some miscellaneous social indicators obtained from the Department of the Environment.

TABLE 2 ABOUT HERE

A summary of the response to the survey is shown in table 2. The representativeness of the sample of twelve authorities and the achieved sample of 456 homes was examined by comparison with the information provided in the DHSS statistics of residential accommodation. (The DHSS statistics relate to England, not England and Wales.) The distribution of types of home in the twelve authorities closely matched the distribution for England given in the DHSS statistics, but the achieved samples of homes in the private and voluntary sectors were under-represented due to non-response. The size distributions of homes within each sector for all the homes in the twelve authorities and for the achieved sample of 456 homes were very similar. Comparison of these size-distributions with those for England as a whole showed that the main discrepancies were that medium-sized homes (31 to 50 beds) were under-represented (50% rather than 58%) and large homes (51 or more beds) were over-represented (33-34% rather than 24%).

The Estimated Cost Function

The theoretical basis for the cost functions estimated from the data obtained in the survey of old people's homes was briefly described above.[17] For convenience, the potential cost-influencing factors that we examined in our analysis may be grouped into five categories:

(a) characteristics of homes,

(b) characteristics of staff,

(c) non-residential services provided by the home,

(d) characteristics of residents, and

(e) characteristics of the areas in which homes are located.

These categories include all but three of the potential cost-raising factors described in an earlier review of the cost-influencing features of old people's homes.[17] The three exceptions are social environment, efficiency and ownership. Some tentative explorations of the association between the first of these and cost is described later, while examination of efficiency essentially requires an analysis of regression residuals. The question of ownership does not arise since our analysis was restricted to homes owned by local authorities. However, the relationship between ownership and costs is briefly considered below and is the subject of closely allied work by Judge, Knapp and Smith.[18]

The cost measure employed as the dependent variable in the cost function analysis was defined as gross expenditure on manpower and running expenses for the financial year 1981-82, divided by the number of beds normally in use. The expenditure figures correspond to those given in aggregate in the Revenue Outturn returns from local authorities to the Department of the Environment for each financial year, and were available for eleven of the twelve local authorities. Gross rather than net costs were employed because the latter are determined almost entirely by charging policies. Capital costs were excluded because the information available from local authority acounts gives depreciation figures (debt charges) which are distorted by such things as the original construction costs (not reflated), the method of depreciation costing adopted, the age of the home and the method of financing.

The criteria for choosing between total cost and average cost per resident as

the dependent variable are described elsewhere.[19] Errors of measurement in the deflating variable (the denominator of the average cost expression) can result in biased and inconsistent estimates of the regression coefficients when an average cost measure is employed. Total cost functions are more susceptible to multicollinearity and heteroscedasticity, reducing the precision of the estimates of the regression coefficients. The measures of home size obtained in the PSSRU survey had been subject to careful editing and checking with the liaison officers of the authorities concerned, minimising the likelihood of errors of measurement. This consideration, combined with ease of presentation, led to the use of an average cost measure. The influence of potential cost-raising factors on the average cost was examined by multiple regression analysis using ordinary least squares estimation. Variables were included in the regression equation if their regression coefficient attained the 0.05 level of significance. For groups of related variables, such as the proportion of residents in different dependency categories, the most parsimonious grouping of the categories was used, consistent with the criterion of statistical significance.

Applying these criteria we eventually iterated to the "best" equation presented in table 3.[20] The equation explains 76 per cent of the observed variation in average cost between homes, and the consistency of performance of the various explanatory variables throughout a carefully constructed series of regression equations provides good grounds for confidence in the result. This is a very robust cost function. Examination of the residuals from the equation revealed no serious departures from the assumptions underlying the uses of the regression model.[21]

TABLE 3 ABOUT HERE

In order to explain the particular form of the equation that was eventually chosen as the most satisfactory representation of the cost function, and to describe some of the implications for policy that follow from it, we shall now employ the fivefold classification of the cost-influencing factors introduced earlier. There are, however, some policy implications which pervade all or most of these five categories, and we therefore consider these separately.

Characteristics of Homes

In the examination of the cost-output relationship, earlier work has made the distinction between the volume and the rate of production. We did not have final output data in this study, but measures of both of these concepts for intermediate output[22] were found to have cost consequences. Volume was represented by the number of beds normally in use. The rate of production was measured by the occupancy rate and also by measures of resident turnover (see below). The occupancy rate was defined as the ratio of the number of residents in the home on the night of the survey, including residents temporarily absent, to the number of beds normally in use. The relationship between average cost and the level of output or scale of activity indicates the presence or otherwise of economies and diseconomies of scale and so, ceteris paribus, the cost-minimising size of a facility. Our estimated cost function makes the important distinction between homes designed on the group-living principle and others. Homes were categorised as group-living homes if residents ate, slept and mainly sat separately from other groups or residents, and as semi-group homes if only the bedrooms and some or all of the sitting space were arranged

for groups of residents.[23] Semi-group homes did not exert any separate influence on cost and were therefore included in the "others" category. For both types of home average cost displays a distinct U-shape when plotted against scale. Operating costs are minimised (other things being equal) at a scale of 74 beds for homes designed on the group-living principle and at the smaller scale of 69 beds for other homes (including semi-group homes), although average costs do not vary a great deal over a fairly wide medium-size range (figure 1). In the sample of homes used for our analysis, average scale was 45 beds in group design homes and 46 in the remainder. The empirical evidence makes it clear that medium-size homes are the cheapest to run (in the public sector at least), but we should also remember that larger homes have lower capital costs per place. Of course, there are other factors to take into consideration before the "optimal" size of a residential home can be decided, although to date the evidence on the advantages and disadvantages of large scale is equivocal.[24] The cost-scale relationship is thus similar to the curvilinear, U-shaped, relationship typically found between average cost and volume of output in social care contexts.

FIGURE 1 ABOUT HERE

Group-living homes were found to have slightly higher costs than non-group homes. The cost implications of group-living were also found to be related to home size, with group-living homes being more expensive than other homes for small establishments, and cheaper for large establishments (figure 1). The costs of group-living were also related to whether the residents of the home were all of the same sex or of both sexes (see below), but no significant interaction was found between group-living and dependency.

There are many costly resources, principally staff resources, which are geared to a particular level of operation and which cannot easily be adjusted to short term changes in occupancy. If a home is temporarily under-occupied, having more spare places than planned, then we would expect average cost per resident to be higher than usual. This is borne out by our results which indicate that average cost is minimised, ceteris paribus, in homes that are completely full. However, the cost-occupancy relationship is such that ten per cent under-occupancy of a home raises cost per resident week by less than five per cent.

All homes in the survey did at least some laundry on the premises. Not unexpectedly, significantly higher average costs were found for the thirty homes which did all their laundry at the home.

Other physical characteristics of the home examined in the regression analyses were design features. A dummy variable identifying purpose-built homes was incorporated together with the proportions of beds not on the ground floor which were and were not reached by lift. These variables were strongly intercorrelated. The regression coefficient for each variable examined individually did not reach the criterion of statistical significance required, and the coefficient on each variable was of the opposite sign to that expected. Consequently these design variables were not retained. Provision of self-contained accommodation for staff was also examined as a potential cost-raising factor, but was not found to be statistically significant.

Characteristics of staff

It is often remarked that some care units are more expensive than others

because they have higher staff-resident ratios. This is undoubtedly true but we should treat such remarks with a degree of caution for at least two reasons. First, staff-resident ratios tend to be higher, ceteris paribus, when residents are more dependent. Thus the true source of cost variation in this case is not the staff-resident ratio or staffing level, but the aggregate dependency of residents. The second reason for proceeding with caution is because staffing levels and costs measure the same thing - the resource inputs.[25] To use one to explain differences in the other, therefore, is tautological. Where it may be legitimate to attribute cost variations to differences in staffing is in relation to the characteristics of staff, and particularly their attitudes, perceptions, experiences and qualifications.

Two staff characteristics were examined in the regression equations, the proportion of supervising and care staff with qualifications as registered or enrolled nurses (nine per cent of such staff) and the proportion of supervisory and care staff with professional social work qualifications (two per cent of such staff).[26] The proportion of qualified nursing staff had a modest effect on average cost but its coefficient did not reach the specified level of statistical significance. The proportion of qualified social work staff was probably too low to have any impact in the regression equations.

The use of additional staff was measured by examining the impact of both students (on placements) and volunteer staff on average costs. The ratio of the number of volunteer staff to the number of paid staff (averaging four per cent) had, as predicted, a negative relationship with cost, but this effect was small and not statistically significant. The ratio of the number of students to the number of paid staff averaged only two per cent and was also not related to costs.

Non-Residential Services Provided by the Home

The services examined under this heading comprised day care within the home and the presence of an attached day centre, the presence of sheltered housing sharing staff or the facilities of the home, the availability of a minibus belonging to the home or a group of homes, and whether meals were prepared in the home for outside consumption, such as for a meals-on-wheels service.

For day care, day centres and sheltered housing both the number of places or dwellings and the use of home staff in the facility were tested for their impact on costs. Each of these factors had a positive impact on costs but only in the case of sheltered housing, for which twelve of the homes (six per cent) supplied staff, was there a significant effect on costs. In the case of day centres only two per cent of homes provided staff. The availability of a home minibus had a very small negative influence after taking account of the other cost-raising factors, and the provision of meals for outside consumption had a moderate positive effect, but neither reached the required level of statistical significance. Our finding that day care provision and the preparation of meals for outside consumption did not appear to raise the costs of residential care could mean that the staff and other resources used in the provision of these services are not included in the residential budget, or that local authorities expect home staff to undertake these non-residential tasks as an additional, non-compensated burden. This could have an adverse effect on the quality of care, although of course relatively few homes are involved.

Characteristics of Residents

An important feature of our estimated cost function is the association between

cost and dependency. We first examined the four-category measure developed by the DHSS following the 1970 Census of Residential Accommodation. This measure has been used in previous cost research.[27] The DHSS measure incorporates indicators of mobility, incontinence, confusion and self-care capacity to perform the functions of washing, bathing, dressing, feeding and using the WC. In addition, the proportion of residents with major behavioural problems and the proportion of residents with symptoms of depression, defined as "depression and guilt, sleep disturbance or loss of energy", were examined as potential influences on cost. The use of alternative measures of dependency, such as the Katz ADL scale and Booth's fifteen point scale, and the influence of individual elements in the dependency measure, did not improve the results. The ADL scale performed badly, whereas the Booth scale exhibited similar associations to those found for the DHSS measure, but was more complicated. Overall explanatory power was no better. The individual components of dependency which were consistently significantly related to cost were mobility, ability to use the WC, and confusion. It is the neglect of all confusion and mental state indicators by the ADL scale which accounts in large measure for its poor performance.

The relation between the dependency indicators and average cost, controlling for the other cost-raising influences, is displayed in figure 2. The third and fourth categories of the dependency scale were combined to even out the proportions in each category, the third category covering about eleven per cent of residents. The depression and behavioural problems variables did not have an

important influence on cost in addition to that exhibited using the dependency measure, the correlations with the proportion of residents in the appreciable and heavy dependency categories being 0.30 and 0.54. In addition to the relationship between dependency and costs, the inclusion of a variable weighting the number of beds in the home by the proportion of residents in the appreciable and heavy dependency categories showed that smaller homes faced relatively higher costs than larger homes when coping with more dependent residents (figure 2). Note that only five per cent of the homes in the sample had more than seventy beds.

FIGURE 2 ABOUT HERE

Resident turnover was measured by four indicators: the ratio of permanent residents admitted in the twelve months prior to the survey date to the number of beds normally in use, the ratio of permanent discharges to the number of beds, the ratio of short-stay admissions to the number of beds and the ratio of short-stay discharges to the number of beds. The permanent admission and discharge ratios were fairly highly correlated ($r=0.68$) and the short-stay ratios were almost collinear ($r=0.99$), but the correlations between permanent and short-stay measures were small. Each of the turnover variables had a positive impact on cost, and the best permanent and best short-stay turnover measures were retained in the equation. This is likely to reflect the additional cost associated with receiving a resident into the home, particularly to help him or her through this difficult adjustment phase, and with discharging a resident from the home. (An average short-stay measure was computed but did not perform better than the use of one of the two ratios.) The proportion of short-stay residents itself was very small at about one and a half per cent and did not have any appreciable impact on costs.

Homes which catered for both male and female residents, as measured by the sex of residents actually in the home on the survey date, were found to have significantly higher costs than single-sex homes. The effect on costs of the sex composition of the home was found to be related to group-living arrangements but not to home size. Mixed sex group-living homes were found to be substantially more costly than any other arrangement. However, only two group-living homes were single-sex. The relationship between dependency and group-living was also examined, but the inclusion of variables modelling the joint effect did not add to the explanation achieved with the separate variables.

Characteristics of the Areas in which Homes are Located

The characteristics of local areas examined in this study comprised a measure of labour cost (based on salary weighting for employees in London and surrounding authorities), other local characteristics hypothesised to affect input prices, and indicators of the relative ease of recruiting staff. The labour cost index was developed by the Department of the Environment for use in calculations of the Rate Support Grant. The index takes the value of 100 for authorities in which no salary weighting is paid and suitably higher values elsewhere. Previous analyses of the labour cost index suggested that it may not adequately reflect the higher costs of salaries and wages in the London and South-East authorities.[28] The variable was therefore retained as a regressor rather than used to deflate the average cost measure. As expected, the labour cost index had a significant effect on costs, its estimated coefficient suggesting an

average increase of £1000 for homes in London boroughs. Three other local area characteristics were examined, each computed from Small Area Statistics supplied for the 1981 Population Census: the unemployment rate, the female economic activity rate and a measure of population sparsity. Female economic activity and population sparsity were weakly related to cost. For the unemployment rate, a more substantial effect was found, but the regression coefficient was positive, contrary to hypothesis, and the variable was removed. Heads of homes were asked to state the ease of recruitment for each category of staff. We then constructed dummy variables which distinguished above-average difficulty in recruitment of supervisory, care and domestic staff, and examined their influence on cost. None of these variables had much effect.

Inter-Authority Cost Variations

An important reason for fitting a cost function is to ensure that costs are viewed in a proper context; that is, costs are compared only after the influences of extraneous factors have been taken into account. That is, it is wrong to talk of the cost of care without regard to the factors associated with it or predictive of it. This is crucial, for example, if we are to counter the wholly inadequate remarks often made about inter-authority differences. In our survey, actual average cost per resident week ranged from approximately £72 in County K to £106 in London Borough B, but we can see from the estimated cost function (table 3) that many factors beyond the immediate or even long term control of authorities have significant cost-raising effects. If we then

calculate the predicted costs for these two authorities we find them to be £76 and £105 respectively - the differences between them are almost entirely accounted for by the factors in our cost function. The remaining differences (the residuals) may then be attributed to different accounting conventions (although these should be minimal given the standardisation of local authority accounting procedures), to differences in omitted variables such as final output, and to variations in efficiency. The actual and predicted (or standardised) costs are presented in table 4. Standardised cost figures are useful for a number of other purposes. They are, for example, currently employed in the calculation of territorial need indicators. The cost estimates used by Bebbington and Davies[30] in this way could, for example, now be up-dated and improved using the cost function described earlier.

TABLE 4 ABOUT HERE

Inter-Sectoral Cost Differences

The most recent figures issued by the Department of Health and Social Security, for the year ending 31st March 1982, indicate that eleven per cent of the 117,000 residents aged 65 and over supported in residential homes by English local authorities were living in voluntary or private establishments. This proportion has declined slightly from a peak of 14 per cent in 1975-76. However, over the same period there has been a high rate of growth in the proportion of residents in voluntary and private homes whose fees are met,

partly or fully, by supplementary benefit payments. This may help to explain the remarkable expansion of the private residential care sector in the last decade. The number of registered places in private homes has almost doubled in this period, with most of the growth having taken place since 1976. Over the same period there have also been marked changes in the characteristics of the residents of these homes. Comparing the twenty per cent national census of private homes conducted by the DHSS in 1971 with the PSSRU survey of private homes in a representative sample in 1981 reveals that the average age of residents is now substantially higher, and on virtually every indicator of dependency, today's residents pose more problems for staff.[31]

Despite the historical significance of the private and voluntary residential sectors, relatively little is known about their performance when contrasted with the public sector. A crucial component of any inter-sectoral comparison is an examination of relative costs. However, most cost comparisons between voluntary, private and public providers have not taken adequate account of the factors known to be associated with differences in cost. The estimated cost function is ideally suited to overcoming these inadequacies. Judge, Knapp and Smith[32] use this approach in comparing private and public residential care services. The cost function reported in this paper and a "charges function" for private homes are used to "partial out" the cost-raising influences of resident dependency, home size, occupancy and so on. The subsequent comparison of standardised costs suggests that private home charges were lower than local authority costs. This result is consistent with much of the North American evidence,[33] although in <u>all</u> of the inter-sectoral studies conducted to date there remain unanswered questions about the outputs of the two sectors.

Balance of Care Considerations

Much has been written recently about "value for money" and the balance of care. Essentially, writers on these topics have been concerned with weighing up the resources required for alternative care services, the expected or known outcomes of those services and the characteristics and needs of relevant populations. The empirical bases of some balance of care studies have often been suspect. It is imperative to measure outcome sensibly and to ensure that the cost comparisons between services are made after removing those cost differences attributable to differences in clientele and so on. The "optimal balance of care" can only be contemplated in practice if we have information on marginal costs and these can usually only be obtained from a cost function.

One of the most frequently stated objectives of care of the elderly during the post-war period in Britain and elsewhere has been a preference for domiciliary or community care over residential care. The two main arguments for a policy emphasis on community rather than residential provision have been that elderly people prefer to live in their own homes and that this alternative is cheaper. However, care services are not discrete, but arranged along a continuum running from full self-support or the highly informal support provided by unpaid carers in the community to the most self-contained of residential establishments. As we move along the continuum so we take in different varieties and degrees of domiciliary and residential provision. Recent changes in the use of residential homes, developing their short stay, day care, and attached housing responsibilities, can all be interpreted as filling in gaps in the continuum of care. It is thus misleading to conduct research on "residential versus

community care", for this breaks the continuum and wrongly assumes independence of costs between settings. It could also encourage the examination of a more narrow range of outcome indicators than would be justified by the policy question, and encourage a focus on quite short time horizons within which the balance and mix of services for clients remains unchanged. Our estimated cost function can contribute to the balance of care debate in two ways. It ensures that comparisons between services are made only after standardising for dependency and other differences between clients, and it provides information on the apportioned costs of jointly provided services which form components of many packages of care: short stay and long stay residential care, attached sheltered housing, day care provided within residential homes and so on.

Cost Inflation

The high rate of cost inflation recently experienced by the residential care sector is demonstrated by the figures in table 5. Expressed in constant prices, the gross operating cost per resident week in local authority homes increased by an average of 2.7 per cent per year between 1972-73 and 1981-82. These inter-temporal variations, like the inter-authority and inter-sectoral variations in cost, have stimulated an awareness of the need for a proper understanding of the financial implications of current and proposed policies for the elderly. Over the postwar period there have been major changes in the design of residential homes, changes in the dependency characteristics of residents, changes in the range and variety of services provided by establishments, and changes in social environment. These have probably all had an impact on the well-being of clients, but will also have had a crucial influence on costs.

TABLE 5 ABOUT HERE

The estimated cost function allows us to be a little more specific about these likely sources of cost inflation, for we can examine how, for example, the changing level of dependency has raised cost.[34] Because we are currently examining cost inflation in more detail, and given constraints on space, we shall merely illustrate the potentiality here. In table 6 we present the sample mean values for all variables which are included in our cost function fitted to 1981 data and which were also covered by the DHSS census of residential homes in 1970. In both cases the mean values are based on the eleven post-1974 local authority areas. The figures provide a key to understanding cost inflation over the period 1970-81. For example, public old people's homes are now on average slightly smaller, accommodate a more dependent population, have a higher rate of turnover of residents, are more likely to be mixed sex establishments and no longer send their laundry out of the home. Our estimated cost function tells us that each of these inter-temporal differences will have raised the cost of care, and specifies how these various explanations compare with each other.[35]

TABLE 6 ABOUT HERE

Cost, Quality of Care and Social Environment

The production of welfare approach is based on the premise that evaluation and policy making require an examination of the association between the resources employed in the provision of care (measured in this case by their costs) and the outputs of care, holding constant the influences of the various non-resource

factors (resident and staff attitudes, social environments, and so on). The outputs of residential care for elderly people are principally of two kinds. Of primary important are the changes in resident quality of life which result from care, but it is also important not to ignore the benefits felt by others, especially residents' relatives and friends. These benefits include relief from the burden of care in the community and perception of the quality of care received by residents. There are, therefore, two reasons for being interested in the quality of care offered to residents. Quality of care is a determinant of output, and it directly influences the benefits enjoyed by those non-residents who care about residents, although in both cases it is of limited utility on its own.

Quality of care is poor and possibly dangerous as a measure of output. It is poor not only because we have very little information on its relationship with final output, but also because the holdall term 'quality of care' hides a myriad of other factors, each of which is quite possibly an important determinant of final output in its own right. To lump these factors together into a composite and often arbitrary single measure thus wastes a large amount of information of value to the policy-maker. Quality of care is a dangerous measure because, at first glance, it has all the appearance and attributes of a good output indicator: it is concerned with desired or welcomed activities, with social environment, with ways of life, with staff-resident ratios, and so on. Because of this concern with something other than, and presumably beyond, the purely financial or resource aspects of care, it may appeal to the researcher and

policy-maker. If so, the quest for information on the effects of residential care - principally on residents, but also on residents' significant others - may prematurely cease. A further source of disquiet about quality of care measures is that, whilst they may enter the utility functions of residents' relatives and friends, and of citizens generally, they may do so only because these non-residents believe that these indicators of good quality of care actually reflect good quality of resident life.

All of the most frequently cited quality of care scales[36] include indicators of the social environments or caring milieu. However, North American research has consistently demonstrated that the examination of the effects of differences in social environment on the well-being of residents requires a far more careful research design than any yet employed in British research on residential care of the elderly.[37] The starting point for many of the recent attempts to conceptualise and model the impact of residential environments is recognition and development of the seminal contributions of Kleemeier,[38] Lewin[39] and Murray.[40]

Lewin, for example, asserted that behaviour was a function of the relationship between a person and his or her environment. Murray also wrote of the relationships between person and environment, but emphasised the importance of an optimal balance between personal needs and environmental press. The social ecology model of Lawton and his associates is based on Murray's "need-press" or "competence-press" theory, emphasising the relationship between the elderly

individual's level of competence ("a diverse collection of abilities residing within the individual") and the environmental press.[41] Moos has similarly postulated a need-press model and has developed a series of "environment-measurement" instruments for virtually every kind of institutional setting, recently developing a Sheltered Care Environment Scale to evaluate settings for the elderly.[42] Thus, as Lawton[43] stresses, "the environment is only one component of a total behavioural system". It should therefore come as no surprise to discover that the results of empirical studies of the output-social environment relationship are equivocal. The direct or explicit assessment of the degree of 'environmental fit' or 'congruence' between the needs of the elderly resident and the demands (or 'press') of the environment provides a more powerful explanation of quality of life than does an assessment of environmental and individual characteristics separately.[44]

It was obviously not out intention in this study to test the validity of the competence-press model directly, but we were concerned to examine whether differences in the social environments of care (components of "environmental press"), considered in the context of differences in the dependency characteristics of residents (components of "individual competence"), were associated with differences in average cost. That is, do residential homes incur greater resource costs in order to provide supportive and stimulating environments for residents with reduced levels of competence? We examined seven dimensions of social environment, corresponding to those characteristics most frequently mentioned in the social work and gerontology literatures and central

to the competence-press theories. These seven were: regime (including social control and independence), motor control, privacy, stimulus and participation, communication and interaction, homogeneity and continuity. Because the purpose of this part of our study was to search for any cost-environment association, and because unidimensional social environment scales can be so wasteful of information about what is, after all, a multidimentional concept, we have kept these seven dimensions distinct in our empirical tests. We have also examined the cost-environment association independently of the other cost-determining factors. There are a number of reasons for this: social environment may itself be determined by cost and by the characteristics of residents and these intricate interdependencies would require more complicated estimation techniques. This would ordinarily cause no real difficulty, but the complex, multidimensional nature of social environment meant that such an approach could not be attempted at present.

TABLE 7 ABOUT HERE

The definitions of the seven dimensions are given in table 7. High values on each dimension indicate a "better" social environment in the sense that the features of residential care that they represent have been found or argued to be associated with good resident quality of life. The relationships between these social environment measures and average operating costs were then examined through multiple regression analysis. The results, summarised in table 8, suggest that higher-than-expected average costs are not related to

higher-than-average scores on the social environment or "quality of care" indicators. (The seven indicators together "explain" only 7% of the residual variation in average operating cost.) That is, subject to all the caveats mentioned here, it appears that high costs are not associated with high quality of care. This lack of association may reflect our inability to examine a competence-press model at the individual level, or may be indicative of a degree of organisational slack (a form of inefficiency) common to many "not-for-profit" organisations. This preliminary conclusion does not necessarily imply that additional expenditure on residential care will not generate better quality of care. It does emphasise that intermediate output indicators (such as quality of care) which have not been validated against final output measures provide a poor and possibly dangerous basis for policy argument.

TABLE 8 ABOUT HERE

Conclusion

Policy decisions regarding care of the elderly have always been based in part upon perceived costs and available cost information. Recently, the importance of costs in these decision making processes has grown, but the research response has been disappointing. Shortages of care resources have inevitably heightened concern about cost variations between services, agencies and care units. It is these variations which provide the basis for cost function examinations. The analyses of cost variations presented in this paper are based on a large and representative sample of public sector residential homes and on the experiences gained from earlier research with less comprehensive data sets. These analyses have allowed us to provide answers to a range of policy questions.

Notes

1. Webb, A. and Wistow, G., 'The personal social services: trends in expenditure and provision', Working Paper in Social Administration No. 5, Loughborough University.

2. See, for example, Kane, R.L. and Kane, R.A., 'Care of the aged: old problems in need of new solutions', Science, 200, 1978, 913-920; Jarrett, J.E. 'The relationship of cost variation, prospective rate setting, and quality of care in nursing homes: a hedonic examination', Review of Business and Economic Research, 1982, 67-77; Dusansky, R., 'On the economics of institutional care of the elderly in the US: the effects of change in government reimbursement', State University of New York at Stony Brook, 1983; Ruchlin, H.J., Levey, S. and Muller, C., 'The LTC market place: an analysis of deficiencies and potential reform by means of incentive reimbursement', Medical Care, 13, 1975, 979-991.

3. U.S. Department of Health and Human Services, Public Health Service, Office of Health Research, Statistics and Technology, Health Statistics, United States 1980, U.S. Government Printing Office.

4. See, for example, the collection of research in Goldberg, E.M. and Connelly, N. (editors) Evaluative Research in Social Care, Heinemann, London, 1981, and the research on the elderly reviewed in Goldberg, E.M. and Connelly, N., The Effectiveness of Social Care for the Elderly, Heinemann, London, 1982.

5. Davies, B.P. and Knapp, M.R.J., Old People's Homes and the Production of Welfare, Routledge and Kegan Paul, London, 1981.

6. Knapp, M.R.J., 'Cost information and residential care of the elderly', Ageing and Society, 1, 1981, 199-228.

7. Knapp, M.R.J., The Economics of Social Care, Macmillan, London, 1984, chapters 4 and 9.

8. Quoted in Community Care, 7th July 1983, p.4.

9. Koutsoyiannis, A., Modern Microeconomics, Macmillan, London, 1979.

10. See Knapp, M.R.J., op. cit., 1984, chapter 9.

11. Darton, R.A. The PSSRU Survey of Old People's Homes, PSSRU, forthcoming, 1984.

12. Wager, R.A., Care of the Elderly, Institute of Municipal Treasurers and Accountants, London, 1972; Davies, B.P. and Knapp, M.R.J. 'Hotel and dependency costs of residents in old people's homes', Journal of Social Policy, 7, 1978, 1-22; Knapp, M.R.J., 'Economies of scale in residential care', International Journal of Social Economics, 5, 1978, 81-92.

13. Work by two of our colleagues at the PSSRU is based upon a carefully integrated collection of cost and output data for elderly clients of the personal social services living in their own homes. See Challis, D.J. and Davies, B.P., Matching Resources to Needs in Long Term Care, Gower, forthcoming.

14. Department of Health and Social Security, The Census of Residential Accommodation 1970, HMSO, London, 1975.

15. Darton, R.A. and McCoy, P.V., 'Survey of residential accommodation for the elderly', Clearing House for Local Authority Social Services Research, 1981, 2, 23-41.

16. Department of Health and Social Security, Local Authority Personal Social Services, Summary of Planning Returns, 1977-78 to 1980-81, DHSS, London, 1979.

17. Knapp, M.R.J., op. cit., 1981.

18. Judge, K., Knapp, M.R.J. and Smith, J., The comparative costs of public and private residential homes for the elderly, Discussion Paper 289, Personal Social Services Research Unit, University of Kent at Canterbury, October, 1983.

19. Knapp, M.R.J., op. cit., 1984, chapter 9.

20. Of the original sample of 235 homes, ten were excluded because of a lack of financial or other data and seven were dropped because of low levels of occupancy at the time of the survey (less than 80 per cent) or because they had not been open for the full financial year.

21. It is also worth noting that thirteen of the 218 homes (six per cent of the sample) had standardised residuals with an absolute value larger than 2, and one home had a residual of 3.28.

22. On the distinction between final and intermediate outputs see Knapp, M.R.J., op. cit., 1984, chapter 3. See also Knapp, M.R.J., 'The outputs of old people's homes in the post-war period', International Journal of Sociology and Social Policy, 3, 1983, 55-85.

23. Compare Willcocks, D.M., Peace, S.M., Kellaher, L.A. with Ring, J., The Residential Life of Old People: A Study in 100 Local Authority Old People's Homes, volumes I and II, Polytechnic of North London, 1982.

24. Davies, B.P. and Knapp, M.R.J., op. cit., 1981, pp. 90-92; Weihl, H., 'On the relationship between size of residential institutions and the well-being of residents', The Gerontologist, 21, 1981, 247-256.

25. On this point see Birnbaum, H., Bishop, C., Lee, A.J. and Jensen, G., 'Why do nursing home costs vary? The determinants of nursing home costs', Medical Care, 19, 1981, 1095-1107.

26. These might also be related to the prices of staff inputs, although this interpretation should be made with some caution.

27. Davies, B.P. and Knapp, M.R.J., op. cit., 1978.

28. Unpublished work by R.A. Darton.

29. Knapp, M.R.J., op. cit., 1984, chapter 9.

30. Bebbington, A.C. and Davies, B.P., 'Territorial need indicators: a new approach', Journal of Social Policy, 9, 1980, 433-462.

31. Darton, R.A., 'Residential accommodation for the elderly, 1970-81', Discussion Paper 277, Personal Social Services Research Unit, University of Kent at Canterbury, 1983.

32. Op. cit.

33. Birnbaum, H., et al., op. cit. See also the literature reviewed in Judge, K., et al., op. cit.

34. The figures in table 6 clearly demonstrate that, using the DHSS four-category index, the aggregate dependency of old people's homes' residents has increased markedly over an eleven year period. The three-category DHSS index employed by two of our colleagues also reveals substantial changes in dependency. See Bebbington, A.C. and Tong, M.-S., 'Trends and changes in old people's homes: provision over twenty years', paper presented at DHSS Seminar on Residential Care for Elderly People, London, October 1983. Recent evidence from four local authorities collected over a two year period, using Booth's dependency measures, show no evidence of a contiuing upward trend. See Booth, T. and Phillips, D., with Barritt, A., Berry, S., Martin, D.N. and Melotte, C., 'A study of trends in dependency in local authority homes for the elderly 1980-82', Research, Policy and Planning, 1, 1983, 1-9.

35. Recent North American evidence on cost inflation is provided by Jarrett, J.E., op. cit.

36. The best known in the British literature is that of Townsend, P., The Last Refuge, Routledge and Kegan Paul, London, 1962.

37. See, for example, the critical review by Bland, R. and Bland, R.E., 'Recent research in old people's homes: a review of the literature', Research, Policy and Planning, 1, 1983, 16-24.

38. Kleemeier, R.W. (ed.), Ageing and Leisure, Oxford University Press, London, 1961.

39. Lewin, K., A Dynamic Theory of Personality, McGraw-Hill, New York, 1935.

40. Murray, H.A., Explorations in Personality, Oxford University Press, London, 1938.

41. Lawton, M.P. and Nahemow, L., 'Ecology and the ageing process', in Eisdorfer, C. and Lawton, M.P. (ed.), The Psychology of Adult Development and Ageing, American Psychological Association, Washington, 1973. See also Lawton, M.P., 'Environment and other determinants of well-being in older people', The Gerontologist, 23, 1983, 349-357.

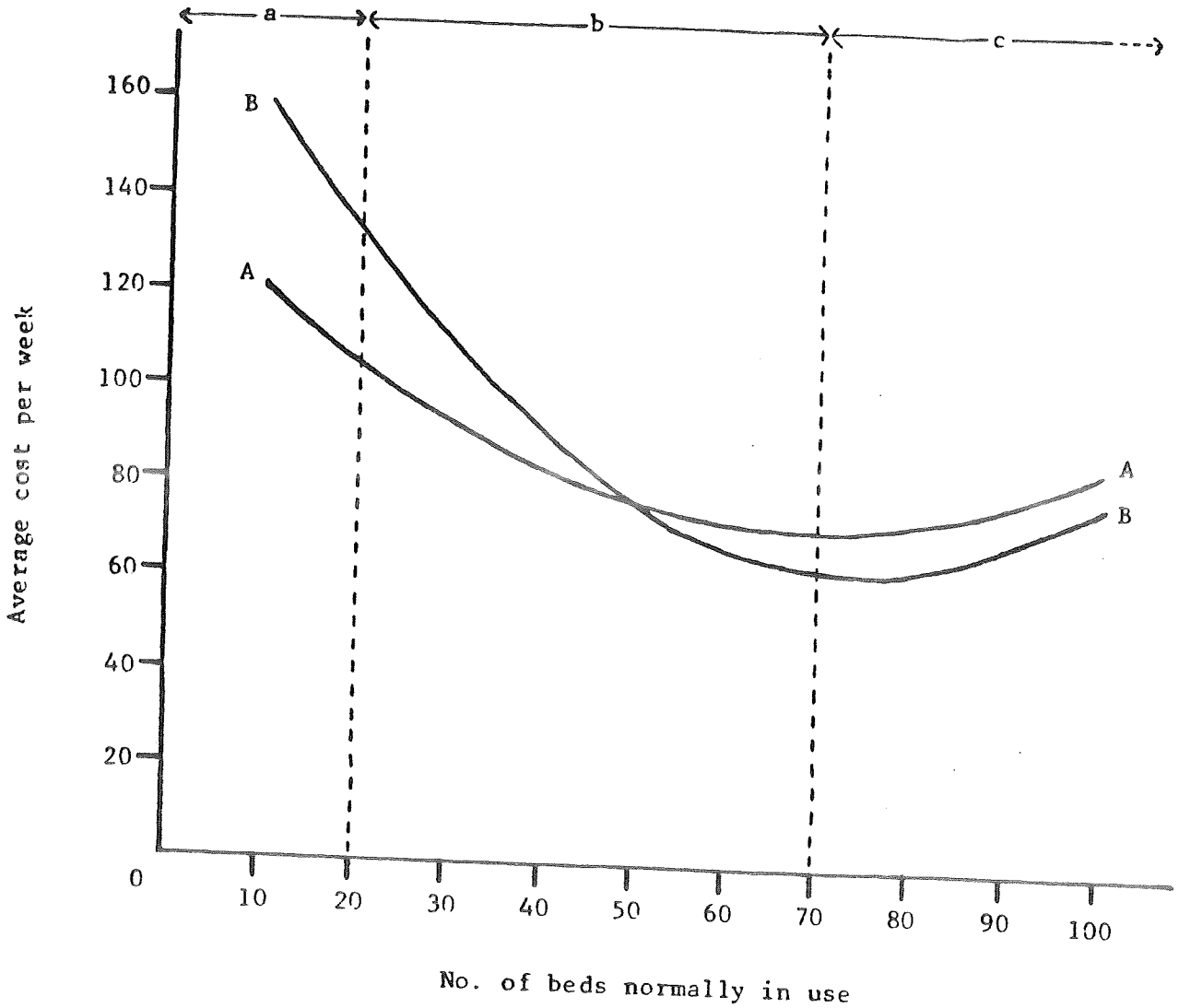
42. Moos, R.H. and Lemke, S., 'Assessing the physical and architectural features of sheltered care settings', Journal of Gerontology, 35, 1980, 571-583.

43. Lawton, M.P., op. cit., 1983, p.349.

44. See Davies, B.P. and Knapp, M.R.J., op. cit., 1981, chapter 5 for a review of theory and evidence on the "competence-press" model.

45. These dimensions, and particularly their examination in previous applied research, are discussed in Davies, B.P., and Knapp, M.R.J., op. cit., 1981, pp.132-146.

Figure 1 : Plot of Predicted Average Cost per Resident Week by Home Size by Group-Living Category

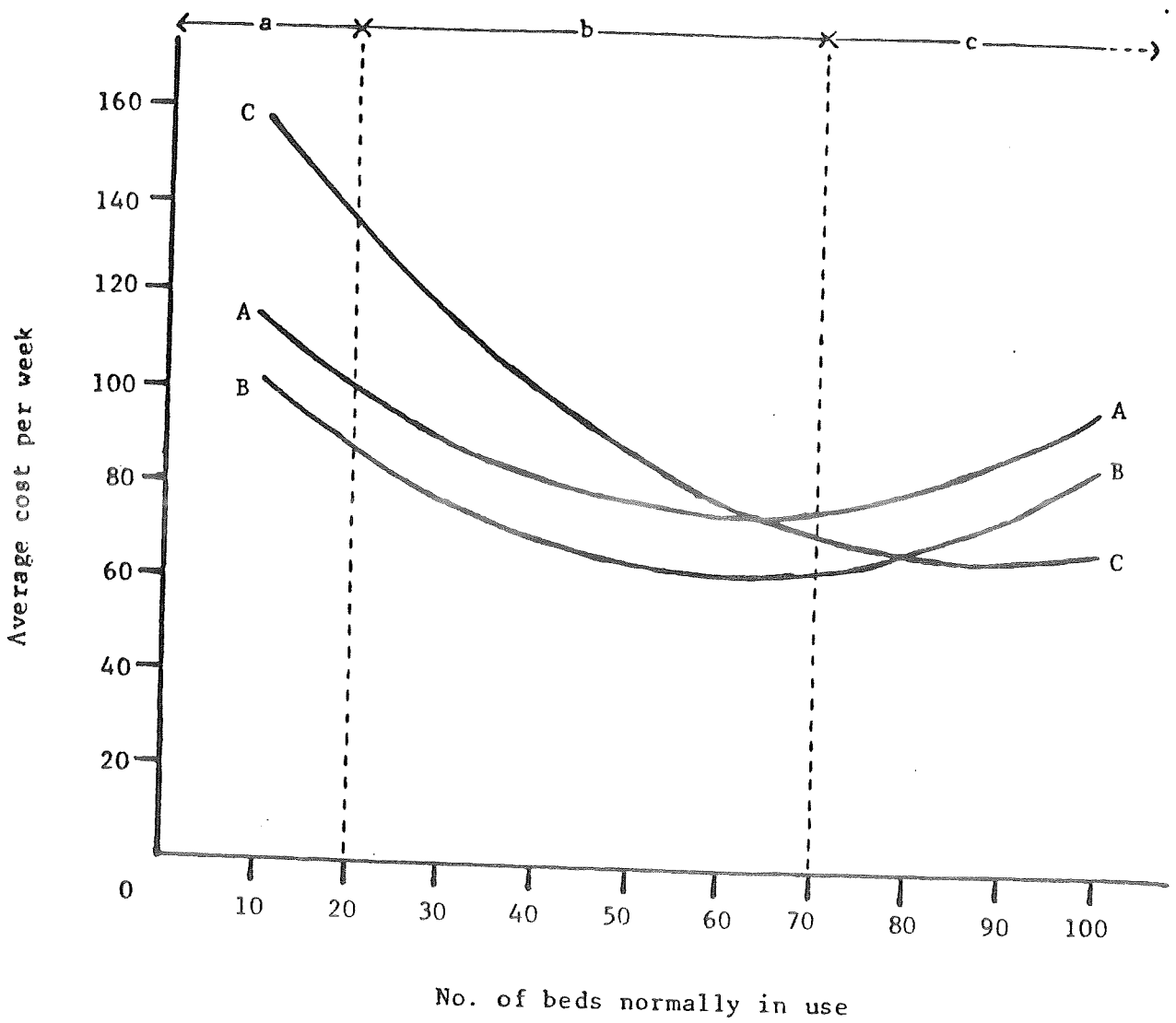


Key

a 2% of homes (min. = 9)
b 93% of homes
c 5% of homes (max. = 106)

A-A Not group-living
B-B Group-living

Figure 2 : Plot of Predicted Average Cost per Resident Week by Home Size by Dependency Category



Key

a 2% of homes (min. = 9)

b 93% of homes

c 5% of homes (max. = 106)

A-A Minimal dependency

B-B Limited dependency

C-C Appreciable or heavy dependency

Table 1 : Variations in the Operating Costs of Local Authority Residential Provision.

Year	MINIMUM COST Cost	MINIMUM COST Authority[4]	MAXIMUM COST Cost	MAXIMUM COST Authority[4]	Measure of variability[3]
1961-62	4.95[1]	Merioneth CC	9.12[1]	Worcester CB	184%
1974-75	30.76[2]	Suffolk CC	52.20[2]	Islington LB	170%
1981-82	77.97[2]	Oldham MB	174.52[2]	Merton LB	224%

Source Institute of Municipal Treasurers and Accountants/Chartered Institute of Public Finance and Acountancy annual publications of personal social services statistics (actuals).

Notes
1. Average operating cost per resident week, net of resident charges.
2. Gross average operating cost per resident week.
3. Defined as the maximum average operating cost divided by the minimum, expressed as a percentage.
4. This is the authority of ownership not of location.

Table 2 : PSSRU Survey of Residential Accommodation, 1981. Response Rate

Type of home	Number of homes	Number of respondents	Response Rate (%)	Number of residents
Local authority	236	235	99.6	10249
Voluntary	99	68	68.7	1678
Private	214	153	71.5	2080
All homes	549	456	83.1	14007

Table 3 : The Estimated Average Operating Cost Function

The estimated cost function indicates that average expenditure on manpower and running expenses per bed normally in use per resident week is equal to:

-552.826*		
+ 1.743**	x	Labour cost index
- 3.264**	x	Number of beds normally in use in group-living homes
- 1.604**	x	Number of beds normally in use in non-group homes
+ 0.024*	x	Number of beds normally in use in group-living homes, squared
+ 0.014**	x	Number of beds normally in use in non-group homes, squared
+10.725*	x	Percentage occupancy level (at 31/10/81)
- 0.058*	x	Percentage occupancy level (at 31/10/81) squared
+ 5.995*	if	staff of home have duties in sheltered housing
+ 4.358*	if	all laundry done within the home
+ 7.736*	x	Number of permanent admissions in 12 months to 31/10/81 per number of beds normally in use
+ 3.188*	x	Number of short-stay discharges in 12 months to 31/10/81 per number of beds normally in use
+ 4.927*	if	mixed-sex non-group-living home
+34.823**	if	single-sex group-living home
+63.294**	if	mixed-sex group-living home
-12.488**	x	Proportion of residents in limited dependency category
+51.714**	x	Proportion of residents in appreciable or heavy dependency categories
- 0.814**	x	Number of beds normally in use weighted by proportion of residents in appreciable or heavy dependency categories

Significance levels: * $0.01 < p \leq 0.05$, ** $p \leq 0.01$

F - value for equation: $F = 37.58$, $p < 0.0001$

$R^2 = 0.76$, Adjusted $R^2 = 0.74$

$n = 218$

Table 4 : Inter-Authority Differences in Actual, Predicted and Residual Operating Costs

Local Authority	Average Operating Cost per Resident Week[1]		
	Actual	Predicted[2]	Residual[3]
London Borough A	96.48	94.43	+2.05
London Borough B	105.70	105.23	+0.47
London Borough D	93.38	94.23	-0.85
Metropolitan District E	89.07	81.03	+8.04
Metropolitan District F	78.26	83.50	-5.24
Metropolitan District G	78.51	76.47	+2.04
Metropolitan District H	91.55	89.90	+1.65
Non-Met County I	82.43	82.65	-0.22
Non-Met County J	84.70	85.68	-0.98
Non-Met County K	71.83	75.51	-3.68
Non-Met County L	81.02	81.15	-0.13
All Authorities	83.46	83.46	0

Notes

1. Average cost per resident week in local authority homes in the area, averaged to give an authority figure.

2. As predicted by the cost function reported in table 3.

3. Actual average cost minus predicted average cost.

Table 5 : The Costs of Local Authority Residential Care for the Elderly, 1961-82

	Average Operating Cost per Resident Week [1]			
	Net Cost		Gross Cost	
Year	Current[2]	Adjusted[3]	Current[2]	Adjusted[3]
1961-62	6.88	55.53	-	-
1972-73	16.24	64.39	22.89	90.76
1976-77	41.07	80.72	55.93	109.93
1981-82	83.82	83.82	115.53	115.53

Source Institute of Municipal Treasurers and Accountants/Chartered Institute of Public Finance and Accountancy annual publications of personal social services statistics (actuals).

Notes

1. Average cost figures are approximations in so far as a small number of local authorities did not make returns to IMTA/CIPFA in each year. Capital costs are not included.

2. Actual expenditures in current costs.

3. Current costs deflated to 1981 prices using the general government final consumption implied deflator.

Table 6: Comparison of Cost-Related Variables for 1970 and 1981 for 11 Local Authorities (as defined on 1st April 1974)

Variable	1970	1981
Mean number of beds normally in use	51.13	45.71
Mean occupancy level[1]	0.97	0.96
Proportion of homes with staff with duties in sheltered housing	0.03	0.06
Proportion of home undertaking laundry in the home[2]	0.67	1.00
Mean admission rate of permanent residents[3]	0.28	0.33
Proportion of homes with male and female residents[4]	0.75	0.89
Proportion of residents of minimal dependency[5]	0.33	0.27
Proportion of residents of limited dependency[5]	0.40	0.35
Proportion of residents of appreciable dependency[5]	0.10	0.11
Proportion of residents of heavy dependency[5]	0.17	0.27

Source DHSS-provided tabulation of data from the 1970 Census of Residential Homes. PSSRU Survey of Residential Accommodation, 1981.

Notes

1. Ratio of number of residents to number of beds normally in use.

2. The cost function shown in table 3 included a dummy variable for whether all laundry was undertaken in the home (14% of homes). This information is not available for 1970.

3. Ratio of number of admissions of permanent residents in preceding 12 months to number of beds normally in use.

4. The cost function shown in table 3 included separate dummy variables for group-living and non-group homes for single-sex and mixed-sex homes. Group-living information was not available for 1970 and so the marginal sex distribution is shown.

5. DHSS 4-category dependency measure, defined in Davies and Knapp (1978). The appreciable and heavy dependency categories were aggregated for the cost function shown in table 3.

Table 7 : Definitions of Indicators of Social Environment

Regime = (0 + 1 if residents are not called in the morning
+ 1 if residents are not discouraged from smoking in their bedrooms or if there are no smokers
+ 1 if all or some residents have birthday parties
+ 1 if any residents keep their pension books or if this is not known) ÷ 4

Motor control = 1 if any residents, excluding wanderers, leave the home unaccompanied by a member of staff
= 0 otherwise

Privacy = (0 + 1 if residents use their bedrooms at any time of day, apart from during cleaning periods
+ 1 if all or some residents have their own locking cupboards or wardrobes
+ 1 if any residents bath themselves without help or supervision by a member of staff
+ 1 if staff do not help residents to dress in the morning, apart from giving help with buttons and zips
+ 1 if all or some residents have keys to their bedrooms) ÷ 5

Participation = (0 + 1 if residents help with jobs around the home
+ 1 if any residents have particular skills or interests that they pursue within the home
+ 1 if any residents have particular skills or interests that they pursue outside the home in the community
+ 1 if there are facilities for residents to make cups of tea
+ 1 if there are facilities for residents to prepare snacks and meals) ÷ 5

Interaction = (0 + 1 if transport is regularly available for residents
+ 1 if day care is provided in the home or if residents attended a day care centre attached to the home in the last 7 days
+ 1 if the nearest bus stop is under 1/4 mile from the front door of the home
+ 1 if the nearest shops are under 1/4 mile from the front door of the home
+ 1 if residents have access to a pay phone) ÷ 5

Homogeneity = 0 if a wing or unit is reserved solely for the elderly mentally infirm or if all beds normally in use are set aside for the elderly mentally infirm
= Proportion of residents suffering from severe confusion, including deterioration of personality or habits, if neither a wing nor all beds normally in use are set aside for the elderly mentally infirm

Continuity = 1 if permanent residents are allowed to bring furniture into the home
= 0 otherwise

Table 8: The Effects of Indicators of Social Environment on Average Cost

Social Environment Dimensions	Mean Values	Correlation with Actual Average Cost	Effect on Average Cost per Resident Week[1] Actual	Residual[2]
(Constant term)			103.65**	0.40
Regime	0.31	0.14	9.79	2.25
Motor control	0.98	-0.24	-30.66**	-5.86
Privacy	0.51	0.01	4.35	4.93
Participation	0.65	0.01	3.31	-1.77
Interaction	0.78	-0.09	-6.80	-0.96
Homogeneity	0.16	0.10	23.26*	-8.10
Continuity	0.94	0.07	4.00	5.57*
F-value for equation			3.88**	2.57*
R^2			0.12	0.08
n			213	213

Notes

1. Regression of actual (observed) and residual average cost on the seven dimensions of social environment, including a constant term.

2. The residual average cost is the actual average operating cost minus the average operating cost predicted by the cost function shown in table 3.

3. Significance levels are shown in the table as follows:

* : $0.01 < p \leqslant 0.05$
** : $p \leqslant 0.01$