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INTRODUCTION

Last year's report of the Royal Commission on Long Term Care (1) and the expected Government response have prompted fresh interest in the debate on how to fund long-term care. To inform this debate the Personal Social Services Research Unit (PSSRU) has conducted a study, funded by the Department of Health, of long-term care demand and finance. This has involved the construction of a computer model to make projections of likely demand and expenditures to 2031.

This article describes the model of long-term care demand and expenditure developed by the PSSRU. It then presents some of the results obtained and sensitivity analysis around them.

STRUCTURE OF THE PSSRU MODEL

The PSSRU long-term care model aims to make projections for England to 2031 of two key variables: the likely level of demand for long-term care services for elderly people and the costs associated with meeting this demand. A variant that could produce projections for the UK to 2051 was developed and used extensively to provide projections for the Royal Commission. The model is described in detail in Wittenberg et al. (2).

The model is cell-based (a macro-simulation model) and takes the form of a spreadsheet. It consists of four main parts. The first part estimates the numbers of elderly people with different levels of dependency by age group, gender, household type and housing tenure. It starts with projections of the elderly population by gender and 5-year age band. It currently uses the Government Actuary's Department (GAD) 1998-based projections (3). The effect of using variant projections can be investigated as discussed below. The projected population by gender and age band is divided into four dependency groups, based on ability to perform activities of daily living (ADLs) and instrumental activities of daily living (IADLs). Use was made of information from the General Household Survey (GHS) in respect of those in private households. Department of Health data was used on the numbers of people in institutional care.

The projected population by gender, age band and dependency is further divided by household type. GAD 1996-based marital status projections were used to divide the projected population into those who will be married or cohabiting and those who will be single and not cohabiting. GHS data were then used to divide the former group into those living with their partner only and those living in a larger household and the latter group into those living alone and those with others. GHS data and projections by the Anchor Housing Trust (4) were then also used to divide the projected population by housing tenure. This enables projections to be made of the numbers of dependent elderly people by age, gender, household type and housing tenure.

The second part of the model then estimates the levels of long-term care services demanded by type of service under current patterns of utilisation. It covers informal care by family and friends, formal non-residential care and institutional care. Informal help for dependent elderly people is included through analysis of GHS data on the basis of a relationship between receipt of informal care and dependency and household type. Receipt of formal non-residential services is also based on GHS analysis of the relationship between receipt of each service and age, dependency, household type, housing tenure and receipt of informal help. Institutionalisation is treated as a function of age, gender and household type, using Department of Health (5) and PSSRU survey (6) data. This enables projections to be prepared of the numbers of elderly recipients of long-term care services.

The third part of the model estimates total health and social services expenditure by multiplying projected amounts of services demanded by the unit costs of services (7). Finally, in the fourth part, expenditure is allocated to each funding source: health care expenditure to the NHS and social care expenditure is divided between social services and elderly people themselves (using data from a PSSRU survey of residential care (6) and Department of Health data). This enables projections to be made of public and private health and social services long-term care expenditures for elderly people.

BASE CASE

This acts as a reference case against which the effect of changes in assumptions can be investigated. It takes account of expected changes in factors exogenous to long-term care policy, such as demographic trends and trends in housing tenure. It holds constant factors endogenous to long-term care policy such as patterns of care and the funding system. The key assumptions of the base case are as follows:

- the number of elderly people by age, gender and marital status will change in line with the GAD 1998-based projections;
- age/gender specific dependency rates remain unchanged;
- an unchanged relationship between receipt of services and age, dependency and household type; and
- an increase in unit costs of 1% per year for social care and 1.5% per year for health care in real terms.

In the following sections, some key assumptions of the base case are allowed to vary in turn: life expectancy, dependency, household composition and real rises in care costs. The table at the end of the paper sets out the different projections obtained using the model by changing one assumption at a time.

ASSUMPTIONS ABOUT LIFE EXPECTANCY

Past population projections have tended to underestimate life expectancy, resulting in the underestimation of the numbers of very elderly people (8). The new 1998-based population projections (3) are substantially different than the 1996-based projections. For example, according to the 1996-based projections, the numbers of people aged 65 and over will increase by 57% between 1996 and 2031, and the numbers of people aged 85 and over by 75%. According to the 1998-based projections, however, the corresponding increases will be 60% and 88%.

The GAD's higher and lower life expectancy variants to the 1998-based principal population projections have also been tested. The high life expectancy variant assumes that mortality rates will be falling by 1% per year by 2032 compared with 0.5% in the principal projection. The low life expectancy variant assumes mortality rates will be constant by 2032.

The first part of the table illustrates the impact of GAD's alternative assumptions. It shows that the numbers of dependent elderly people would increase by 54% under the low expectancy variant and 70% under the high life expectancy, compared to 62% under the principal projection (base case). Overall expenditure is projected to increase by 148% under the principal projection, by 133% under the low life expectancy assumption and by 162% under high life expectancy.

ASSUMPTIONS ABOUT FUNCTIONAL DEPENDENCY

The model uses as a measure of dependency the ability to perform activities of daily living (ADLs) and instrumental activities of daily living (IADLs). The elderly population was divided into four dependency categories: no problems with ADLs or IADLs, problems with IADLs but not with ADLs, problems with one ADL and, finally, problems with two or more ADLs or being in an institution.

Information from the 1994/5 GHS was used to breakdown the private household population into these four dependency groups. All those who reported either difficulty in conducting these tasks or inability to do so without help were regarded as having dependency. It would have been desirable to take account of cognitive impairment as well but the GHS does not include questions about it.

Information on the numbers of elderly people in residential, nursing home and long-stay hospital care were obtained from the Department of Health (5). The institutional population were combined with the most dependent private household elderly population. The proportion of the population who are dependent rises with age, from less than 20% of those aged 65 to 69 to over 50% of men and over 75% of women aged 85 and over. The proportion with dependency is higher for women than for men in each age band.

There are different views about whether age-specific dependency rates can be expected to rise, fall or remain broadly constant in the future (9, 10). Constant age-specific dependency rates may be regarded as a neutral assumption. Yet, if the age-specific dependency rates remain constant while life expectancy rises, the number of years with dependency will rise as well as the number of years without dependency. A less pessimistic scenario for future dependency would be to assume that, as life expectancy rises, the number of years without dependency rise by the same amount and the number of years with dependency remains constant. A scenario on these lines was developed by Wiener et al. at the Brookings Institution (11). Their scenario involves moving the age-specific dependency rate for each five year age-band upwards by five years in order to match a five year increase in life expectancy. This involves an assumption that, for example, people aged 70 years in 2031 will have the same probability of being dependent as those aged 65 in 1998.

The summary table presents the impact of three alternative assumptions about trends in age/gender-specific dependency rates: rates increasing by 1% per year, rates decreasing by 1% per year, and the Brookings scenario. It shows that the numbers of dependent elderly

people would increase by 14% if dependency rates decreased by 1% per year or under the Brookings scenario, by 125% if rates rose by 1%, and by 62% with constant rates (base case). Overall expenditure is projected to increase by 84% between 1996 and 2031 with rates falling by 1% per year, by 73% under the Brookings scenario and by 222% with rates rising by 1% per year, compared to 148% with constant dependency rates. The impact of the Brookings scenario is similar to that of dependency rates falling by 1% per year.

ASSUMPTIONS ABOUT HOUSEHOLD TYPE

The projected elderly population were, as mentioned above, divided into four household types: living alone, single living with others, married/cohabiting living with partner only, married/cohabiting living with partner and others. The base case of the model holds constant the proportion of single elderly people who are projected to live alone. As the proportion of elderly people who live with their children has been falling, it seems possible that the proportion of single elderly people living with others will fall. A scenario was tested in which this proportion was assumed to halve, from around 20% currently to around 10% in 2031. This scenario would increase considerably the number of people projected to live alone in 2031. Yet, overall expenditure would increase by 154% under this scenario, compared to 148% under the base case.

ASSUMPTIONS ABOUT REAL RISES IN CARE COSTS

Expenditure projections are inevitably sensitive to assumptions about real rises in the unit costs of care, such as the cost of an hour's home care or a community nurse visit. If the unit costs of care remained constant in real terms, projected expenditure in 2031 would be only 61% higher than in 1996, as against 148% higher under the base case assumption (of unit costs rising by 1% per year for social care and 1.5% for health care). If, however, unit costs increased by 1% per year faster than under the base case, projected expenditure in 2031 would be 249% higher than in 1996. This shows that expenditure projections are arguably even more sensitive to assumptions about rises in real unit costs than to assumptions that affect the future volume of services demanded, such as future mortality, dependency and household composition rates.

DISCUSSION

These projections show that future demand for long-term care is sensitive to assumptions about future mortality, dependency rates and, to a much lesser extent, household composition. Projections of future expenditure are also sensitive to assumptions about real rises in the unit costs of care.

The projections presented here assume an unchanged relationship between age, gender, dependency, household type and housing tenure and receipt of care. No allowance has been made for changes in public expectations about quality, range or level of care or for changes in policy and practice concerning patterns of care. Rising expectations, associated with rising real pensioner incomes, could clearly have a substantial impact on future demand for long-term care.

The model assumes that the supply of long-term care will be able to expand sufficiently to meet the projected increases in demand. There must clearly be some doubt about whether the supply of informal care will expand in line with increasing demand for long-term care (12). If it does not, this could have considerable implications for demand for formal services. There may also be issues about the supply of formal care. The assumption in this analysis is that real rises in the unit costs of care of 1.5% per year for health care and 1% per year for social care will be sufficient to ensure the necessary supply to meet projected demand.

The findings suggest that policy-makers need to plan for uncertainty in future demand for long-term care. Future mortality and dependency rates, which are inevitably uncertain, could exert considerable impact on demand for long-term care. Consideration of any changes to the system for funding long-term care needs to take account of the extent of uncertainty about future public expenditures.

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TABLE

The table presents in summary form some projections obtained using the PSSRU model. The figures relate to projected numbers of elderly people (in thousands) or projected expenditure (in billions of pounds). The figures in brackets are the projected percentage increase between 1996 and 2031. Cells are left empty where the projections are the same as the base case.

	Projected numbers of elderly people	**Projected numbers with dependency**	**Projected number of recipients of home care**	**Projected number of people in institutional care**	**Projected total expenditure (billions of £)**
1996 estimates	7,751	2,498	509	404	9.8
Base case projection for 2031	12,432 (60%)	4,047 (62%)	755 (48%)	666 (65%)	24.3 (148%)
Life Expectancy scenarios					
Low life expectancy	12,013 (55%)	3,855 (54%)	716 (41%)	623 (54%)	22.9 (133%)
High life expectancy	12,836 (66%)	4,238 (70%)	794 (56%)	710 (76%)	25.7 (162%)
Dependency scenarios					
1% per year decrease in dependency rates		2,847 (14%)	624 (23%)	469 (16%)	18.0 (84%)
1% per year increase in dependency rates		5,617 (125%)	927 (82%)	885 (119%)	31.5 (222%)
Brookings scenario		2,848 (14%)	629 (24%)	415 (3%)	16.9 (73%)
Household composition scenarios					
Proportion of single people who live with others halves			794 (56%)	686 (70%)	24.9 (154%)
Real rise in unit costs scenarios					
No real rise in unit costs					15.7 (61%)
Unit costs rise 1% faster than base case					34.2 (249%)

Source: model estimates