AN ALTERNATIVE PREMIUM CALCULATION METHOD FOR CERTAIN LONG-TERM CARE COVERAGES

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ABSTRACT

Several probability models for the random amounts of needed long-term care are explained, and one model is used to provide an alternate premium calculation method for certain long-term care coverages. Approximations to the mean and variance of the future payments random variable are derived. Provision for adverse claim experience is contained in the premium technique. The model and method is illustrated with a complete example. Suggestions for reading in demographic journals, governmental pamphlets, medical journals, gerontology journals, and actuarial journals are provided.

1. INTRODUCTION

The actuarial profession, the general public, and the U.S. Congress are becoming very interested in the needs and costs of long-term care coverages for a rapidly growing older population. The Record, Society of Actuaries contains informative and lengthy records of panel discussions on such coverages [21], [23]. These discussions help establish the need for the private insurance industry to be doing research on how it can provide Long-Term Care (LTC) policies in an actuarially sound manner. They record some of the difficulties encountered in determining that LTC is needed, and the lack of data on which to base sound insurance policies.

This paper will provide several probability models for the random amounts of needed LTC, and use one of the models to provide an alternate premium calculation method for certain LTC coverages.

An example will be provided, which depends on research reported in a medical journal.

The last section provides suggested readings from demographic journals, governmental pamphlets, medical journals, gerontology journals, actuarial journals, and other sources.

2. PROBABILITY MODELS FOR LTC NEEDS

Consider a person whose current age is x, and who has just been issued a policy for certain LTC benefits.

Let $x + T_1$ = random time of first LTC;

$x + T_2$ = random time of first recovery;

$x + T_3$ = random time of second LTC;

$x + T_4$ = random time of second recovery;

...

$x + T_{2J+1}$ = random time of $(J + 1)$st LTC, where J is a counting random variable defined on 0, 1, 2, ...;

L = length of last LTC.

For practical purposes, J would be concentrated on the first 3 or 4 positive integers. Since it would vary from issue age to issue age, a more complete notation would be J(x), where x is the issue age. The future payments random variable Y_x for \$B per year, paid monthly, for periods in LTC, for an issue age of x, is defined by

$$Y_x = v^{T_1} B\ddot{a}^{(12)}_{\overline{T_2 - T_1}|} + v^{T_3} B\ddot{a}^{(12)}_{\overline{T_4 - T_3}|} + \ldots + v^{T_{2J+1}} B\ddot{a}^{(12)}_{\overline{L}|} \quad . \tag{1}$$

Although Y_x is a fairly complete model, it is too complicated for the present time. We will build a simpler model which relies on a random variable R_1, the random time for the first loss of independence in ADL, as well as T_1. Loss of independence in ADL does not mean paid long-term care. The 1982 National Long-Term Care Survey estimated that 4.6 million Americans (aged 65 and over) had limitations in ADL or instrumental activities of daily living (shopping, cooking, cleaning, managing money). Of that group, almost 70 percent relied exclusively on unpaid sources of home and community health care. (Source: [5], p. 271). Let us use $f_x(r,t)$ for the joint probability density function of R_1 and T_1 .

We will let

$$j_x(t_1) = \int_0^{t_1} f_x(r,t_1)\, dr \ , \ 0 < t_1 < \infty.$$

Then $\int_a^b j_x(t_1)\, dt_1 = P[a \le R_1 \le T_1 \le b],\ 0 < a < b < \infty.$

A simpler probability model than Y_x is

$$Z_x = V^{T_1} B \ddot{a}^{(12)}_{\overline{n(x,T_1)}|} \qquad (2)$$

where $n(x,T_1)$ is the random number of years of life after losing independence in ADL, and requiring LTC. The values of the random variable Z_x will be $\geq$ the values of the random variable Y_x because Z_x reflects the payments in a regular stream, and hence at earlier times (in many cases) than the interrupted stream of payments in Y_x. Thus, $E[Z_x]$, which represents a net single premium, is larger than $E[Y_x]$, the theoretical net single premium.

$$E(Z)_x = B\int_0^{\infty} v^{t_1} \ddot{a}^{(12)}_{\overline{n(x,t_1)}|} j_x(t_1)\, dt_1 . \qquad (3)$$

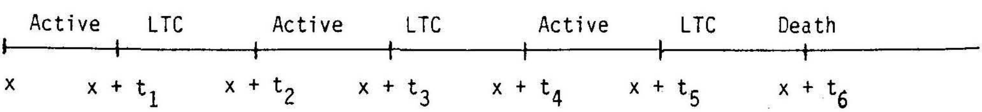
We can also calculate Var $[Z_x]$ (and hence Standard Deviation $[Z_x]$), a calculation which appears most difficult for the random variable Y_x.

$$E(Z_x{}^2) = B^2\int_0^{\infty} v^{2t_1} \left[\ddot{a}^{(12)}_{\overline{n(x,t_1)}|}\right]^2 j_x(t_1)\, dt_1 . \qquad (4)$$

In the usual way,

$$\text{Var}\ (Z_x) = E(Z_x{}^2) - [E(Z_x)]^2 .$$

A possible realization of $x + T_1$, $x + T_2$, ... could be portrayed as follows:



The occurrences at t_1, t_2, t_3, t_4, t_5, and t_6 are random events. Thus, this simple graph is only one of infinitely many possibilities. Company or intercompany data could permit the calculation of an average amount of aggregate length of LTC for a homogeneous group of policyholders. However, the estimations of the interruption times appears much more complicated. The statistical estimation of $n(x,T_1)$ is simpler, and as stated earlier, is a conservative procedure. For the graph above, $n(x,t_1)$ would be the sum of three intervals of LTC, and

$$v^{t_1} B\, \ddot{a}^{(12)}_{\overline{t_2-t_1+t_4-t_3+t_6-t_5}|} > v^{t_1} B\, \ddot{a}^{(12)}_{\overline{t_2-t_1}|} + v^{t_3} B\, \ddot{a}^{(12)}_{\overline{t_4-t_3}|} + v^{t_5} B\, \ddot{a}^{(12)}_{\overline{t_6-t_5}|} .$$

For the x's of practical interest,

$$E(Z_x) = B \sum_{k=0}^{C} \int_{5k}^{5k+5} v^{t_1} \ddot{a}^{(12)}_{\overline{n(x,t_1)}|} j_x(t_1)\, dt_1 , \qquad (5)$$

for $C \leq 10$.

By an approximation to a mean value theorem for integrals,

$$E(Z_x) \doteq B \sum_{k=0}^{C} v^{5k+2.5} \ddot{a}^{(12)}_{\overline{n(x,5k+2.5)}|} \int_{5k}^{5k+5} j_x(t_1) dt_1 . \qquad (6)$$

In a similar manner,

$$E(Z_x{}^2) \doteq B^2 \sum_{k=0}^{C} v^{2(5k+2.5)} \left(\ddot{a}^{(12)}_{\overline{n(x,5k+2.5)}|} \right)^2 \int_{5k}^{5k+5} j_x(t_1) dt_1 . \qquad (7)$$

As stated before, $E(Z_x) \geq E(Y_x)$, with strict inequality in most cases. Therefore, one approach to the net annual premium P for a face size of \$B would be $P = B\, E(Z_x) \big/ \ddot{a}_x^{LTC \,\&\, d}$. (8)

Such premiums would cease upon first long-term care claim, or death. Now

$$\ddot{a}_x^{LTC\ \&\ d} = 1 + \sum_{t=1}^{100-x-1} v^t \ {}_tp_x^{LTC\ \&\ d} \quad , \tag{9}$$

where ${}_tp_x^{LTC\ \&\ d}$ = P[(x) does not require paid LTC or die in t years].

A more conservative approach to premium calculations will now be described. Suppose that Q policies are issued, for $Q \geq 30$. If we assume independence of policies, and the same probability distribution, by the Central Limit Theorem,

$$P \left\{ \sum_{k=1}^{Q} Z_{x,k} \leq [Q\ E(Z_x) + 1.645\ (Q\ Var(Z_x))^{1/2}] \right\} \doteq 0.95 \ .$$

For the present, we will consider the variability of benefits, but not the variability in receipt of premiums. Then, the net annual premium P for a face size of \$B would be

$$P = B \, \frac{E(Z_x) + 1.645(Var\ (Z_x) / Q)^{1/2}}{\ddot{a}_x^{LTC\ \&\ d}} \quad . \tag{10}$$

See pages 170-173 of [1] for the genesis of this approach.

Suppose that we wish to obtain premiums for LTC coverage with a limit G on the total of daily benefits (e.g., three years). To accomplish this, we replace the values of n(x, j) in formulas (6) and (7) by minimum $\{n(x,j), G\}$ for all entries.

3. A MAJOR RESEARCH STUDY ON ACTIVE LIFE EXPECTANCIES AND ITS USE IN AN EXAMPLE

Ideally, actuaries would use company or inter-company data in computing premiums by formulas (6), (7), (8), (9), and (10), or some other set of formulas. At the present time, there is not an abundance of such data. Even when there is a greater supply of data sets, actuaries will gain by seeking information from various sources. In that spirit, a major research study will now be described and some of its results will be used for our purposes.

In 1983, Sidney Katz and co-researchers [16] invented a new concept, that of active life expectancy. The end point of active life expectancy can be defined as loss of independence in the activities of daily living (ADL), as measured by being independent in (1) bathing, (2) dressing, (3) transferring from bed to a chair, (4) eating, (5) walking, (6) using the toilet, and (7) getting outside. Katz et al developed tables of active life expectancy for the noninstitutionalized elderly people in Massachusetts in 1974 by applying life table techniques to data gathered from a carefully designed study. From the initial pool of eligible respondents (65 years of age or older), 1625 people were interviewed and ADL scores were constructed. The scores reflected the respondents' levels of independence in bathing, dressing, transfer, and eating. Although the scores were not based on all seven ADL, the hierarchical nature of the ranks was maintained, and the respondents overall functional statuses could be ordered. Comprehensive discussions on the development of the Index of ADL can be found in three papers co-authored or authored by Sidney Katz [13], [14], and [15]. In early 1976, data was gathered from a large subset of the original 1625 respondents, namely 89% of the 1625. From the 1225 people who in 1974 were independent in ADL, proportions were calculated of those who lost independence in ADL, or who died during the study period of 15 months. For their study,

$${}_nq_x = [P(x) \text{ loses independence in ADL or dies during the next } n \text{ years}]. \quad (11)$$

Table 1 of [16] is an abridged life table in which

ℓ_x = Number alive and independent in ADL at age x (12)

$_nd_x = \ell_x - \ell_{x+n}$ (13)

T_x = person-years lived independent in ADL (14)

$\overset{\circ}{e}_x = T_x / \ell_x$ = active life expectancy at age x . (15)

The proportions $_nq_x$ were obtained by applying the Reed-Merrell method [28], page 133, to the rates $_nm_x$ where $_nm_x$ = rate for loss of independence in ADL or death. The Reed-Merrell method used the equation

$_nq_x = 1 - \exp\left\{- n \cdot {_nm_x} - an^3 \cdot {_nm_x}^2\right\}$ where $a = 0.008$.

Table 1 of [16] did not allow for re-entry to the ℓ_x column of those who lost independence in ADL at an earlier age, but subsequently regained it. From 117 persons who were initially dependent in ADL in 1974, proportions were calculated of those who regained their independence in ADL 15 months later. The results are presented in Table 5 of [16].

The author did attempt to build a table in which two populations ((1) alive and independent in ADL, (2) dependent in ADL) were decremented by mortality, losing independence, regaining independence, and person-years alive and independent in ADL (T_x) developed. However, this led to some difficult questions with uncertain answers. One such question is: does the reentried function T_x divided by ℓ_x (alive and independent in ADL) really represent the active life expectancy at age x ?

As a consequence, the $_nq_x$ values from Table 1 of [16] were used. We needed to interpolate for values at age groups 85-89, and 90-94. These values are for the total population (males and females).

TABLE 1

Probabilities of Losing Independence in ADL or Dying

Age Group (x to x + 5)	$_5q_x$
65-69	0.29
70-74	0.40
75-79	0.41
80-84	0.57
85-89	0.76
90-94	0.94
95-99	1.00

Values from this table, and the relations

$$_5p_x = 1 - {_5q_x} ,$$

$$_{10}p_x = {_5p_x} \cdot {_5p_{x+5}} ,$$

$$_{5k}p_x = {_5p_x} \cdot {_5p_{x+5}} \cdot {_{5k-10}p_{x+10}} , \quad k = 3, 4, 5$$ were used to obtain Table 2.

TABLE 2

Probabilities of Not Losing Independence in ADL or Dying

$_{5k}p_x$

k\x	65	70	75	80
1	0.71	0.60	0.59	0.43
2	0.43	0.35	0.25	0.12
3	0.25	0.15	0.07	0.02
4	0.11	0.04	0.01	0.00
5	0.03	0.01	0.00	0.00

Let $_5q_x^{\ell.i.} = P[(x)$ loses independence in ADL in $[x, x + 5]]$. We will assume that $_5q_x = {_5q_x^{\ell.i.}} + {_5q_x^d}$ where "d" means death. Hence, $_5q_x^{\ell.i.} = {_5q_x} - {_5q_x^d}$. Table 15 of [30] gives Medicare probabilities of death for the same time period (1974) as the Katz et al study. Although the values are for exact ages 65.5, 66.5, ..., 99.5, we will use them as if they were for ages 65, 66, ..., 99. For simplicity, we created total population q_x values by averaging the male and female q_x values.

TABLE 3

Age Group	${}_5q_x^{d}$	${}_5q_x^{\ell.i.}$	Graduated ${}_5q_x^{\ell.i.}$
65-69	0.14	0.15	0.13
70-74	0.20	0.20	0.14
75-79	0.29	0.12	0.15
80-84	0.41	0.16	0.16
85-89	0.58	0.18	0.18
90-94	0.75	0.19	0.19
95-99	1.00	0.00	0.00

We will use the symbol ${}_{5k|5}q_x^{\ell.i.}$ for P[(x) retains independence in ADL for 5k years, and then loses independence in ADL in the subsequent 5 year period]. We computed values of ${}_{5k|5}q_x^{\ell.i.}$ from the products ${}_{5k}P_x\ ({}_5q_{x+5k}^{\ell.i.})$.

TABLE 4

${}_{5k|5}q_x^{\ell.i.}$

k\x	65	70	75	80
0	0.13	0.14	0.15	0.16
1	0.10	0.09	0.09	0.08
2	0.06	0.06	0.05	0.02
3	0.04	0.03	0.01	0.00
4	0.02	0.01	0.00	0.00
5	0.01	0.00	0.00	0.00

For our work, we will assume that

$$P[5k \leq R_1 \leq T_1 \leq 5k + 5] = {}_{5k}p_x \cdot {}_5q^{\ell.i.}_{x+5k} \cdot {}_5h_{x+5k}$$

for a suitable h function. In particular, we will use the following h function, which uses the fact that in 1987 almost 70% of those with limitations in ADL relied exclusively on unpaid sources of home and community health care, ([5], p. 271), but provides for an increase in the number of LTC policies, and recognizes the growth in the number of adult day care centers.

TABLE 5

Values for ${}_5h_{x+5k}$

k\x	65	70	75	80
0	.10	.20	.30	.40
1	.20	.30	.40	.50
2	.30	.40	.50	.60
3	.40	.50	.60	.70
4	.50	.60	.70	.80
5	.60	.70	.80	.90

By combining values from Tables 4 and 5, Table 6 is produced.

TABLE 6

$$\int_{5k}^{5k+5} j_x(t_1)\, dt_1$$

k\x	65	70	75	80
0	0.013	0.028	0.045	0.064
1	0.020	0.027	0.036	0.040
2	0.018	0.024	0.025	0.012
3	0.016	0.015	0.006	0.000
4	0.010	0.006	0.000	0.000
5	0.006	0.000	0.000	0.000

We now wish to approximate the $n(x,t_1)$ function. To do so, we will say that

$$n(x,5k+2.5) \doteq {}_5h_{x+5k}\left[\mathring{e}_{x+5k+2.5} - (a\mathring{e})_{x+5k+2.5}\right]$$

where the h values are in Table 5, $(a\mathring{e})_x$ are the active life expectancies from Table 1 of [16], and $\mathring{e}_x$ are the life expectancy values for Massachusetts in 1974 given in Table 3 of [16]. An interpolation was used for ages 85-89, and 90-94. This approach is conservative, because $(a\mathring{e})_x$ does not count years which would be gained by re-entry to independence in ADL.

TABLE 7

$n(x, 5k + 2.5)$

k\x	65	70	75	80
0	0.65 years	1.20 years	1.44 years	1.68 years
1	1.20	1.44	1.68	1.55
2	1.44	1.68	1.55	0.78
3	1.68	1.55	0.78	
4	1.55	0.78		
5	0.78			

As an example, let $B = 1$, and $i = .06$. Then $\ddot{a}_{\overline{n}|}^{(12)} = (1 - v^n)/d^{(12)}$ for $d^{(12)} = 0.058127665$. By using values from Tables 6 and 7 in formulas (6) and (7) with $C = 5$, and the usual variance formula, Table 8 was computed.

TABLE 8

$\underline{x}$	$E(Z_x)$	$E(Z_x^2)$	$Var(Z_x)$	$(Var(Z_x))^{1/2}$
65	0.0484	0.0304	0.0280	0.1674
70	0.0801	0.0688	0.0624	0.2497
75	0.1108	0.1164	0.1042	0.3228
80	0.1316	0.1616	0.1442	0.3798

We need to compute values for $\ddot{a}_x^{LTC\ \&\ d}$ given in formula (9). We assume that $q_x^{LTC\ \&\ d} = P[0 \leq R_1 \leq T_1 \leq 1] + q_x^d$ where the R_1 and T_1 events are measured from age x. Since $P[0 \leq R_1 \leq T_1 \leq 1] = \int_0^1 j_x(t_1)\,dt_1$, for simplicity, we will assume that $\int_0^1 j_x(t_1)\,dt_1 = \frac{1}{5}\int_0^5 j_x(t_1)\,dt_1$. Values of $\int_{5k}^{5k+5} j_x(t_1)\,dt_1$

are given in Table 6. The six values under each age x were used from age x to the end for that issue age.

Columns of ${}_tp_x^{LTC\ \&\ d}$ values were computed as follows:

$$p_x^{LTC\ \&\ d} = 1 - q_x^{LTC\ \&\ d} ,$$

$${}_2p_x^{LTC\ \&\ d} = p_x^{LTC\ \&\ d}(p_{x+1}^{LTC\ \&\ d}),$$

$${}_3p_x^{LTC\ \&\ d} = {}_2p_x^{LTC\ \&\ d}(p_{x+2}^{LTC\ \&\ d}) , \ldots$$

Starting values for x were 65, 70, 75, and 80. The discount factors v^t were computed with $i = .06$.

A summary of all of these calculations is the following table.

TABLE 9

$\ddot{a}_x^{LTC\ \&\ d}$

x	
65	9.45493
70	8.11732
75	6.78728
80	5.52772

We will assume that the policy provides a $50.00 daily benefit for nursing home care, and a $25.00 daily benefit for home health care or adult day care. For illustrative purposes, we assume that at age 65, 65% of the daily claims are for $50.00, and 35% are for $25.00. This equates to an average daily cost of $41.25, and a composite yearly cost of $15,056.25. The following table summarizes our assumptions at the various ages.

TABLE 10

Daily Benefit Assumptions, and B Values

x	Percentage for $50.00	Percentage for $25.00	Average Daily Cost	Yearly Cost (B)
65	65%	35%	$41.25	$15,056.25
70	69%	31%	42.25	15,421.25
75	76%	24%	44.00	16,060.00
80	86%	14%	46.50	16,972.50

By using formula (8), the next table was produced.

TABLE 11

Net Annual Premiums

x	
65	$77.07
70	152.17
75	262.17
80	404.07

Finally, we compute premiums by formula (10), with $Q = 30$, to provide for random deviations. The lowness of the values in Table 11 would suggest the need for such provisions.

TABLE 12

Net Annual Premiums with Some Provision for Random Deviations

x	
65	$157.10
70	294.70
75	491.57
80	754.25

If the $n(x,5k + 2.5)$ values in Table 7 had exceeded 3 years for some entries, we could have illustrated net annual premiums for coverage with a three-year limit on the total of daily benefits. Although that did not occur, the paragraph below formula (10) explains how such premiums could be calculated, in other cases.

The net premiums in Tables 11 and 12 would have to be increased to provide for expenses, adverse deviations from assumptions, and contribution to surplus.

4. SUGGESTED AREAS FOR READING

Actuaries have great potential for increasing the active life expectancy of the elderly by helping to minimize the financial worries of health care at those ages. In designing new policies for LTC coverage, new ideas can be found in demographic papers, governmental pamphlets, medical papers, gerontology papers, actuarial papers, and other sources. The paper by K. Manton and B. Soldo [24] is demographic in nature, that by Katz et al is a medical paper. Among many governmental publications which could be cited, attention is drawn to "Aging in the Eighties, Functional Limitations of Individuals Age 65 Years and Over," by Deborah Dawson, Gerry Hendershot, and John Fulton [4], the related study [17], "Use of Nursing Homes by the Elderly: Preliminary Data from the 1985 National Nursing Home Survey," by Esther Hing [12], and "Americans Needing Help to Function at Home," Barbara A. Feller, [9]. References [4] and [9] provide the results of national surveys of the civilian noninstitutionalized population of the United States in 1984 and 1979 of people who have difficulty in performing ADL. They also report the summaries of numbers of people who experience difficulties with home management, or instrumental activities of daily living (IADL): preparing meals, shopping for personal items, managing money, using the telephone, doing heavy housework, and doing light housework. The summaries were by age groups, and by sex. They point out that home health care, adult day care, and other ways are permitting people with chronic disabilities to stay in their homes. Figures 4 and 5, and Tables 38 - 44 of [10] provide comparable data for 1986.

An early book which emphasized wellness, self responsibility for health, and a proper distribution of national money spent for health was [18], by Marc Lalonde, Canadian Minister of National Health and Welfare at the time the book was written. It contains clear exposition of risk factors which affect our active life expectancies at the various ages, and what can be done in the future to diminish those risk factors.

The comprehensive paper Manton-Soldo [24] contains projections of the non-active population for years 2000 and 2040, with breakdowns by age and sex. It used information on loss of independence in ADL among 5,580 people who were participants in the National Long-Term Care Survey (NLTCS) conducted by the Health Care Financing Administration in 1982. The disability specific rates estimated from the NLTCS were applied to population projections developed by The Office of the Actuary, Social Security Administration and reported in [8]. Drs. Manton and Soldo assumed the rates would remain constant over time.

The paper [27] appears in a medical journal, but provides fresh and insightful ideas about the financing of long-term care, the heterogeneity of the population needing LTC, the fear of uninsurable risks, and other insurance matters.

The actuarial literature contains many papers which are valuable in developing LTC coverage. One such paper is, "Actuarial Aspects of the Changing Canadian Demographic Profile," by Robert Brown, [3]. Edward Lew and Lawrence Garfinkel analyzed data of a comprehensive prospective epidemiologic study of over one million men and women launched by the American Cancer Society in 1959, [19, [20]. Table 7 of [20] and Table 5 of [19] permit comparisions of active life expectancies with life expectancies of the "ostensibly healthy," and the overall group in ages 65 and over, by sex from that study. The Office of the Actuary, Social Security Administration, regularly publishes comprehensive discussions of historic and projected reductions in mortality rates by ten causes of death, e.g. [29]. One continuing source for comparisons over time of loss of independence in ADL are issues of [11]. Again, the panel discussions in Volumes 11 and 13 of the Record contain a wealth of good ideas. Dr. James Knickman's discussion on pp. 2361-2367, [21], covered many points. One issue he emphasized is that potential policyholders want coverage for care, not insurance only recoverable in a nursing home. A second issue to be solved is the definition of an insurable event. He criticizes the ADL indicators as not sophisticated enough to avoid misrepresentation by insureds. However, a major theme of his discussion is that financing arrangements should be developed to eliminate the humiliating process under which the elderly spend away or give their assets to their children so that they qualify for Medicaid. A second theme is the desire on the part of almost all elderly to receive help in their homes as long as possible. It seems that the wide acceptance of the ADL indicators for various purposes, and their growing data collection offers one possible way for LTC coverage to be developed. The Society's Experience Committee on Individual Health Insurance has formed a Task Force to work on intercompany data on LTC. It is expected that this will be an ongoing study. It should be most valuable to actuaries working in this area. The May, 1988 issue of Health Section News is a special issue on Long-Term Care Insurance, containing ten very useful papers, [22]. The theme of the first paper, [26], by Arnold Shapiro and Bruce Stuart, is similar to the purpose of this section.

In an issue of Gerontologist, S.J. Brody has suggested using Katz' index to levels of independence in ADL to determine eligibility to LTC insurance benefits, [2], especially pages 136 and 137.

Reference [25] was produced as the result of a comprehensive Brookings Institution study on long-term care needs, methods for meeting those needs, and the development of an elaborate computer simulation model for projections of people needing LTC, and their financial resources. From page 254, [25], "... the model begins the simulation period with a nationally representative sample of 28,000 adults. ... The final output file from the model provides detailed information for each person aged 65 and older, for each year from 1986 through 2020, on age, marital status, disability, sources and amounts of income, assets, and use of and payment sources for nursing home and home care services." Detailed descriptions of the assumptions for mortality, disability, recovery from disability, economic changes, long-term care use, nursing home and home care reimbursement rates, public program eligibility, and demographic and economic characteristics of the elderly are provided on pages 30-50, [25]. A technical description of the simulation model appears in pages 251-269, loc. cit..

As more private insurance policies are developed, their planners will want to know what Congress is considering in the form of Federal Long-Term Care Coverage. A valuable source for study is [5], in particular, pp. 267-294. Those pages reveal that for the immediate future and probably for some years to come, there will be great needs for private LTC policies to cover expenses of nursing home stays, or paid assistance for home care. A companion volume to [5] is [6]. It carries the subtitle: "The Long-Term Care Challenge." On page 62 it reports on the work of The Task Force on Long-Term Health Care Policies which was formed by the Department of Health and Human Services at congressional request. Several of its recommendations in a 1987 report to Congress were designed to encourage the growth of a broad-based market for affordable long-term care policies. As stated on p. 62,

> "The recommendations included expansion of the market through employer-sponsored long-term care insurance, the creation of tax incentives to encourage participation by both employers and insurance companies, long-term care financing through vested pension funds, and the development of new approaches to eligibility requirements for long-term care insurance benefits. The Task Force also stressed the importance of efforts to educate the public in the need for this type of coverage."

The comparable volumes for 1988, [7], report on more proposed legislation. Because of the small chance of the passage of such bills, the need for private LTC coverage is still large. Loss of independence in one or more ADL is a requirement for assistance in each of the six bills described in pages 261-263, Volume 1, [7].

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