A REPORT ON THE ACTUARIAL, MARKETING, AND LEGAL ANALYSES OF THE CLASS PROGRAM

APPENDIX L:

IN-DEPTH DESCRIPTION OF ARC MODEL

ACTUARIAL RESESARCH CORPORATION'S LONG-TERM CARE PREMIUM MODEL

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I. INTRODUCTION

The ARC Long-Term Care Model is designed to calculate long-term care insurance premiums and project cash flow to assist policymakers in their efforts to design a government-sponsored program. It can model various benefit structures under user-selected assumptions on participation, utilization, mortality, interest, lapse, and expense loading. Input and output are in Microsoft Excel Worksheets with program calculations performed in Visual Basic for Applications (VBA). The computer code underlying these calculations is clearly written and organized and may be viewed by any user by simply opening Excel's Visual Basic Editor.

ARC's model is specifically designed to examine the implementation of the long-term care program described in the Patient Protection and Affordable Care Act (ACA), passed by Congress in March 2010. Title VIII of this act contains a program know as the Community Living Assistance Services and Supports (CLASS) Act. This provision of the bill would establish a government-operated long-term care insurance program.

II. SUMMARY OF THE CLASS ACT

The CLASS Act establishes a national voluntary insurance program for purchasing community living assistance services and support, with the aim of helping individuals with functional limitations to achieve personal and financial independence while alleviating burdens on family caregivers.

Employed individuals who are at least age 18 may be eligible to participate in the CLASS program, generally through their employer. There is no underwriting and premiums vary only by age. A five-year vesting period is required to receive benefits, and an individual must have earned at least enough income to be credited with a quarter of coverage under Social Security rules ($1,120 for both 2010 and 2011)[1] for three out of the five vesting years. At the time of enrollment, individuals must also not be in jail or a patient in a hospital, nursing facility, or similar institution.

[1] http://www.ssa.gov/OACT/COLA/QC.html

Under the CLASS program, a cash benefit that averages a minimum of $50/day will be paid to eligible beneficiaries that meet vesting requirements, with no lifetime limit. The cash benefit is paid daily or weekly into a beneficiary's Life Independence Account and may be used to buy nonmedical services and supports needed to maintain independence at home, including: home modifications, assistive technology, accessible transportation, personal assistance services, home care aides, and nursing support. Services may be provided by a family member.

Benefits are expected to be scaled from 2 to 6 levels based on the beneficiary's level of functioning, and payments are triggered by a minimum level of functional impairment. Functional impairment will be defined by the inability to perform 2 or 3 activities of daily living (ADLs) without substantial assistance; or by substantial cognitive impairment requiring supervision for the individual's health and safety; or by other similar conditions as determined by regulation. There are six ADLs that are defined: eating, toileting, transferring, bathing, dressing, and continence. Functional limitations must be expected to last for a continuous period of more than 90 days and must be certified by a licensed health care professional. There is presumptive eligibility for active enrollees that are discharged from certain institutions that provide long-term care.

Benefits are intended to supplement rather than supplant other health care benefits, and program participation does not affect eligibility for other governmental benefits. For those institutionalized beneficiaries who are enrolled in Medicaid, however, only 5 percent of the cash benefit goes to the enrollee and 95 percent goes toward the facility cost of care. This has the effect of reducing Medicaid expenditures. For Medicaid beneficiaries receiving Home and Community-Based Services (HCBS) or in Programs of All-Inclusive Care for the Elderly (PACE), the split is 50-50 between the enrollee and the Medicaid program. In all cases, Medicaid provides secondary coverage for the remainder of costs incurred.

The CLASS Act requires the Secretary to develop at least three actuarially sound benefit plans, with premiums established so as to assure solvency over a 75-year period. The program establishes a nominal premium of $5, indexed to the CPI, for individuals with income below the poverty line and for full-time students under age 22 who are actively employed. The premium is to be loaded by no more than 3 percent to cover administrative expenses.

The monthly premiums determined for an individual at the time of enrollment in the CLASS program may remain the same for as long as the individual is an active enrollee except that they may increase (1) to keep the program solvent or (2) for an individual who has a 3-month or more lapse in payment of premiums. In the case of a lapsing policyholder, the amount of the premium adjustment would depend on the timeframe before reenrollment. If the individual reenrolls within 5 years of the beginning of the lapse, his premium will be age-adjusted as if for an initial enrollment, but the individual would receive credit for prior months of paid premiums. If the individual reenrolls after 5 years from the start of the lapse, the individual does not receive credit for prior months of premiums paid, and is subject to a penalty on top of a new issue-age premium, with the penalty being the greater of 1 percent of the issue-age premium for each lapsed month, or an amount the Secretary determines to be actuarially sound. Full-time students paying the nominal premium will also be subject to a new age-adjusted premium upon ceasing full-time student status.

Although premiums are intended to remain the same for an individual with continuous enrollment, the Secretary may adjust premiums for enrollees if the 20-year projection of premium and benefit outlays indicates an imbalance that threatens program solvency. Exempt from such increases would be active enrollees who meet all three of the following criterion: (1) are age 65 or older, (2) have paid premiums for at least 20 years, and (3) are not actively employed. Any unpaid benefits as a result of death or failure of a beneficiary to elect to receive benefits before the end of a 12-month period (benefits cannot be rolled over from year to year) revert back to the CLASS Independence Fund.

The CLASS Independence Fund may be held only for: (1) investment, (2) to pay administrative expenses, and (3) to pay cash benefits. No taxpayer funds are to be used to pay benefits, although the law is silent on whether taxpayer funds may be used to pay administrative expenses. Similar to Social Security and Medicare, the CLASS Independence Fund will have a Trust Fund, a Board of Trustees, a Trustee's Report (with 75-year projections), actuarial opinion provided by the CMS Chief Actuary, and an Advisory Council. If the program is determined to be not sound, premiums may be increased and/or new enrollment may be stopped, or legislative action may be recommended.

III. DATA SOURCES

This section describes the data sources used to create input for the ARC CLASS Program Model. The main data sources include the 2011 OASDI Trustees Report, the Current Population Survey (CPS), the National Health Interview Survey (NHIS), the National Long Term Care Survey (NLTCS), and the National Nursing Home Survey (NNHS).

Trustees Report

The annual Trustees Report presents the current and financial status of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds. The report is put out by the Social Security Administration's Office of the Chief Actuary.[2] Supplemental tables for single years are provided and used as the source for:

- Unemployment rate and labor force participation rate projections by age group, sex, and year
- U.S. population projections by age, sex, and year
- Mortality assumptions projected by age, sex, and year

Labor force data are critical to the calculation of program cash flow. The labor force participation rates and unemployment rates are used to calculate the number of workers that may participate in the program, pay premiums into the system, and ultimately will be

[2] http://www.ssa.gov/OACT/TR/2010/index.html

eligible for benefits. The default labor force participation and unemployment rates vary by age, sex, and year.

Current Population Survey

The CPS is a monthly survey of households providing data on the labor force, employment, unemployment, hours worked, earnings, and other demographic and labor force characteristics. The CPS is collected each month from a probability sample of approximately 60,000 households through personal and telephone interviews and is designed to be representative of the civilian noninstitutional population of the US. It is conducted by the Bureau of the Census for the Bureau of Labor Statistics.[3] The March 2009 CPS is used in the model for the annual income interval distribution by sex and age group. Below is a table that shows the income distribution of workers for all ages.

2009 CPS Income Distribution

Yearly Income Interval		% Workers Below High End Threshold	CPS Population Weight (000)		
Low End	High End		Total	Males	Females
$1.00	$1,000	2%	3,939	1,656	2,284
$1,000.01	$2,000	5%	3,371	1,371	2,000
$2,000.01	$3,000	7%	3,004	1,248	1,756
$3,000.01	$4,000	8%	2,652	1,130	1,522
$4,000.01	$5,000	10%	3,194	1,424	1,770
$5,000.01	$6,000	12%	2,394	1,016	1,377
$6,000.01	$7,000	13%	2,017	788	1,229
$7,000.01	$8,000	15%	2,673	1,159	1,514
$8,000.01	$9,000	16%	1,769	744	1,025
$9,000.01	$10,000	18%	3,819	1,747	2,071
$10,000.01	$11,000	19%	1,629	620	1,009
$11,000.01	$12,000	21%	3,187	1,342	1,845
$12,000.01	$15,000	26%	7,825	3,396	4,429
Total Workers		100%	158,162		

The income distribution is used in the model to estimate the population that is eligible to participate in the CLASS program, which requires an individual to earn in one year more than the amount needed to earn one quarter of coverage under the Social Security program. This amount is $1,120 in both 2010 and 2011, but it was $1,090 in 2009, the year of the CPS used in the model. The model uses the distribution of workers by income

[3] http://www.bls.gov/cps/

to estimate the number of eligibles corresponding to the income requirement selected by the user. The level of the premium depends on the total *number* of eligibles compared to the number of eligibles that could immediately qualify for benefits. The cash flow projections also depend on the number of individuals who participate in the program. When the user selects a subsidy for the premiums for low-income individuals, the model calculates the number of individuals receiving the subsidy as the number of workers whose income is above the income requirement and below the poverty line.

National Nursing Home Survey

The NNHS is a nationwide sample survey of nursing homes, residents, discharges, and staff. Nursing homes included in the survey are freestanding or nursing care units of hospitals, retirement centers, or other similar entities, with at least three beds. They must be Medicare or Medicaid certified or state licensed to operate as a nursing home. The survey is conducted by the National Center for Health Statistics, part of the Centers for Disease Control and Prevention. Estimates from the 1999 survey are based on roughly 1,400 responding facilities out of approximately 18,000 nursing homes in the United States.[4] The 2004 survey uses 1,174 responding facilities. Prevalence rates and Admission rates are graduated by age using the Whittaker-Henderson graduation algorithm, which maximizes a function that measures both "fit" and "smoothness." The fit is measured by the sum of the squares of the difference between the graduated prevalence rates and the original prevalence rates and the "smoothness" is measured by the sum of the second differences of the graduation rates by age. The model uses NNHS Survey resident and discharge data by age and sex from the 1985 and 2004 surveys and is the source for:

- Nursing Home Incidence Rates
- Nursing Home Prevalence Rates,
- Average Lengths of Stay, and
- Distributions of lengths of nursing home stays (i.e., continuance tables)

The 1985 survey is used as base information for incidence rates and average length of stay because it analyzed nursing home behavior in more detail than the 1999 or 2004

[4] http://www.cdc.gov/nchs/nnhs.htm

surveys. There is a difference in how nursing home admissions and lengths of stay are defined in the surveys and how they are used for purposes of insurance. The surveys count every admission to a nursing home, while insurance would concatenate multiple stays into one benefit period whenever there is a transfer between nursing homes or a stay that is briefly interrupted by a hospital stay. The 1985 survey had information that made it possible to concatenate stays, while the more recent surveys do not contain the information to make this possible. In general, it is more difficult to determine accurately admission rates and lengths of stays than it is to determine the number of nursing home residences at a point in time. The ratio of the number of admissions to the population is referred to as the admission rate, while the ratio of the number of residents to the population is referred to as the prevalence rate. There is a loose relationship between prevalence rates (PR), admission rates (AR), and average lengths of stay (ALOS) such that the following equation is approximately true:

PR = AR * ALOS

All of the NNHSs provide relatively accurate counts of the resident population and therefore of prevalence rates. We used the ratio of the prevalence rates obtained from the 2004 survey to those obtained from the 1985 survey to project the admission rates from the 1985 survey up to 2004. We did not project the average lengths of stay.

1985 NNHS Utilization Rates and Average Length of Stay by Age and Sex

Age	Prevalence Rate		Admission Rate		Average Length of Stay	
	Male	Female	Male	Female	Male	Female
20	0.01%	0.01%	0.05%	0.02%	947	898
30	0.05%	0.03%	0.05%	0.02%	947	898
40	0.07%	0.07%	0.06%	0.02%	880	956
50	0.18%	0.14%	0.17%	0.07%	791	1,066
60	0.39%	0.44%	0.28%	0.20%	767	975
70	1.17%	1.34%	0.85%	1.15%	535	697
80	4.76%	7.26%	4.39%	5.16%	370	630
90	16.24%	25.65%	14.38%	15.52%	369	556
100	37.41%	46.66%	40.04%	24.27%	300	503

2004 NNHS Prevalence, Ratio of 2004 to 1985 and Calculated 2004 Incidence

Age	2004 Prevalence Rate		Ratio of Prevalence 2004 to 1985		Calculated 2004 Incidence	
	Male	Female	Male	Female	Male	Female
20	0.01%	0.01%	1.29	1.00	0.06%	0.02%
30	0.03%	0.01%	0.53	0.33	0.03%	0.01%
40	0.05%	0.06%	0.70	0.86	0.04%	0.02%
50	0.13%	0.11%	0.72	0.80	0.12%	0.06%
60	0.37%	0.33%	0.94	0.75	0.26%	0.15%
70	0.91%	0.95%	0.78	0.71	0.66%	0.82%
80	2.90%	4.37%	0.61	0.60	2.68%	3.11%
90	10.71%	18.52%	0.66	0.72	9.48%	11.20%
100	21.22%	42.20%	0.57	0.90	22.71%	21.95%

National Long-Term Care Survey

The NLTCS is a nationally representative longitudinal survey of Medicare beneficiaries designed to study changes in health and functional status of Americans age 65 and over, in both community and institutional settings. The NLTCS defines an institutional setting as one having a full-time medical professional (doctor, nurse, physician assistant, or psychiatrist) on its staff. Data from this survey exist for years 1982, 1984, 1989, 1994, 1999, and 2004. The survey population consists of roughly 36,000 people originally drawn from Medicare enrollment files in 1982 with new people entering each successive survey. With each survey about 5,000 people passing age 65 between each wave are added to replace those that have died. In this way, the NLTCS represents all Medicare beneficiaries age 65 and over both institutionalized and noninstitutionalized (although it excludes individuals in correction facilities). The NLTCS has many components, including disability measures, cognitive test results, medical conditions, education levels, and income. It tracks health expenditures, Medicare service use, and the availability of personal, family, and community resource caregiving. The survey was administered by the U.S. Census Bureau and Duke University.[5]

Longitudinal data from 1984 to 1989 are used to identify incidence rates according to the methods of Eric Stallard and Robert Yee as presented in their paper Noninsured Home and Community-Based Long-Term Care Incidence and Continuance Tables[6] (2000).

[5] http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/09681/detail

[6] Stallard, E. and R. K. W. Yee. 2000. *Non-Insured Home and Community-Based Long-Term Care*

Data from the 1984 through 2004 NLTC surveys are used to identify prevalence rates of frailty to both community and institutional respondents. These results are graduated using the Whittaker-Henderson formula according to both respondent age and data year. The rates of change for the prevalence rates are used to trend the incidence rates calculated by Stallard and Yee through 2004 by age, sex, and ADL level.

The NLTCS asks each respondent if he has trouble with each of six ADLs, and follows up by asking if he gets help from a person. Those getting help from a person are counted as needing assistance with that ADL. Continence is also assessed by the NLTCS, but separately with the general medical questions. Cognitive impairment is calculated by a mini-mental status exam in each survey except for the 1999 survey, where it is calculated by a more detailed SPMSQ test, which we have calibrated to the mini-mental exams in the other years. The mini-mental status exam has ten simple questions, and answering three or more of those questions incorrectly identifies the respondent as cognitively impaired. Persons interviewed through a proxy are marked as cognitively impaired if they are reported to have Alzheimer's, dementia, or senility. The community survey for this group is used to obtain the trends in frailty prevalence among those 65 and older. This is used to adjust the Stallard and Yee incidence rates to a more current year.

Prevalence Rates of Frail Persons Aged 65 and Over Receiving Home Care						
Age/Sex Adjusted Frailty Rates	1984	1989	1994	1999	2004	Prevalence Rate Increase
1 or more ADLs	8.62%	9.25%	9.77%	10.23%	10.72%	0.1052%
2 or more ADLs	4.42%	4.94%	5.44%	5.95%	6.52%	0.1052%
3 or more ADLs	3.09%	3.59%	4.09%	4.66%	5.33%	0.1117%

The model calculates 2004 home care incidence rates using the 1984-1989 Stallard/Yee incidence rates and ratio of home care prevalence in 1989 and 2004 from the National Long Term Care Survey (NLTCS). The 2004 incidence rates are projected to be the

Incidence and Continuance Tables, Long-Term Care Experience Committee. Schaumburg, IL: Society of Actuaries.

1984-1989 incidence rates multiplied by the ratio of 2004 prevalence to 1989 prevalence. The model does not project average lengths of stay.

1984-1989 Stallard/Yee Utilization Rates and Average Length of Stay by Age and Sex

Age	Admission Rate		Average Length of Stay	
	Male	Female	Male	Female
70	2.01%	1.69%	1,259	1,246
80	4.06%	5.12%	1,306	1,169
90	8.22%	12.29%	896	934
100	10.19%	13.62%	896	934

NLTCS Prevalence, Ratio of 2004 to 1989 and Calculated 2004 Incidence

Age	1989 Prevalence Rate		2004 Prevalence Rate		Ratio of Prevalence 2004 to 1989		Calculated 2004 Incidence	
	Male	Female	Male	Female	Male	Female	Male	Female
70	2.56%	2.89%	3.01%	3.31%	1.17	1.15	2.35%	1.93%
80	6.12%	6.56%	7.85%	8.79%	1.28	1.34	5.21%	6.85%
90	11.83%	13.78%	17.56%	20.84%	1.48	1.51	12.21%	18.59%
100	17.95%	18.75%	26.00%	33.55%	1.45	1.79	14.76%	24.37%

Note: All values in both tables assume 2+ ADL threshold. Analogous calculations are performed if there is a different ADL requirement.

National Health Interview Survey

The NHIS is a cross-sectional household interview survey begun in 1957 and conducted annually. It provides data on a broad range of health-related topics for the civilian noninstitutionalized population of the U.S. The NHIS has an expected sample size of approximately 35,000 households each year, and provides information on the amount, distribution, and effects of illness and disability and the services rendered for or because of such conditions. The data include numerous demographic and socioeconomic characteristics. In particular, this study focuses on age, gender, earnings level, cognitive impairments, and ADL limitations that are used to determine eligibility rates for the CLASS model. The survey is conducted by the National Center for Health Statistics.[7]

In the survey, respondents are asked several times if they have some kind of limitation in

[7] http://www.cdc.gov/nchs/nhis.htm

their daily life. They are asked separately if they are limited in the work they can do, or if they are limited in daily living, or if they are limited in any way. Those who report some kind of limitation are then asked about specific limitations.

We have set up our CLASS model so that the user can select from among utilization rates based on several possible interpretations of cognitive impairments. Senility (which includes Alzheimer's and dementia and is denoted by the letter "S" in the model) is always included as a cognitive impairment. A second interpretation also includes mental retardation and developmental disabilities (denoted by "SRD" in the model). The third category also includes ADD, Schizophrenia, bipolar disorder, and other mental disabilities, which are all kept together because they are represented by the same variable in the survey. When all mental impairments are included, the model refers to this option as the "SRDA" option. The survey asks everyone if they have difficulty performing ADLs, including: eating, dressing, transferring, bathing, and using the toilet. However, the survey does not ask about continence as an ADL or in any other fashion.

The 2007-2009 NHIS was the source in the model for frailty prevalence rates for the under 65 population by age and sex. Frailty rates are calculated separately for all three interpretations of cognitive impairment and for one, two, and three ADLs aggregating data from the three years. In addition, frailty rates are calculated for individuals at several income levels. These rates are independently graduated using the Whittaker-Henderson formula by respondent age. Users can select the utilization rates used in the model calculation from among the three interpretations of cognitive impairment and 1+, 2+, or 3+ ADLs. The choice of the interpretation of cognitive impairment has a significant impact on the results because including ADD, Schizophrenia, Mental Retardation, and developmental disabilities more than doubles the frailty rate. Changing between 2 and 3 ADLs has a much smaller effect on the initial frailty rate among those who work, but has a significant impact on frailty for the population as a whole.

Frailty Prevalence Rate and Population (000) based on 2007-09 NHIS Data among Ages 18-65		All Cognitive		Without ADD		Senility Only	
		2 or More ADLs	3 or More ADLs	2 or More ADLs	3 or More ADLs	2 or More ADLs	3 or More ADLs
Whole Population	Number Frail	2,651	2,005	1,865	1,589	1,155	830
	Prevalence Rate	1.39%	1.05%	0.98%	0.83%	0.60%	0.43%
Income Earners Only	Number Frail	623	571	480	428	234	176
	Prevalence Rate	0.35%	0.33%	0.27%	0.24%	0.13%	0.10%
$10,000 or More in Earned Income	Number Frail	412	374	315	277	173	99
	Prevalence Rate	0.30%	0.27%	0.23%	0.20%	0.12%	0.07%
$15,000 or More in Earned Income	Number Frail	314	308	262	229	148	112
	Prevalence Rate	0.24%	0.24%	0.20%	0.18%	0.11%	0.09%

The following table shows how the incidence rates used in the ARC Model for 2+ ADLs and the senility plus developmental disabilities (SRD) interpretation of mental impairment compare with the intercompany study from the Society of Actuaries (SOA).

Comparison of Model Incidence Rates to Intercompany Study

Age	ARC Male Incidence Rate	ARC Female Incidence Rate	SOA (Both Genders) with no elimination period
45	0.22%	0.09%	0.13%
55	0.28%	0.19%	0.14%
62	0.44%	0.53%	0.23%
67	2.06%	2.34%	0.47%
72	3.99%	4.03%	1.18%
77	6.89%	8.19%	2.81%
82	12.41%	14.35%	5.61%
87	20.16%	23.63%	9.62%

In addition, we take NHIS data from every year from 1997 to 2009 to identify how frailty prevalence rates have changed over time according to age and gender (but not earnings level). Rates are calculated according to the same method and attributes as for the

prevalence rates calculated from 2009. These prevalence rates over time are graduated using the Whittaker-Henderson formula by data year and respondent age. The average rate of growth over the 1997-2009 timespan is summarized in the table below.

Frailty Growth Rate Adjusted for Age and Sex			
	1997	2009	Average Annual Rate of Growth
1 or More ADL, SRDA	0.24%	0.61%	0.031%
2 or More ADL, SRDA	0.18%	0.53%	0.029%
3 or More ADL, SRDA	0.12%	0.48%	0.030%
1 or More ADL, SRD	0.23%	0.49%	0.022%
2 or More ADL, SRD	0.17%	0.41%	0.021%
3 or More ADL, SRD	0.10%	0.35%	0.021%
1 or More ADL, S	0.27%	0.38%	0.010%
2 or More ADL, S	0.20%	0.29%	0.007%
3 or More ADL, S	0.13%	0.20%	0.006%

The increase in frailty rates over time has mostly occurred because of cognitive factors, and the more restrictive the cognitive assumption, the less reported growth there is. For the most generous interpretation of cognitive impairment, frailty grows among all age groups, where if only senility is included, then frailty increases only among older people.

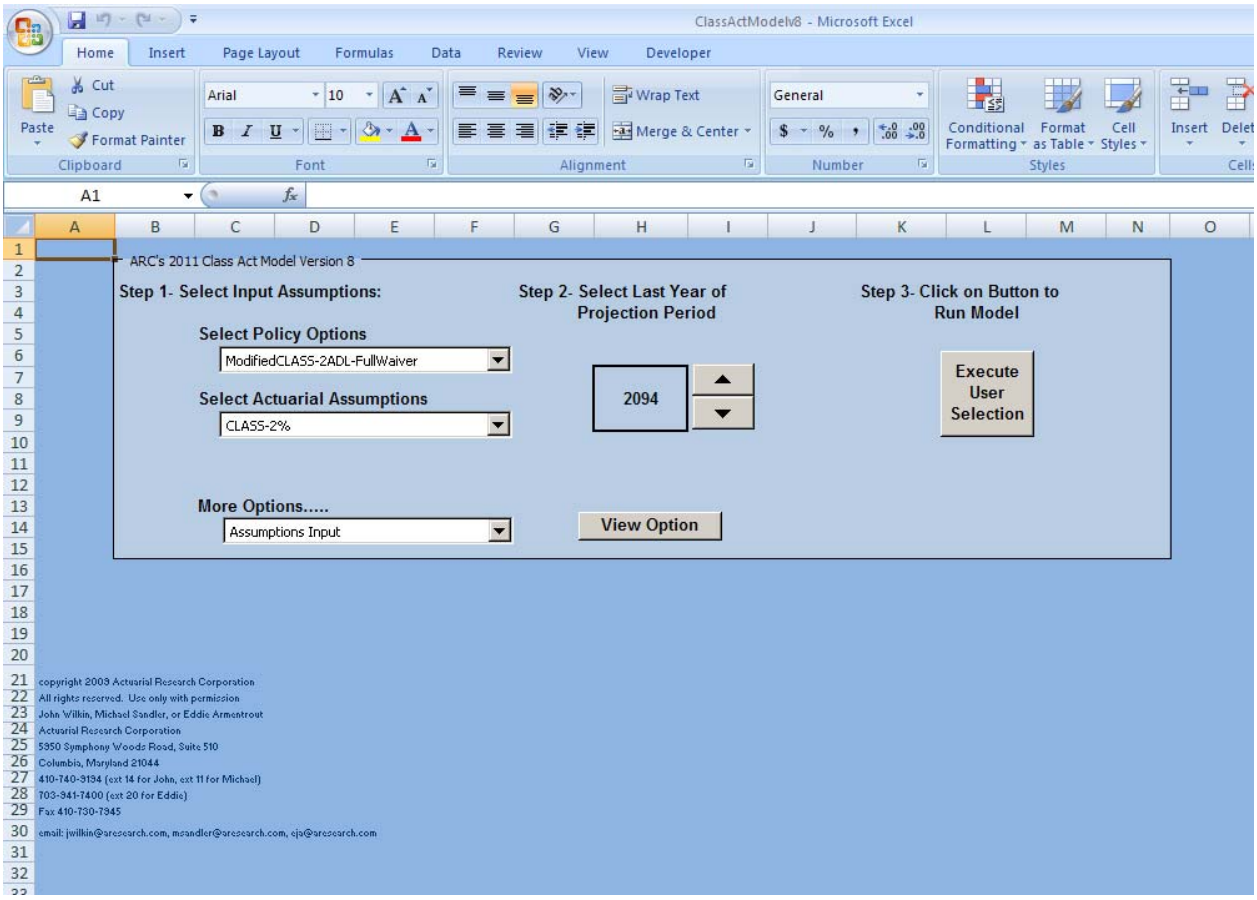
Frailty Rates by Age, Sex, with 2 or More ADL, SRDA			
Age	1997	2009	Average Annual Rate of Growth
25	0.11%	0.47%	0.030%
35	0.14%	0.48%	0.028%
45	0.20%	0.55%	0.029%
55	0.24%	0.58%	0.028%
65	0.48%	0.66%	0.015%

Frailty Rates by Age, Sex, with 2 or More ADL, Senility Only			
Age	1997	2009	Average Annual Rate of Growth
25	0.09%	0.09%	0.000%
35	0.11%	0.09%	-0.001%
45	0.17%	0.22%	0.004%
55	0.24%	0.38%	0.012%
65	0.48%	0.53%	0.004%

IV. ARC MODEL DESCRIPTION

This technical description of the ARC Long-Term Care Model will explain the inputs and assumptions necessary to run the model, describe the formulas used by the model, and explain the outputs and results returned by the model.

A. CONTROL PANEL



The main control panel of the model allows the user to select a set of policy options, a set of actuarial assumptions and the duration of the projection. Once these parameters are selected, the user can run the model by pressing the "Execute User Selection" button.

B. INPUTS

Before the model can be used, there are a variety of input parameters that must be selected to create a scenario. These inputs include policy options and actuarial assumptions that influence the results of the model. A given set of policy options and a given set of actuarial assumptions can be saved and retrieved so that runs can be replicated easily and accurately.

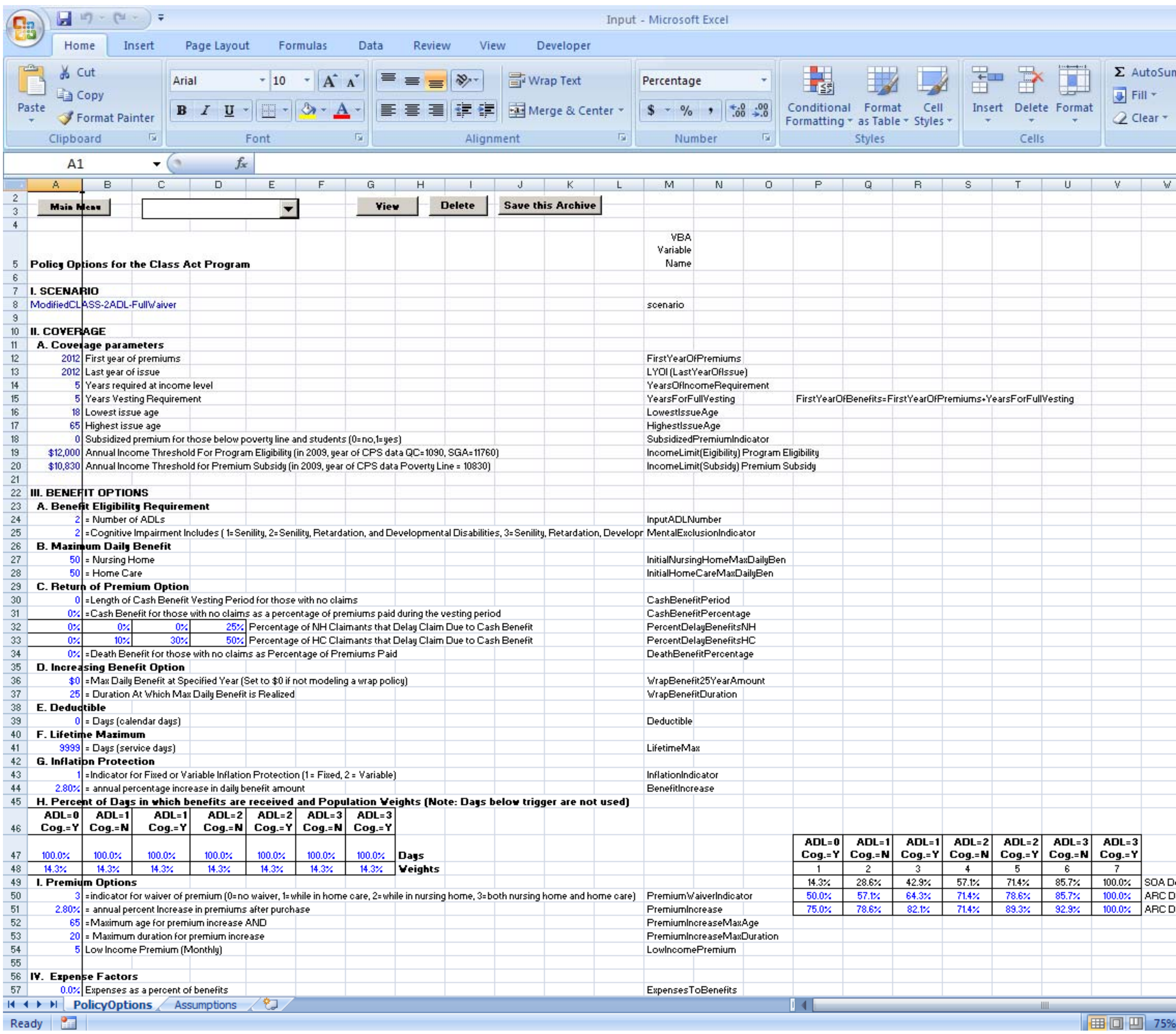
In this section, the input parameters will be described along with the sensitivity of the premium level to choices in the parameters. In order to do this, we have chosen (somewhat arbitrarily) a set of parameters as a baseline. The baseline estimate will be a modified version of the CLASS Act with the following choice of input parameters (which will be discussed below):

- 5 years vesting and work requirement
- $12,000 income requirement for 5 years (no low income premium)
- Benefit trigger of 2+ ADLs or cognitive impairment of senility, mental retardation, or developmental disability (SRD)
- $50 daily benefit (nursing home and home care)
- No deductible or lifetime maximum
- Benefits and premiums increase at 2.8% per year, except for those who are aged 65+ and of policy duration 20+
- Full waiver of premium while on claim.
- Participation of 2%
- Administrative expense factor of 3% of premium

1. Policy Options

The policy options are inputs related to the law, regulations, and specifications that would be present under a government-run long-term care program. These assumptions allow the user to define coverage regulations, benefit eligibility requirements, descriptions of the program benefits, and premium expense factors. Coverage regulations include the timeframe during which policies are issued, the number of years of required employment after enrollment, and the number of years required for vesting of the policy. Benefit eligibility requirements (sometimes referred to as “benefit triggers”) include criteria based on cognitive ability and the ability to perform activities of daily living (ADLs), which are used as benchmarks to determine whether a policyholder is eligible to start

drawing long-term care benefits. The model allows for the user to change the number of ADLs necessary to trigger the benefit and the definition of cognitive impairment that will qualify a beneficiary for benefits. The user can also define the average daily benefit, deductible, lifetime maximum, and level of inflation protection. The user can enter other policy parameters to model variations of the standard CLASS benefits. These variations include various forms of a return of premium provision and daily benefits that start low and increase substantially.



Scenario

The first section of the policy input worksheet is a place to name the scenario. This name will appear at the top of each output table.

Coverage (including vesting)

The second section of user inputs describes the conditions under which an individual may participate in the program. Coverage includes the years during which the model assumes new policies will be issued, the ages at which new policies will be issued, and the income required for participation.

First Year of Premiums and Last Year of Issue

It is currently assumed that the first year of premiums will be 2012, which is also the first year of issue. The model will calculate the premiums for this cohort of participants to fully finance their expected benefits. If the user chooses to set the last year of issue also equal to 2012, then the cash flow output from the model will show the cash flow for just this one cohort. If the user elects to set the last year of issue equal to 2094 (the last year of projection), then the model will show the cash flow under conditions of continuous enrollment.

Years Vesting Requirement and Years Required at Income Level

The user may specify any number of years of vesting. No benefits are paid during the vesting period. Under the theoretical antiselection formula, the effect of antiselection decreases each year from issue, regardless of whether benefits are payable. Thus, the vesting period reduces benefits not only for the years of no benefit payments but also because of the waning effects of antiselection during the vesting period. Under the additional first-year claims antiselection method, all antiselecting enrollments survive the vesting period and become beneficiaries.

The user may also set the number of years of work required for vesting. The model assumes that the frailty rates of the working population apply during the years of required work, but that the rates will transition to the total population rates over the 10-year period

after the required work period. This 10-year period is known as the "select" period. Decreasing the Years Vesting Requirement increases premiums because antiselection will have a greater effect closer to the purchase of a policy. As the duration from the purchase of a policy increase, antiselection decreases. The following table shows that premiums decrease by about 16% by increasing the vesting period from 5 years to 7 years.

Years Vesting Requirement, 7 years vs 5 years in baseline	
Issue Age	**% change in premium**
35	**-18%**
40	**-17%**
45	**-16%**
50	**-15%**
55	**-14%**
60	**-17%**
65	**-18%**
Average	**-16%**

Years required at income level allows the user to change the number of years during the vesting period that a policyholder must earn the minimum required income in order to be eligible to participate in the CLASS program. Decreasing this value increases premiums, because it shortens the select period. The example below changes this parameter from the baseline value of 5 to the 3 (which is the number of years required in the CLASS Act), resulting in a 3% increase in average premiums. The model calculates this effect by decreasing the select effect of the work requirement by two years.

Years Required at Income Level, 3 vs 5 baseline	
Issue Age	**% change in premium**
35	**+0%**
40	**+0%**
45	**+0%**
50	**+1%**
55	**+3%**
60	**+5%**
65	**+3%**
Average	**+3%**

Income Threshold for Program Eligibility and Subsidized Premium

This input variable allows the minimum income required to be eligible for the program to be changed by the user. Decreasing the income threshold below the poverty line ($10,830) increases premiums because policyholders below the poverty line are charged a lower premium and their benefits must be subsidized by the premiums of policyholders who earn an income above the poverty line. Above the poverty line, changes in the income threshold for eligibility have a very small effect on the level of premiums. This small effect, however, is the result of the use by the model of different sets of incidence rates that vary by income level. These rates (which are tabulated from the NHIS) vary for those under 65 and in home care, not for the over 65 or for those in nursing homes. In the coverage section, the user also specifies whether a subsidized premium for low-income individuals exists and the income requirement for this subsidized premium. Dropping the income requirement from $12K to $1,090 increases premiums by about 86%.

Income Threshold for Eligibility, $1,090 vs $12K	
Issue Age	**Sensitivity Value = $1,090**
35	**+93%**
40	**+90%**
45	**+89%**
50	**+87%**
55	**+86%**
60	**+85%**
65	**+85%**
Average	**+86%**

Benefit Options

The third section of user input is to specify the benefits that will be paid under the CLASS program. Several long-term care benefit options are included and may be run in any combination:

- Number of ADLs to trigger benefits
- Separate trigger for cognitive impairment
- Definition of what is included as a cognitive impairment
- Daily benefit (may be specified as any dollar amount separately for nursing home or home care)

- Return of Premium options
- Low initial daily benefit with rapid increases
- Deductible in calendar days
- Lifetime maximum in service days
- Level of inflation protection
- Percent of days on which services are received
- Waiver of premium options
- Indexation of premiums
- Maximum age of a beneficiary for which premiums can be increased
- Maximum duration of time that a beneficiary's premiums can be increased
- Low Income Premium

Benefit Eligibility Requirement (Benefit Trigger): Number of ADLs and Definition of Cognitive Impairment

The number of ADLs that a person needs in order to be eligible to draw benefits can be changed by the user. A higher requirement for the number or ADLs necessary to draw benefits will lower premiums because it makes the requirements for benefit eligibility stricter. The model has stored utilization rates by ADL from both the NHIS (for the under 65) and the NLTCS (for the over 65). The model always uses all NH admissions regardless of the benefit eligibility requirement. The model assumes that 25% of those with one ADL less than the benefit trigger requirement will also receive benefits. By going from a 2-ADL requirement to a 3-ADL requirement, the average premium decreases by about 13%.

ADLs Needed to Qualify for Benefits	
Issue Age	**Sensitivity Value of going from 2 ADLs to 3 ADLs**
35	**-10%**
40	**-13%**
45	**-14%**
50	**-13%**
55	**-13%**
60	**-13%**
65	**-12%**
Average	**-13%**

The definition of cognitive impairment can be changed by the user in order to change the utilization rates for the under 65 population. The definitions available for modeling are to define cognitive impairment as:

1. Senility (denoted by S and including Alzheimer's and dementia)
2. Senility, Retardation, and Developmental Disabilities (SRD)
3. Senility, Retardation, and Developmental Disabilities, "ADD, Bipolar, Schizophrenia, etc." (SRDA)

By changing the definition of cognitive impairment to include more conditions, premiums will increase. The table below shows that excluding mental retardation and developmental disabilities from the baseline option decreases premiums by about 4%, but by a much greater amount for the younger ages. On the reverse side, including ADD, bipolar, and schizophrenia to the baseline option increase premiums by about 3%, but by much more at younger ages.

Definition of Cognitive Impairment		
Issue Age	**Sensitivity Value = S (excludes mental retardation and developmental disabilities from the baseline)**	**Sensitivity Value = SRDA (includes ADD, bipolar, and schizophrenia to baseline)**
35	**-20%**	**+10%**
40	**-13%**	**+7%**
45	**-7%**	**+6%**
50	**-3%**	**+4%**
55	**-2%**	**+1%**
60	**-0%**	**+0%**
65	**-0%**	**+0%**
Average	**-4%**	**+3%**

Maximum Daily Benefit (separately for nursing home and home care)

The maximum daily benefit can be set to any amount specified by the user. As the daily benefit is increased for both nursing home and home care, premiums increase proportionately. The benefit can be changed for Nursing Home and Home Care independently. In this example, the Nursing Home and Home Care benefit were $50 increased by 2.8% per year in the baseline run. Decreasing the Home Care benefit has a greater downward effect on premiums because more beneficiaries receive home care benefits than nursing home benefits.

Maximum Daily Benefit		
Issue Age	Sensitivity Value: NH=50, HC=25	Sensitivity Value: NH=25, HC=50
35	-43%	-8%
40	-43%	-9%
45	-42%	-10%
50	-41%	-11%
55	-41%	-12%
60	-41%	-12%
65	-40%	-12%
Average	-41%	-11%

Return of Premium Options

The model can calculate premiums for two forms of a return of premium benefit. The first form is a periodic cash benefit paid to policyholders who have not filed a claim during a predetermined period of time. The user may enter the time period between cash benefit payments as well as the cash benefit amount expressed as a percentage of premiums paid during the specified time period. For example, the user may select a 10-year periodic return of 10% of premiums (essentially returning one year's premium for every 10 years paid). Under this option, every tenth year that a policyholder has not made a claim, he will be paid 10% of the premiums that he has paid during that 10-year period. This benefit has the effect of increasing premiums because it increases the benefits paid to policyholders.

Periodic Return of Premium Benefit	
Issue Age	Sensitivity Value = Benefit, 10% of premium every 10 Years with no claim
35	+7%
40	+7%
45	+7%
50	+6%
55	+6%
60	+5%
65	+5%
Average	+6%

The other form of a return of premium benefit is the payment of a death benefit, expressed as a percentage of premiums paid. The death benefit is an amount paid to the beneficiary of a policyholder who dies before a certain age and before ever submitting a

claim. This benefit is paid to a beneficiary of the policyholder's choosing. Under the death benefit structure being modeled, a policyholder will receive the input percentage until he reaches age 65. From age 66 to 75, the death benefit percentage decreases by 10% per year until reaching 0% at age 75. Below is an example of a death benefit schedule with the benefit specified at 80%.

Death Benefit by Age as a Percentage of Premiums Paid (Death Benefit = 80%)				
Age	Death Benefit		Age	Death Benefit
<=65	80%		71	32%
66	72%		72	24%
67	64%		73	16%
68	56%		74	8%
69	48%		75	0%
70	40%		75+	0%

This death benefit will have the effect of increasing premiums because it increases the benefits being paid to policyholders.

Death Benefit	
Issue Age	**Sensitivity Value = 80% Death Benefit**
35	**+3%**
40	**+3%**
45	**+3%**
50	**+3%**
55	**+3%**
60	**+1%**
65	**+1%**
Average	**+2%**

When modeling a periodic cash benefit, an additional situation that needs to be considered is the behavior of policyholders who will delay filing a claim in order to collect a cash benefit. Some policyholders may delay going on claim if they are scheduled to receive a cash benefit payment in the near future and then file the claim immediately after the cash payment has been received. To model this behavior, assumptions of the percentage of claimants who will delay filing a claim for each of the four years prior to a cash benefit payment are entered in the "Assumptions" worksheet of the Input workbook. The model then applies these percentages to new claimants in each

of those four years leading up to the cash benefit. This calculates the number of beneficiaries who wait to go on claim until after the cash benefit payment. Once the benefit is paid, the policyholders who delayed their claims are added to the pool of beneficiaries and begin drawing benefits.

Increasing Daily Benefit Option (faster than inflation)

An increasing daily benefit policy is a CLASS policy that would pay a benefit that starts small but increases substantially in real terms over the first 25 years that the policies are held. After 25 years, the daily benefit covered by the CLASS policy would reach a high ultimate level designed to cover a substantial portion of the costs of providing long-term care services. An input parameter is provided that sets the maximum real daily benefit paid by the CLASS policy at year 25 under this scenario. Another parameter specifies the daily benefit amount for the first year that benefits are paid. After this 25 year-period, benefits increase by the standard benefit increase to account for inflation.

The Increasing Benefit Option models a daily benefit payment that starts small and then increases rapidly in real terms. The benefit starts at the user-defined maximum daily benefit, and is increased until the real daily benefit reaches the user-defined maximum daily benefit at year 25. After year 25, the benefit is increased by the standard yearly benefit increase. The real benefit increase schedule (i.e., excluding inflation protection) between the first year policies are sold and the twenty-fifth year at which the target maximum daily benefit is reached is as follows:

- Years 1-10: No increase in benefit.
- Years 11-15: Daily Benefit is increased by 5% per year.
- Years 15-20: Daily Benefit is increased by 10% per year.
- Years 21-25: Daily Benefit is increased by the factor necessary to raise the maximum daily benefit to the target value at year 25.

The premiums for this option depend on the starting and 25-year values of the maximum benefit being modeled.

Increasing Daily Benefit Policy	
Issue Age	Sensitivity Value = $20 Benefit Increasing to $150 at Year 25
35	68%
40	70%
45	75%
50	73%
55	58%
60	25%
65	-4%
Average	44%

Deductible

By changing the deductible, the user changes the length of time that a beneficiary must wait to start receiving benefits after going on claim. Increasing the deductible will decrease premiums as it decreases the benefit payments.

Deductible	
Issue Age	50-day deductible vs 0 days in baseline
35	-5%
40	-6%
45	-5%
50	-5%
55	-5%
60	-5%
65	-5%
Average	-5%

Lifetime Maximum Benefit

The lifetime maximum benefit allows the user to input the maximum number of days that a beneficiary may receive benefit payments after going on claim. Decreasing the maximum number of days that a beneficiary can draw benefits will decrease premiums.

Lifetime Maximum Benefit	
Issue Age	3-Years Maximum vs Lifetime in Baseline
35	-37%
40	-36%
45	-35%
50	-34%
55	-33%
60	-33%
65	-31%
Average	-34%

Inflation Protection

Inflation Protection (i.e., annual increases to daily benefit amount and sometimes to the premium amount) can be specified as either a fixed amount per year or a variable amount that varies by age of the policyholder. The baseline premiums assume that both benefits and premiums will be indexed by 2.8% every year (which is the ultimate rate of inflation assumed in the 2011 Trustees Reports). If both benefits and premiums were index by 4% per year the resulting premiums would increase as shown in the following table:

Inflation Protection (Indexing of Benefits and Premiums)	
Issue Age	**4% vs 2.8%**
35	**+13%**
40	**+13%**
45	**+13%**
50	**+12%**
55	**+9%**
60	**+5%**
65	**+4%**
Average	**+8%**

If benefits are indexed at 2.8% but premiums are level (instead of also being indexed by 2.8%), then the initial premiums would be significantly higher as shown in the following table:

Inflation Protection at 2.8% But With a Level Premium	
Issue Age	**Level Premium vs 2.8% indexed premium**
35	**+43%**
40	**+37%**
45	**+32%**
50	**+31%**
55	**+29%**
60	**+25%**
65	**+22%**
Average	**+28%**

In addition to the initial premiums being much higher when premiums are level than when they are indexed, the error in the premium of missing the inflation assumption is

also much higher. When both benefits and premiums are indexed, the premium assuming 4% indexation is (on average) 8% higher than when assuming 2.8% indexation. With level premiums, the initial premium is 28% higher than when indexed by 2.8% (assuming a 2.8% indexation of benefits). But if benefits are indexed by 4%, then the level premium increases by an average of 23% instead of by 8%.

Inflation Protection (Indexation of Benefits) With Level Premiums	
Issue Age	**4% vs 2.8%**
35	**+34%**
40	**+31%**
45	**+29%**
50	**+26%**
55	**+22%**
60	**+18%**
65	**+14%**
Average	**+23%**

The variable inflation protection schedule offers greater inflation protection at younger ages. The reduced inflation protection at higher ages (where it is not as important) is a way to reduce premiums. Under this option, inflation protection is determined by age, with younger policyholders acquiring more inflation protection. This schedule is outlined below:

Age	Inflation Schedule at Each Age
<45	4.0%
45-55	3.5%
55-65	3.0%
65-75	2.5%
75-85	2.0%
85+	1.5%

Inflation Protection with Reduced Protection at Higher Ages (Both benefits and premiums are indexed)	
Issue Age	**Varies by Age at a fixed rate**
35	**-27%**
40	**-24%**
45	**-22%**
50	**-19%**
55	**-16%**
60	**-12%**
65	**-12%**
Average	**-16%**

Percent of Days on which Benefits are Received

The model assumes that benefits are paid in cash and that the daily maximum benefit is received every day while in claim. However, it is possible to model a service benefit. The model can also handle the situation where a claimant is given a choice between a (smaller) cash benefit and a (larger) service benefit. For example, the cash benefit could be equal to half of the service benefit payment. To model the effect of this benefit offering, the model first assumes that all Nursing Home and Assisted Living beneficiaries would receive the service benefit amount for every day in claim. To determine the portion of home care beneficiaries who elect to receive cash, data was used from an Institute for the Study of Labor (IZA) publication concerning the German long-term care model as well as data from the NLTCS. Once the proportions of home care beneficiaries who receive the cash and service benefit are determined, a factor can be applied to the home care benefit for each year to adjust the average daily benefit actually paid down to account for beneficiaries receiving the cash benefit.

According to the IZA publication, in 2003, 15% of German LTC beneficiaries not in a nursing home chose to receive the service benefit and 85% received the cash benefit. Of the 85%, those who are in assisted living would receive the service benefit under ARC's assumption. This portion of the beneficiaries is calculated using frailty data obtained from the NLTCS 1999 survey. Once the proportions of beneficiaries choosing the cash benefit and service benefit are determined, they can be weighted together assuming a benefit of 1 for service and 0.5 for cash. The resulting factor is applied to the home care benefits paid each year to estimate the decrease in benefit payments.

The percent of days for which a beneficiary receives benefits while in the community can be adjusted between 0% and 100%. Decreasing the percent of days in which a beneficiary receives benefits decreases premiums.

Percent of Days on which Benefits are Received	
Issue Age	**Sensitivity Value = 80% vs 100%**
35	**-17%**
40	**-17%**
45	**-16%**
50	**-16%**
55	**-15%**
60	**-16%**
65	**-15%**
Average	**-16%**

Premium Waiver while on Claim

The decision about whether or not to waive premium payments for CLASS beneficiaries will have a direct impact on the level of premiums needed to sustain the CLASS program. The premium waiver can be set to four scenarios:

1. No waiver of premium for any beneficiaries, i.e., all beneficiaries continue to pay premiums while on claim.
2. No waiver of premium for Home Care beneficiaries, only for Nursing Home beneficiaries.
3. No waiver of premium for Nursing Home beneficiaries, only for Home Care beneficiaries.
4. Waiver of premium for all beneficiaries.

The baseline premium includes a full waiver of premium for all beneficiaries. By lifting this waiver, premiums decrease because the number of policyholders paying premiums will increase to include those who are currently on claim. Waiving premium payments for all beneficiaries would lead to the highest level of CLASS premiums. A partial waiver results in lower premiums, and no waiver leads to the lowest level of premiums.

Premium Waiver While on Claim			
Issue Age	**HC Waiver Only vs Full Waiver**	**NH Waiver Only vs Full Waiver**	**No Waiver vs Full Waiver**
35	**-0%**	**-3%**	**-3%**
40	**-1%**	**-4%**	**-4%**
45	**-1%**	**-4%**	**-5%**
50	**-1%**	**-4%**	**-5%**
55	**-2%**	**-5%**	**-7%**
60	**-3%**	**-8%**	**-10%**
65	**-3%**	**-10%**	**-13%**
Average	**-2%**	**-6%**	**-8%**

The level of premium payments is not the only implication of a premium waiver. The uncertainly in the premium level in the future is affected by the decision to waive premiums. CLASS legislation grants the Secretary the authority to raise premiums in order to preserve the viability of the CLASS program. Premiums would need to be raised if the projected income is not enough to cover projected benefit payments. If the pricing of the CLASS policy is incorrect because of interest rate or utilization assumptions, the premium correction necessary to maintain program viability is less if there is no waiver of premium. The necessary premium correction increases for a policy with a partial premium waiver and is the greatest for a policy with a full premium waiver.

For example, suppose utilization is greater than anticipated, and after 10 years of operation, the decision is made to raise premiums in order to keep the program solvent. Below is a comparison of the necessary premium increase for each of the three waiver scenarios.

Necessary Percentage Increase in Premiums after Year 10		
	Utilization is 10% Greater than Anticipated	Utilization is 50% Greater than Anticipated
No Waiver	15%	74%
Partial Waiver	16%	78%
Full Waiver	18%	90%

Maximum Age and Duration of Policy for Premium Increase

The ARC CLASS model contains input parameters that allow the premiums to stop being increased for policyholders who have reached a specified age AND have held their policy

for a specified duration. In the baseline run, policyholders must be age 65 and have held their policy for 20 years in order to stop receiving premium increases. For options that include indexed premiums, increasing the age or duration necessary to qualify for a level premium will decrease premiums because policyholder premiums will increase for a longer duration. The following table shows the reduction in premiums when the age requirement for level premiums is increased from 65 to 75. Premiums for those aged 55 or older do not change because the 20-year requirement goes to age 75 or higher.

Maximum Age for Premium Increase	
Issue Age	**Age 75 vs Age 65**
35	**-2%**
40	**-4%**
45	**-4%**
50	**-2%**
55	**0%**
60	**0%**
65	**0%**
Average	**-1%**

The following tables shows the premium reductions when the 20-year requirement for a level premium is increased to 30 years. The premiums for those issued policies aged 35 or younger do not change because it takes 30 or more years to meet the age 65 requirement.

Maximum Duration for Premium Increase	
Issue Age	**30 years vs 20 Years**
35	**0%**
40	**-3%**
45	**-4%**
50	**-3%**
55	**-3%**
60	**-2%**
65	**-1%**
Average	**-2%**

Expense Factors

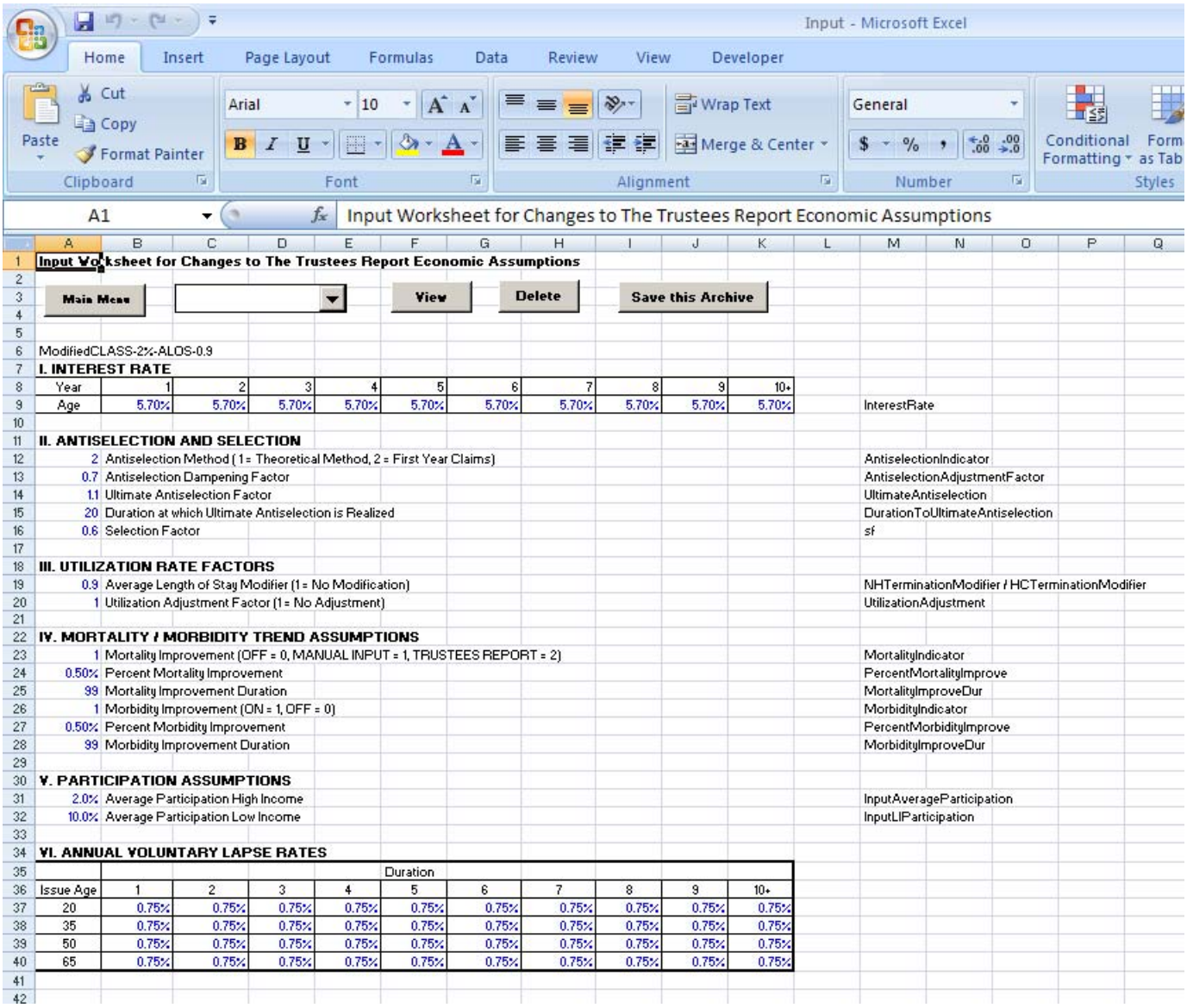
The model contains two parameters that can be used to load expenses into the premium calculation: one is a load as a percent of benefits, and the other is a load as a percent of premiums. The expenses as a percent of benefits variable allows the user to input a

percentage load on premiums for expenses. This load will follow the pattern of benefit payments, such as the expenses related to the administration of claims. Increasing the percentage will have the effect of increasing premiums. For example, a 4% load on benefits will increase premiums by 4%.

The expenses as a percent of premiums variable allows the user to input a percentage load on premiums for expenses. This load would follow the pattern of premium payments related to the collection of premiums, such as expenses related to premium billing and collection and for maintaining policies in force. Increasing this percentage will increase premiums by the reciprocal of one minus the load. For example, the 3% load in the baseline premiums results in a 3.1% (= 1/(1-3%)) increase in premiums. If this parameter were increased to 10%, then the increase from the baseline premium would be 7.8% (=.97/.9).

2. Actuarial Assumptions

The model has the capability to estimate results with various sets of actuarial assumptions. The "Assumptions" input worksheet allows a user to specify the average annual return on investment, antiselection factors, utilization rate factors, participation assumptions, and voluntary lapse assumptions. These assumptions do not vary according to the policy options, but are parameters used in the formulas to calculate premiums.



Expected Rate of Return (Interest Rate)

The expected rate of return can be set to any value by the user. Increasing the expected rate of return decreases premiums because benefits paid in the future are discounted at a greater rate. The increase in investment return means that fewer premium dollars are required to finance benefit payments. As can been seen below, the assumed expected rate of return has a significant impact on the premium level.

Expected Rate of Return		
Issue Age	**3% vs 5.7%**	**7% vs 5.7%**
35	**+47%**	**-14%**
40	**+44%**	**-14%**
45	**+43%**	**-14%**
50	**+41%**	**-14%**
55	**+35%**	**-13%**
60	**+27%**	**-11%**
65	**+24%**	**-9%**
Average	**+34%**	**-12%**

Antiselection and Selection Factors

Adverse selection is the idea that an individual's propensity to enroll in an insurance program is positively correlated to their risk. This means that individuals who are more likely to draw benefits from an insurance policy are more likely to enroll in the program than people who are healthy. This would imply that the insured population is frailer than the general population. In order to account for this increased frailty, adverse selection factors are used to increase the likelihood that a policyholder will draw benefits.

The model can use one of two approaches to antiselection: a theoretical approach or a first-year assumption regarding additional claims. The theoretical approach assumes that adverse selection is greatest at the time of issue, so the adverse selection factors for an individual decrease as the policy moves further from the enrollment date. This is true for two reasons: First, an individual's ability to predict their future health is greatest for the near future and becomes less accurate for the distant future. Second, if an individual does not go onto claim for many years after issue, it is an indication that their own perceived disabilities were not significantly greater than that of other policyholders.

The antiselection factor in the model varies by duration, the participation rate, and the prevalence rate of frailty. The model calculates antiselection factors dimensioned by sex, issue age, and duration and multiplies these factors by the respective incidence rates derived from general population survey data when calculating nursing home admissions and home care incidence, as described in Chapter VII on Benefit Payments. Perfect antiselection would mean that every single eligible person who is already frail and

immediately eligible for benefits would purchase a policy. Using both the actual prevalence rates and assumed participation for a given age and gender, we can construct an upper bound for antiselection as the reciprocal of the maximum of prevalence and participation. This maximum antiselection applies at duration zero.

The model also allows the user to build in a level of conservatism by not allowing the antiselection factor to fall below an ultimate value (set at 1.1 for the baseline) for all durations at and above a specified number (set at 20 for the baseline). This means that ultimately the average policyholder is assumed to be 10% more likely than the general population to become frail. For durations 1 through 19, the model does a geometric interpolation between the duration zero antiselection factor and the duration 20 antiselection factor.

The factor is further dampened to take into account that antiselection will not be perfect. The dampening takes the form of raising the antiselection factor to a user-specified power (set at 0.7 in the baseline). The CLASS Act has a 5-year vesting period before a policy holder is eligible for benefits, so the first relevant antiselection factor is that at duration 5.

Below is an example of the antiselection factor at duration 5 when the participation and prevalence rates are both 1%. The reciprocal of 1% is 100, which when raised to the 0.7 power equals 25.12. The geometric interpolation of 25.12 and 1.1 at duration 5 gives the antiselection factor (ASF, as used in Chapter VII):

ASF(1%, 5) = 25.12 ^ 0.75 * 1.1 ^ 0.25 = 11.49

Thus, the incidence rates for the appropriate age and sex would be increased by a factor of 11.49 in order to calculate the new claims at duration 5 when the participation rate is 1%. The 0.75 exponent is equal to 15 / 20, which is the fraction of the distance from 0 to 20 represented by the distance from 5 to 20, while the exponent 0.25 is the ratio of 5/20.

The table below shows the effect of increasing the antiselection damping factor from 0.7 to 0.85 when the participation rate is 2%.

Antiselection Dampening Factor (0.85 vs 0.70 baseline)		
Issue Age	**2% Participation Rate**	**6% Participation Rate**
35	**+23%**	**+15%**
40	**+20%**	**+12%**
45	**+17%**	**+9%**
50	**+14%**	**+8%**
55	**+13%**	**+6%**
60	**+15%**	**+7%**
65	**+16%**	**+7%**
Average	**+16%**	**+8%**

An alternative method for estimating the impact of antiselection is to estimate the number of people who are immediately eligible to enroll in the program and also meet the ADL or cognitive requirement to qualify for benefits. This method relies on counts of frail individuals in survey data as opposed to a comparison of prevalence rates from data and an assumed participation rate in the theoretical antiselection calculations. Under this alternative method, it is assumed that 100% of this frail population would: (1) choose to enroll in the CLASS Act the first year policies are offered, (2) survive the 5-year vesting period, (3) meet the work requirements, and (4) file a claim as soon as possible. After the first year in which benefits are paid, incidence rates for policyholders are assumed to be the same as general population incidence.

NHIS 2007-2009 survey data were used to determine the number of policyholders who would be eligible to file a claim in the first year that benefits are paid. Frailty prevalence rates for people age 18 to 64 are distributed by income, category of cognitive impairment, and number of ADLs. The number of first-year claims is then determined based on the user-defined input for these three categories. Once the number of first year claims is determined, the claims must be distributed by age, sex, and poverty status to be used in the model.

TABLE: NHIS 2007-2009 Survey Data

Frailty Prevalence Rate and Population (000) based on NHIS Data 2007-2009 - Ages 18 to 64		All Cognitive		Without ADD		Senility Only	
		2 or More ADLs	3 or More ADLs	2 or More ADLs	3 or More ADLs	2 or More ADLs	3 or More ADLs
Whole Population	Frail Population	2,651	2,005	1,865	1,589	1,155	830
	Prevalence Rate	1.39%	1.05%	0.98%	0.83%	0.60%	0.43%
Income Earners Only	Frail Population	623	571	480	428	234	176
	Prevalence Rate	0.35%	0.33%	0.27%	0.24%	0.13%	0.10%
$10K+ Earned Income	Frail Population	412	374	315	277	173	99
	Prevalence Rate	0.30%	0.27%	0.23%	0.20%	0.12%	0.07%
$15K+ Earned Income	Frail Population	314	308	262	229	148	112
	Prevalence Rate	0.24%	0.24%	0.20%	0.18%	0.11%	0.09%

Method of Antiselection	
Issue Age	**Additional First Year Claims vs Formula**
35	**-8.55%**
40	**-9.58%**
45	**-11.07%**
50	**-14.66%**
55	**-18.39%**
60	**-17.41%**
65	**-18.24%**
Average	**-14.99%**

This table illustrates how premiums are affected when using the additional first-year claims method of estimating antiselection versus the formula approach. Premiums for all ages decrease under the first year claims method of antiselection. This decrease is because the first-year additional claims method adds fewer additional claims over the life of the policy than the formula method. The first year additional claim method does result in a greater number of claims during the first year benefits are paid, however this method does not impact incidence in subsequent years. In contrast, the formula antiselection method increases incidence rates for the first 20 years of program operation.

The number of first-year claims above the income eligibility threshold and below the subsidy threshold is considered the number of below poverty claims. The remaining claims above the subsidy threshold are standard claims. The claim distribution resulting from the NNHS nursing home and the NLTCS home care incidence rates was used to distribute the number of first-year claims between nursing home and home care claims by age and sex. The distribution of claims by age and sex is the same for the above poverty population and below poverty population. The resulting claim distributions are used to calculate nursing home and home care incidence for the first year that benefits are paid.

Selection

Selection is the idea that the rules set up by the issuer of an insurance policy will allow only lower-risk individuals to participate. This would imply that the insured population is less frail than the general population. The CLASS Act requires that a policyholder earn income above a certain threshold during at least three years out of their five-year vesting period. The model uses a select period of ten years after the completion of the years of income requirement or age 75, whichever comes first. The model has an initial selection factor as an input and then uses a linear interpolation with a selection factor of 1.0 (i.e., no selection) as the ultimate selection factor to populate the array of selection factors by issue age and duration. The initial selection factor can be set by the user (it is 0.6 for the baseline) for ages under 65 (where the work requirement applies), but 1.0 for ages 65 and over. The 0.6 factor is based on tabulations of the HIS that show the prevalence of frailty for those that earn at least $1 per year is about 60% of the prevalence for the total population. The model then multiplies these selection factors, all of which are less than or equal to 1, by the relevant incidence rates when calculating nursing home admissions and home care incidence.

In theory, the selection factor of 0.6 should apply to any individual in a year when he is working. The selection factor should begin moving toward 1.0 in the year that the individual stops working. The model begins the trend toward 1.0 in the year after the work *requirement* ends, rather than when actual work stops. Thus, if there is a

requirement for three years of work, then the selection factor would begin moving toward 1.0 in the fourth year after issue. The table below shows the change in the premium if the selection factor is set to 0.8 instead of 0.6.

Selection Factor	
Issue Age	**0.8 vs 0.6**
35	**+1%**
40	**+1%**
45	**+1%**
50	**+1%**
55	**+4%**
60	**+8%**
65	**+6%**
Average	**+4%**

Utilization Rate Factors

There are two factors that can be used to change the general level of the utilization rates: one adjusts the level of the incidence rate and the other adjusts the average length of stay (for nursing home stays) and average lengths of episode (for home care stays). The input variable, Percent Morbidity Improvement, is provided to adjust the overall level of utilization for a given group of policyholders. This factor is applied to incidence rates and can be used to adjust the overall level of utilization up or down. When the average length of stay (episode) is changed, the model adjusts the continuance tables to match the new lengths of stay.

Mortality and Morbidity Trend Assumptions

Mortality Improvement can be: (1) manually set to a yearly rate of improvement, (2) read from the trustees report assumptions, (3) or turned off. If the user sets the annual rate of mortality improvement to be 0.5%, for example, then the age-sex specific mortality rate in one year is equal to the corresponding rate in the prior year multiplied by .995. The user may also limit the number of years of mortality improvement. Rates after this number of years become constant. Increasing mortality improvement increases life expectancy and therefore raises premiums because more policyholders live to higher ages where frailty rates increase.

When the parameter is set to use the Trustees Report assumptions, the model reads year-by-year the life tables used in the 2011 Trustees Report. These life tables result in rates of improvement that vary through time and by age and sex. The mortality rates at age 65 and the resulting average annual rate of improvement are shown in the following table:

Mortality Rates at Age 65 from the 2011 Trustees Report Alternative II Assumptions

Gender	2011	2085	Annual Rate of Improvement
Male	.015689	.007420	0.78%
Female	.010363	.005049	0.54%

Mortality Improvement			
Issue Age	**0.25% vs 0.50% baseline**	**Trustees Report vs 0.50%**	**No Improvement vs 0.50%**
35	**-2%**	**+3%**	**-5%**
40	**-3%**	**+1%**	**-6%**
45	**-2%**	**+2%**	**-5%**
50	**-2%**	**+2%**	**-4%**
55	**-2%**	**+2%**	**-4%**
60	**-2%**	**+1%**	**-3%**
65	**-1%**	**+1%**	**-2%**
Average	**-2%**	**+1%**	**-4%**

The duration of mortality improvement can be set by the user. The baseline premiums assume mortality improves over the entire projection period (which is 82 years for issue age 18). Shortening the duration of the mortality improvement will shorten life expectancy and decrease premiums.

Mortality Improvement Duration (with 0.5% annual improvement)	
Issue Age	**30 years of improvement vs no limit**
35	**-2%**
40	**-1%**
45	**-1%**
50	**-1%**
55	**-1%**
60	**-1%**
65	**-0%**
Average	**-1%**

Morbidity improvement is applied to utilization and decreases utilization of benefits because of assumed decrease in incidence of disease. Annual morbidity improvement works in a similar fashion to mortality improvement. For example, if the morbidity improvement factor is 0.5%, then the age-sex specific incidence rates (one for nursing home admissions and one for home care incidence) for a given year are equal to the corresponding rates for the prior year times .995. Morbidity improvement can be turned off or set to a manually input value. Increasing morbidity improvement will decrease premiums because it decreases the number of claimants.

Morbidity Improvement		
Issue Age	No improvement vs 0.5% baseline	0.25% vs 0.50%
35	+15%	+7%
40	+13%	+6%
45	+12%	+6%
50	+12%	+5%
55	+11%	+5%
60	+9%	+4%
65	+8%	+4%
Average	+10%	+5%

The duration of morbidity improvement can also be set by the user. The baseline premiums assume morbidity improves until the end of the projection period. Shortening the duration of the morbidity improvement will increase incidence and increase premiums.

Mortality Improvement Duration	
Issue Age	30 years vs no limit
35	3%
40	1%
45	1%
50	1%
55	0%
60	0%
65	0%
Average	1%

Average Participation

Assumed average participation can be entered for both low income and high income populations. The participation rates by age and sex for individuals above the poverty line are stored in the "Data" workbook. The low income participation rates are assumed to be constant by age and sex. Increasing participation decreases antiselection and increases program income. This results in lower premiums.

Average Participation		
Issue Age	**4% vs 2% baseline**	**6% vs 2% baseline**
35	**-8%**	**-13%**
40	**-10%**	**-14%**
45	**-10%**	**-14%**
50	**-10%**	**-14%**
55	**-11%**	**-15%**
60	**-15%**	**-21%**
65	**-16%**	**-24%**
Average	**-9%**	**-15%**

Lapse Rates

Lapse rates can be manually entered by the user for multiple issue ages and durations. The durations for which lapse rates are entered cover the first ten years of enrollment, and ages for which lapse rates are entered are 20, 35, 50, and 65. These rates are then interpolated across the range of issue ages. The baseline premiums assume a 0.75% lapse rate for all ages and duration. Increased lapse rates will decrease premiums because policyholders who lapse have paid more in premiums than they have received in benefits, and no benefits will be paid in the future. This excess of premiums over benefits can then be used to pay for benefits to continuing policyholders.

Lapse Rates		
Issue Age	**0.5% vs 0.75%**	**0.25% vs 0.75%**
35	**+3%**	**+5%**
40	**+2%**	**+5%**
45	**+2%**	**+5%**
50	**+2%**	**+5%**
55	**+2%**	**+4%**
60	**+1%**	**+3%**
65	**+1%**	**+3%**
Average	**+2%**	**+4%**

Under the law, an enrollee is considered to have lapsed from the CLASS program if they fail to pay premiums for three months. If the enrollee fails to pay premiums for less than five years, then they can reenroll but premiums will be set at the same level as a newly enrolled person. To become eligible for benefits, the enrollee will need to continue to make payments for the larger of A) The number of months left to pay before the lapse and B) 24 months. If the lapse lasts longer than five years, the person may reenroll, but will have to pay for the full 60 months to achieve eligibility and will have to pay premiums equal to a new enrollee of the same age plus a 1% penalty for every month of the lapse.

There are currently no provisions to return benefit reserves to lapsed or otherwise disenrolled participants. Therefore, when someone lapses or disenrolls and does not return to the program those benefit reserves are kept by the CLASS Independence Fund, which can reduce the overall premiums necessary to sustain the CLASS program. In addition, anyone who has a lapse of more than 5 years but returns will not keep their benefit reserves and will pay punitive premiums that are higher than someone who enrolls for the first time at the same age. People who lapse for less than five years and return will earn coverage with a shorter deferral period than someone entering the program for the first time (though no less than 24 months). This person will be more expensive to insure than someone entering the program for the first time, but they will still be paying the same premium. In the case of someone who lapses and returns in less than five years, the CLASS Independence Fund cannot keep the entire benefit reserve from the original lapse as a mechanism of reducing premiums.

Lapse-supported premiums rely on the assumption that lapse allows the CLASS Independence Fund to retain the benefit reserves from lapsed people. Expected benefits paid out are reduced by the noncoverage of people who lapse and then become frail. However, the people whose lapses are most significant are those who become frail shortly after they lapse. These are also going to be the most difficult to keep out of the program politically.

C. OUTPUTS

Upon each run of the model, five primary output tables are produced: premiums, fund operations, detailed nursing home benefit projections, detailed home health care benefit projections, and program demographic projections. Just as input settings can be saved, output results can be saved along with the corresponding inputs. This is convenient for keeping records of previous model runs, as well as comparing differences in outputs among different scenarios.

Premium Output

There are a few tables describing the premium calculation and resulting cohort premiums. One premium table shows the estimated present value of benefits and premiums by issue age for the first year's issues from which the issue-age premiums are derived. This table includes the calculated premium and cohort income, which can be compared to the expected benefit. Another table shows premiums by age at issue that result from the given input assumptions. These premiums are given for all ages within the specified issue age limits and all years within the specified years of issue. After the first year of issue, succeeding year's premiums are calculated by increasing the prior year's premium (at the same issue age) by the rate of increase in benefits, as opposed to projecting benefits and premiums.

Fund Balance Output

The cash flow table shows the year-by-year operations of the LTC trust fund, including income, outgo, and balance. Income is shown separately for premiums, interest, and (if applicable) other. Outgo is shown separately for benefits and expenses. The premium income is the result of the participation assumptions for each age by year and the premiums at each age. The fund is described by the change in the fund balance from the previous year and the overall fund balance at the end of the year. Premiums generally increase each year for any given age at issue, while premiums for past purchasers may or may not increase depending on the specifications of the law or regulations. Interest is a function of the assumed interest rate and the size of the trust fund. Benefits are based on a combination of incidence rates and average length of episode.

Cash flow is projected year-by-year for the policies issued in the first year by issue age and sex. The cash flow for each subsequent year is based on the cash flow from the first year of issue adjusted for increases in benefits, increases in premiums, changes in the inforce at each duration, and changes in the claim rates. The fund balance table accumulates the cash flow for all issue years.

Nursing Home and Home Health Benefits

The detailed nursing home benefits table shows the number of nursing home residents, the average yearly benefit, and total yearly benefits separately for males and females. The detailed home health care benefit table shows similar statistics for those residing in the community. This table also includes the daily maximum benefit amount for each year during program operation.

Demographic Projections

The demographic table shows premium payers and beneficiaries in nursing home and in home care. The premium payers are reported in total as well as broken out into those who pay the subsidized and unsubsidized premiums. Deaths, lapses, and new issues are shown by year, and the beneficiaries are reported as new incidences for the year as well as by the total number of current beneficiaries for nursing home and home care.

V. PARTICIPANTS

Participants (also called policyholders) are calculated by multiplying the eligible population times an assumed participation rate. Participation rates are assumed to vary by age and sex. The relative value of participation rates by age and sex were obtained from the participation rates observed in the Federal Government's and the California state government's LTC programs. The user can adjust the average level of these rates with an input parameter. Below are participation rates for 20, 40, and 60 year olds given average participation rates of 2%, 4%, and 6%.

	Average Participation		
Age	2%	4%	6%
20	0.46%	0.53%	0.60%
40	1.29%	2.40%	3.51%
60	5.26%	11.33%	17.40%

The eligible population is considered to be those workers aged 18 or over who earn above the required amount for participation. Workers are obtained by multiplying the US population times the labor force participation rate times one minus the unemployment rate. These calculations are performed by age, sex, and year. All of these assumptions are taken from the 2011 Trustees Report. The percentage of the workers who earn above a specified threshold is determined from data from the CPS.

Although the CLASS Act provides for a special premium for full-time students who work, the model does not take this provision of the law into account. Because students lose the right to the special premium once they are no longer students, it is assumed that the number of students taking advantage of this provision would be small.

Eligible Population

In order for a working individual to qualify for enrollment in the CLASS program, he must have earned at least an amount equal to that necessary to be credited with a quarter of coverage under the Social Security Act. In the ARC model, the income threshold for eligibility to the CLASS program can be adjusted to any level desired. The March 2009 CPS was used to obtain an income distribution of the United States labor force. This distribution contains counts of workers in various income bands by age and sex, and was used to estimate the proportion of workers who earn income greater than or equal to the defined income threshold. Once the segment of workers who fall below the income threshold is removed, the eligible population has been defined. The ARC model allows the user to set a second (higher) income threshold to determine the population eligible for a premium subsidy for low-income individuals. The law specifies that this level is the poverty line.

New Issues

CLASS program participants are calculated from the eligible population using program participation rates for each age and sex. Participation rates can be input at any level, from a fraction of 1% to 100%. Based on the data from the Federal and California LTC programs, the participation rates increase with age. Because of the 3-year work requirement, we calculate premiums up to issue age 65, although there may be a few issues at higher ages. Age limits may be entered to specify the upper and lower bounds of the individuals that may participate in the program.

The first year that individuals may participate in the CLASS program, the model calculates new issues as the assumed participation rate times the eligible population (for each age and sex separately). In all future years, the model first calculates the increase in the participation rate from each age to the next higher age. This increase in the participation rate is then multiplied by the eligible population to determine new issues.

Inforce Policies

Continuing policyholders are calculated using the mortality and lapse rates in the input assumptions for the model: the rates of survival and of lapsing on the policy are applied to the new issues and inforce policies each year to determine the policies inforce for the subsequent year. In this manner, each age cohort is "followed" in the model through to the end of life, which is assumed to be 100.

Lapses

In any insurance program, enrollees may stop making payments on a policy. When this happens, coverage terminates and the policy is said to have "lapsed." In order to take this behavior into account, the model allows the user to input lapse rates that are used to model current enrollees who drop out of the insurance pool. The model allows the lapse rates to vary by issue age and duration.

Lapse rates in private industry have proved to be very low (often about 1% or less per year). There should be some concern regarding lapse-supported products. The

assumption of lapse reduces premium levels, because much of the premiums paid in the years just after issue are not needed to pay benefits but are set aside in the form of reserves for future benefit payments. The reserve can be thought of as investment by policyholders in the policy. Once they lapse, this investment is lost and returned either to the fund or to other policyholders in the form of lower premiums. If actual lapses turn out to be less than assumed, then premiums may have to be increased. The concept of losing one's investment upon lapse may also result in politicians creating some form of nonforfeiture benefit at a later date.

The model calculates the persistency of each cohort of policyholders from one year to the next taking into account both lapse and mortality. The persistency rate is one minus the decrement rate. Thus, the number of policyholders persisting from one year (at age x) to the next year (at age x+1) is projected according to the following formula:

$P(x+1) = P(x) * (1-lr) * (1-dr)$

Where:
$P(x)$ = the number of policyholders in force at age x
lr = the lapse rate (which is specific to age at issue and duration)
dr = the death rate (which is specific to age and sex)

The number of lapses is calculated as a proportionate share of the total difference in inforce policies for an age cohort from one year to the next, i.e., $P(x) – P(x+1)$.

Deaths

When an enrollee dies, they are removed from the insurance pool. Participant deaths are modeled based on the mortality assumptions obtained from the 2011 Trustees Report, which vary by age, sex, and year. Alternatively, mortality can start with the 2011 TR mortality table and then be trended by user specified annual rates of decline.

VI. TRUST FUND INCOME (PREMIUM PAYMENTS AND INTEREST)

The model simulates trust fund operations over the period from 2012 to 2094. Several properties of the fund are tracked and reported by year to illustrate fund activity. Total fund income is calculated each year as the sum of premiums collected and interest income. Fund expenditures for each year are calculated as the sum of benefit payments and administrative expenses. The increase in the fund for the year is measured as the fund income less fund expenditures, and this amount is added to the fund balance from the beginning of the calendar year to obtain the end of year balance.

Premium income is calculated as the sum of all premiums paid by inforce members for a given year. The model varies premiums by issue age, issue year, and income status. According to the CLASS Act, premiums may be specific to an individual if he has lapsed for more than 3 months and then reenrolled. The model does not take this behavior into account. Premiums for the first year of issue (i.e., 2012) are calculated for each cohort (i.e., each issue age) by projecting benefit payments and premium payments for each year until the end of life (assumed to be age 100).

Once the premiums are estimated by age for the first year of issue, they are projected for new issues in future years at the same rate as the increase in benefit levels (which is the CPI-U for the CLASS Act). This assumption ignores trends in any other factors, such as: mortality, utilization rates, and participation rates. Because premiums vary by age and issue year, the number of policies inforce is tracked by age and issue year as well. Thus, premium income for each year the program is equal to the number of premium-paying policyholders in a given year (remember some policyholders in claim status may have premiums waived) disaggregated by year of issue and age at issue times the appropriate premium. Thus, the general formula for premium income is calculated according to the following formula summed over all issue years and issue ages:

PI(ia, dur) = PRM(ia, iy) * (1 + prm index) ^ dur * number of premium payers

When there is a low-income subsidized premium, then the above formula is applied

separately to the low-income participants using the low-income premium.

Interest income is calculated as the interest rate for a given year multiplied by the starting fund plus half of the change in fund balance (income – expenditures). This assumes that program income is uniformly distributed by month over the course of each year.

VII. BENEFIT PAYMENTS

Benefit payments are calculated by multiplying the number of beneficiaries times the average number of days in an episode of care times the daily benefit amount. Benefit payments are split into years by the use of continuance tables. This allows for the proper indexation of benefits and the discounting for present values. These calculations are done separately for those in a nursing home and those in home care. For those in a nursing home an episode of care is referred to as the length of stay and the beginning of the episode is marked by the admission into a nursing home. Key to the calculation of beneficiaries is the concept of an incidence rate, which is the number of persons with a new episode of care during the year divided by the number exposed to such an incident in the middle of the year. This is as opposed to a prevalence rate, which is the number of beneficiaries at any point in time divided by the total number of participants at that time.

The number of new beneficiaries each year is calculated as the number of policyholders not already in claim status times the incidence rate of new episodes of care. The incidence rate is adjusted for the effects of antiselection and selection. Thus, the general equation for the number of new beneficiaries each year is:

$$NHA = (P - NHC) * IR * ASF * SF$$

Where:
NHA = the number of admissions to a nursing home each year
NHC = the number of beneficiaries already in a nursing home, i.e., in claim status
P = the number of policyholders in force

IR = the incidence rate
ASF = the antiselection factor
SF = the selection factor

The term (P - NHC) is referred to as the exposure to admission. The number of beneficiaries in claim status in home care is not subtracted from the number of policies to determine the exposure to admission because those in home care could transfer into a nursing home, just as those not yet in claim status could be admitted directly to a nursing home.

A similar equation is used to calculate the number of new beneficiaries that start an episode of care at home or in the community.

HCE = (P – HCC) * IR * ASF * SF

Where:
HCE = the number of episodes of care that start in home care each year
HCC = the number of beneficiaries already in home care, i.e., already in claim status

The ARC Model keeps track of new claims by age, sex, year of claim, issue year, and subsidy status. The dimensions of age, sex, and year of claim are necessary for projection purposes, because the continuation in claim depends on age, sex, and duration in claim. The dimension of issue year is kept track of for purposes of calculating premiums. Each year of issue must be charged a premium that will support that cohort from issue until the end of life. Therefore, the experience of each cohort of new policy issues is kept track of separately, and each is charged a unique premium. The dimension of subsidy status is kept track of separately because those with subsidized premiums (i.e., those whose income is below the poverty line) pay only $5 per month, while everyone else must pay for themselves plus subsidize the premiums for those with low income.

Therefore, in the ARC Model, the variables for new beneficiaries would look like this:

NHA(age, sex, claim year, issue year, subsidy status) and
HCE(age, sex, claim year, issue year, subsidy status)

The incidence rates vary by age, sex, and the number of activities of daily living (ADLs) needed to qualify for benefits, which is either 2+ or 3+ ADLs. There are six ADLs listed in the law: eating, toileting, transferring, bathing, dressing, and continence. Participants may also qualify for benefits based on cognitive impairment. Although this is taken into account in the model's incidence rates, the rates of cognitive impairment do not vary with the level of ADLs needed to trigger benefit payments.

Total benefit payments for each new episode of care (i.e., for each new claim) is determined by disaggregating the average length of episode into up to 25 calendar years. The disaggregation is done by using a continuance table, which gives the fraction of total days that occur above selected durations in each episode of care. For example, for a new episode of home care that starts at age 65, the average length of care for a female with 2+ ADL is 1,328 days. The continuance table for an episode of care that starts at age 65 shows that .886 of the days of care are above the 6^{th} month, .691 are above the 18^{th} month, .535 are above the 30^{th} month, etc. Thus, the number of days of care in the first several calendar years from incidence would be determined as follows:

D(0) = ALOE * (1 - CT(6)) = 1328 * (1 - .886) = 1328 * .114 = 151.4
D(1) = ALOE * (CT(6) – CT(18)) = 1328 * (.886 - .691) = 1328 * .195 = 259.0
D(2) = ALOE * (CT(18) – CT(24)) = 1328 * (.691 - .535) = 1328 * .156 = 207.2
…
Where,
D(0) = the average number of days of benefit payments in the calendar year of incidence (assuming that new claims occur on average at the midpoint of the year)
D(1) = the average number of days of benefit payments in the calendar year after incidence

D(2) = the average number of days of benefit payments in the second calendar year after incidence
ALOE = average length of episode
CF(n) = the value from the continuance table at duration n months

It can be seen that eventually the value in the continuance table will reach zero, and that the summation of all fractions applied to the ALOE will equal 1.0, so that all days in the ALOE will be allocated to a calendar year. The user may also specify a deductible period and / or a lifetime maximum. In such cases, the continuance table also determines whether the day of frailty is a day in benefit status.

Continuance Table Adjustments

An input is provided in the "Assumptions" tab of the input workbook that allows the user to manually adjust the average length of stay. This factor, referred to as the "Average Length of Stay Modifier," allows the user to scale the average length of stay up or down to simulate longer or shorter long-term care stays. When the user modifies the average length of stay the Model adjusts the continuance table to match the new length of stay by adjusting the probabilities of termination between thresholds in the table. Specifically, this adjustment is performed by first transforming the continuance probabilities into termination rates by dividing the probabilities at each threshold by the probability at the prior threshold and subtracting from 1. After the termination rates are obtained between each threshold, they are multiplied by factor to get adjusted termination rates. The factor that produces the assumed average length of stay is found and used to adjust the termination rates. The continuance table is then reconstructed using these modified termination rates.

VIII. PREMIUM FORMULA

The model calculates long-term care premiums on a closed-group basis until the end of life for each cohort separately beginning in the year 2012. A cohort represents all policies issued in a single year to a single year of age. This is the actuarially accepted practice for

individually equitable premiums (as opposed to premiums with built-in cross subsidies) for policies sold on a voluntary basis. Premiums calculated in this manner do not rely on premiums from future purchasers to support the benefit payments to past purchasers, as is the practice for social insurance programs such as Social Security and Medicare. A common practice for judging the financing of social insurance programs is to do a 75-year open group projection.

It is important to realize that a premium cannot be precisely calculated for a LTC policy that increases premiums or benefits by some index (such as the CPI) that cannot be known for all future years at the time of the premium calculation. The premium calculation can use assumptions about these indices for the future. However, if these assumptions turn out not to be realized (which will occur 100 percent of the time) then the premiums will not be accurate. Premiums can be precisely calculated in an actuarial manner if assumptions used to represent these indices are specified (such as 2.8 percent per year), and then in the actual operation of the program, the premiums and benefits are increased at the rate of the stated assumption and not by the actual index.

The premium calculation starts by projecting the cash flow separately for each issue age until the end of life (assumed to be age 100) for the last remaining individual in the cohort. Cash flow includes premium payments, nursing home and home health care benefit payments, and administrative expenses.

Administrative expenses are those costs that are not included in the cost of benefits paid to policyholders: wages for the government workers that administer the program, processing fees, the provision for office space, and computers are examples of administrative costs. The law specifies that premiums cannot be loaded by more than 3% for administrative expenses, although it does not rule out the financing of administrative expenses from other sources. The loading percentage is a user input.

Because the level of the premium payment stream cannot be know before the level of the premiums are calculated, the premium stream is initially calculated using a premium of $1

per month (which is indexed if so specified by the user). The premiums are then calculated by determining the level of premiums such that the present value of premiums is equal to the present value of benefits and expenses for each issue age separately. Administrative expenses are specified by the user as a percent of premiums. The equation for the premium for a given issue age cohort is as follows:

Premium = PVCohortBenefit / [(1 – PPAdmin) * PVCohortIncome]

Where,
PVCohortBenefit = the present value of the estimated stream of future benefit payments
PVCohortIncome = the present value of the estimated stream of future premium payments starting at $1 per month
PPAdmin = the percent of premium load for administrative expenses

Premium Indexing Options

Under the federal long-term care program outlined in the CLASS Act, there are certain triggers that will stop premium increases for inforce policies. An enrollee's premium will cease to increase after an enrollee has paid premiums in the program for at least 20 years, is aged 65 or over, and is unemployed. It is not clear if these provisions of the law apply only to unexpected increases, as opposed to those that are specified at the time of issue. The model user can specify whether automatic, planned increases stop at a specified age or specified duration. If activated, these premium indexing parameters are taken into account when accumulating the stream of future premium payments. Of course, a level premium can also be modeled by entering 0.0% in the premium indexing input parameter.

Low-Income Premium

The CLASS Act guarantees a low premium to individuals whose income falls below the poverty line, as well as employed students who are less than twenty two years of age. This low-income premium starts at $5 per month and can be indexed upward for each year after 2012. Taking this lower premium into account results in increased premiums

for enrollees above the poverty threshold, because their premiums must subsidize the difference between the low-income premium and the actuarially fair premium. The model allows the user to specify an income level different than the poverty line for eligibility for the low-income premium. If this level is set higher than the amount required to be eligible for the CLASS program, then no one would qualify for the low-income premium.

March 2009 CPS data were used to determine the proportion of workers who fall below the poverty line and the model sets the participation percent for the low-income population by age as input parameters. The premium adjustment to account for the low-income subsidy is calculated on an aggregate basis (i.e., across all ages) with all unsubsidized policyholders having their premiums increased by the same percent. The model first calculates the present value of the total shortfall for the low-income policyholders by accumulating the difference between the PVCohortBenefit and the PVCohortIncome (assuming a $5 initial premium) across all years of birth. After also accumulating the present value of the total benefits for the above poverty threshold participants across all years of birth the premium adjustment is calculated as follows:

PremiumAdjustment = (PVShortfallTotal + PVBenefitsTotalAbove) / PVBenefitsTotalAbove

The calculated preliminary premiums for all issue ages are multiplied by this Premium Adjustment Factor to determine the actuarially balanced premiums for the above poverty population including the low-income subsidy.

Premiums with Periodic Cash Benefit and Death Benefit

To calculate premiums when modeling a periodic cash benefit or death benefit that is a function of the premium, the present value of the benefit is calculated as a percentage of the present value of the total cohort premium payments (i.e., cohort income). This factor is then applied in the denominator of the premium calculation in a manner similar to that for the percent of premium administrative expense load as follows:

CashBenefitFactor = pvCashBenefit/pvCohortIncome
DeathBenefitFactor = pvDeathBenefit/pvCohortIncome
Premium = PVCohortBenefit / (0.97 * (1-CashBenefitFactor-DeathBenefitFactor)*PVCohortIncome)

In this way, the premiums are increased to account for the additional benefits being paid for the cash benefit and/or death benefit. These benefits can be modeled independently or concurrently.

Premiums for Initial Issue Year by Issue Age

The premium calculation starts by projecting the cash flow separately for each issue age from the age at issue until the end of life. Cash flow includes premium payments, nursing home and home health care benefit payments, and expenses. Premiums are calculated so that the present value of premiums is equal to the present value of benefits and expenses for each issue age separately. The premium calculation can be characterized as being on a closed-group basis until everyone in the group has died. This is the actuarially accepted practice for individually equitable premiums (as opposed to premiums with built-in cross subsidies) for policies sold on a voluntary basis. Premiums calculated in this manner do not rely on premiums from future purchasers to support the benefit payments to past purchasers, as is done for social insurance programs such as Social Security and Medicare.

Premiums for All Issue Years by Issue Age

The premiums obtained for the initial issue year are projected to all other issue years using the CPI-U. These premiums are used in the simulation of the long-term care program over the specified time period. The premiums are the basis for calculating the fund balance over the length of the simulation.

IX. FUND OPERATIONS

After the premiums are calculated, the second iteration of the model simulates the operation of the trust fund for the long-term care program for an eighty-three year period, from 2012 to 2094. This is long enough for those participating at age 18 in 2012 to reach age 100. The fund output worksheet summarizes the year-by-year cash flow of the program over the long-range projection period. Income includes premiums and interest earned on the fund balance and outgo includes all benefits and administrative expenses.

The premium stream and benefit stream for new issues after 2012 are based on the projected stream for those issued policies in 2012, adjusted for the size of the new issue cohort and increases in premium and benefit levels. The projections are done separately by issue age, sex, and subsidized/unsubsidized premium groups.

In the second iteration, the number of new participants in each calendar year is determined by issue age, sex, and subsidized/unsubsidized premium group. Each new cohort is projected through time by applying death rates and lapse rates. Thus, for every calendar year, each age and each sex, the number of policies inforce is stored by the year of issue.

Premium Income

Premium income to the trust fund is based on the premiums calculated in the first iteration of the model (as opposed to a $1 premium). In the first iteration, premiums are determined for each issue age for new policy issues in 2012 (the first year of premium payments) for those in the low-income and the unsubsidized income groups. For those who are issued policies in 2012, these initial premiums are indexed according to user specifications (i.e., no indexing, indexing for life, or indexing up to some specified age and / or duration). For those who are issued new policies after 2012, the premiums calculated for 2012 are indexed up to the new issue year at the same rate as benefits are indexed (reflecting the higher benefit payments for each new year of issue) and then

indexed after the new issue year in the same manner as specified by the user in the policy options.

Aggregate (or total) premium payments in each calendar year are then the result of the sum product of the number of premium payers classified by issue age, issue year, and subsidized/unsubsidized times the appropriate annual premium level.

Benefit Outgo

For each calendar year, the first iteration of the model calculates by issue age, sex, and subsidized/unsubsidized premium groups the number of new claims, the number of beneficiaries on claim, and the amount of benefit payments for those in a nursing home and those in home care. In the second iteration of the model, these numbers are used to project the cash flow for subsequent cohorts, adjusted for the size of each cohort and the indexing of benefit levels.

A REPORT ON THE ACTUARIAL, MARKETING, AND LEGAL ANALYSES OF THE CLASS PROGRAM

For additional information, you may visit the DALTCP home page at http://aspe.hhs.gov/_/office_specific/daltcp.cfm or contact the office at HHS/ASPE/DALTCP, Room 424E, H.H. Humphrey Building, 200 Independence Avenue, SW, Washington, DC 20201. The e-mail address is: webmaster.DALTCP@hhs.gov.

Files Available for This Report

Main Report [48 PDF pages]
http://aspe.hhs.gov/daltcp/reports/2011/class/index.shtml
http://aspe.hhs.gov/daltcp/reports/2011/class/index.pdf

APPENDIX A: Key Provisions of Title VIII of the ACA, Which Establishes the CLASS Program [6 PDF pages]
http://aspe.hhs.gov/daltcp/reports/2011/class/appA.htm
http://aspe.hhs.gov/daltcp/reports/2011/class/appA.pdf

APPENDIX B: HHS Letters to Congress About Intent to Create Independent CLASS Office [11 PDF pages]
http://aspe.hhs.gov/daltcp/reports/2011/class/appB.htm
http://aspe.hhs.gov/daltcp/reports/2011/class/appB.pdf

APPENDIX C: Federal Register Announcement Establishing CLASS Office [2 PDF pages]
http://aspe.hhs.gov/daltcp/reports/2011/class/appC.htm
http://aspe.hhs.gov/daltcp/reports/2011/class/appC.pdf

APPENDIX D: CLASS Office Organizational Chart [2 PDF pages]
http://aspe.hhs.gov/daltcp/reports/2011/class/appD.htm
http://aspe.hhs.gov/daltcp/reports/2011/class/appD.pdf

APPENDIX E: CLASS Process Flow Chart [2 PDF pages]
http://aspe.hhs.gov/daltcp/reports/2011/class/appE.htm
http://aspe.hhs.gov/daltcp/reports/2011/class/appE.pdf

APPENDIX F: Federal Register Announcement for CLASS Independence Advisory Council [3 PDF pages]
http://aspe.hhs.gov/daltcp/reports/2011/class/appF.htm
http://aspe.hhs.gov/daltcp/reports/2011/class/appF.pdf

APPENDIX G: Personal Care Attendants Workforce Advisory Panel and List of Members [6 PDF pages]
Full Appendix http://aspe.hhs.gov/daltcp/reports/2011/class/appG.htm
http://aspe.hhs.gov/daltcp/reports/2011/class/appG.pdf

Ga: Federal Register Announcement for Personal Care Attendants Workforce Advisory Panel http://aspe.hhs.gov/daltcp/reports/2011/class/appGa.pdf

Gb: Advisory Panel List of Members http://aspe.hhs.gov/daltcp/reports/2011/class/appGb.pdf

APPENDIX P: June 22, 2011 Technical Experts Meeting [46 PDF pages]

Full Appendix http://aspe.hhs.gov/daltcp/reports/2011/class/appP.htm
http://aspe.hhs.gov/daltcp/reports/2011/class/appP.pdf

Pa: Agenda and Discussion Issues and Questions http://aspe.hhs.gov/daltcp/reports/2011/class/appPa.pdf

Pb: Presentation Entitled “Core Assumptions and Model Outputs” http://aspe.hhs.gov/daltcp/reports/2011/class/appPb.pdf

Pc: Presentation Entitled “Actuarial Research Corporation’s Long Term Care Insurance Model” http://aspe.hhs.gov/daltcp/reports/2011/class/appPc.pdf

Pd: Presentation Entitled “The Avalere Long-Term Care Policy Simulator Model” http://aspe.hhs.gov/daltcp/reports/2011/class/appPd.pdf

Pe: Presentation Entitled “Alternative Approaches to CLASS Benefit Design: The CLASS Partnership” http://aspe.hhs.gov/daltcp/reports/2011/class/appPe.pdf

APPENDIX Q: Table 2: Actuarial and Demographic Assumptions [2 PDF pages]
http://aspe.hhs.gov/daltcp/reports/2011/class/appQ.htm
http://aspe.hhs.gov/daltcp/reports/2011/class/appQ.pdf

APPENDIX R: Figure 1: Daily Benefit Amount for Increased Benefit [2 PDF pages]
http://aspe.hhs.gov/daltcp/reports/2011/class/appR.htm
http://aspe.hhs.gov/daltcp/reports/2011/class/appR.pdf