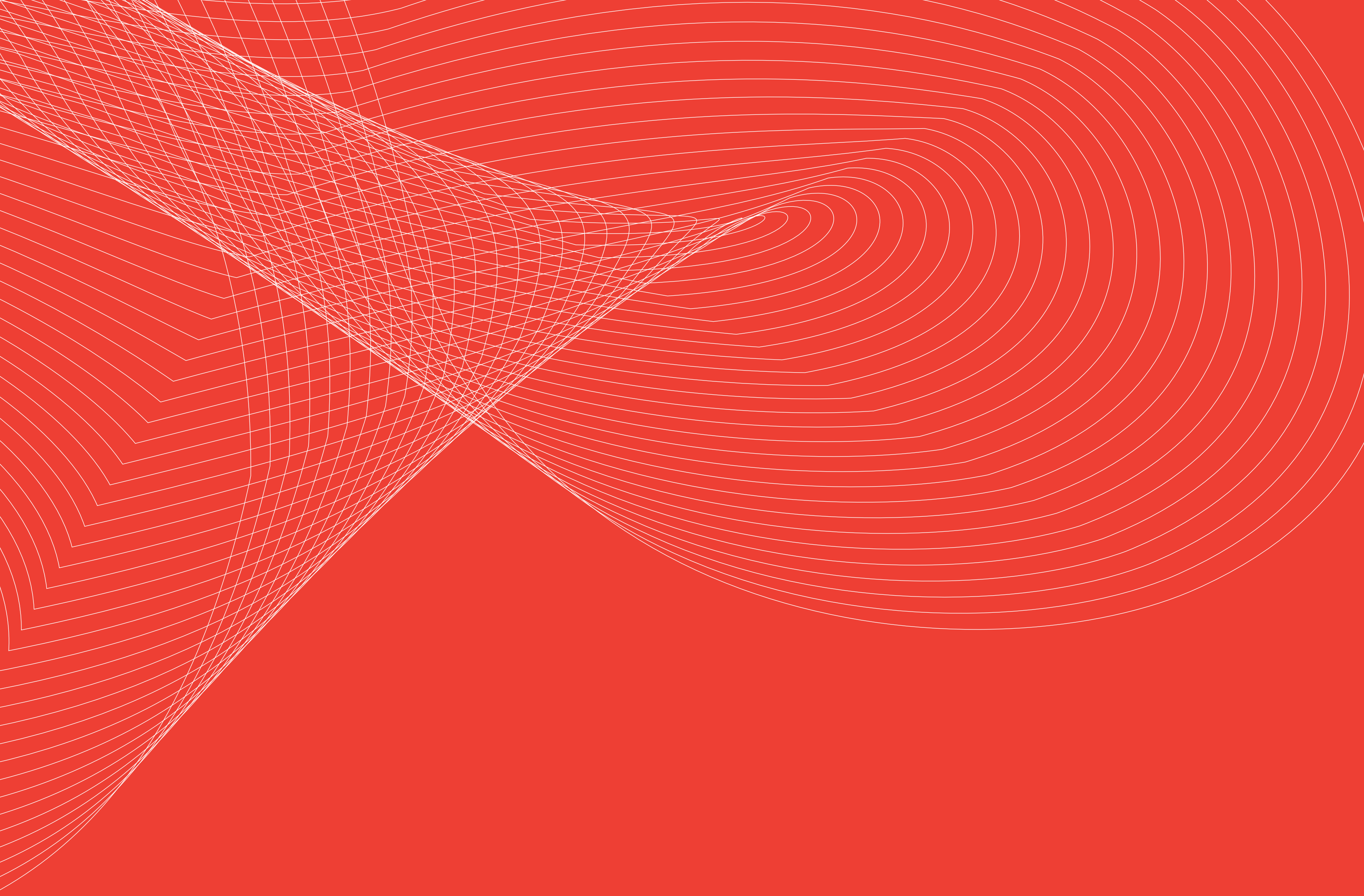
Technical Assumptions Informing an Interactive, Web-based Model of Public Long-Term Care Insurance Programs /

April 2010

Avalere®



The SCAN Foundation provided funding for this research. **Avalere Health** maintained editorial control and the conclusions expressed here are solely those of the authors.

Introduction

The recently passed Patient Protection and Affordable Care Act contains a provision that supporters hope will help shift the United States from a Medicaid financed long-term care (LTC) system to a premium funded, public long-term care system. This legislation, the Community Living Assistance Services and Support (CLASS) Act, has attracted support, in part because it addresses two policy concerns. The first is that the need for LTC is an insurable event for which few Americans have coverage. Related to that is the concern that limitations of private LTC insurance prevent it from serving as the source of this coverage for most Americans.

Without effectively implemented reform, this country's long-term care system and the people who use it will continue to experience significant funding and delivery gaps. Individuals who need LTC rely on unpaid family members and friends or dip into their home equity, personal savings, and other out-of-pocket dollars to finance home care, assisted living, or nursing home care. Medicaid has become the country's long-term care safety net for individuals who exhaust their individual and family resources. However, the federally and state-funded program pays for nursing home care but does not guarantee access to home and community-based services. Only seven percent of Americans currently have private long-term care insurance coverage.

Policymakers have recognized the need for reform since at least 1990, when the Claude Pepper Commission issued a landmark report calling for the U.S. to improve the way it pays for long-term care. Still, in 2010, with inevitable demographic changes looming that will dramatically increase the portion of the population 85 years and older, nearly every American remains vulnerable to the personal and financial devastation of a long-term illness or disability. In addition, the reliance on Medicaid as a major LTC financing mechanism will further complicate states' ongoing budget challenges.

There are several reasons it has taken 20 years for Congress to pass widespread change such as the CLASS Act. First, the financial vulnerability associated with long-term care is hidden from the vast majority of Americans who might otherwise demand reform. Many Americans incorrectly believe Medicare covers extended nursing home stays. Second, federal policymakers have been focused on other health-related priorities such as enacting a Medicare drug benefit and covering the uninsured. Finally, policymakers worry robust long-term care reform would require enacting an expensive new federal program that would drain resources from deficit reduction and other spending priorities.

Budgetary concerns largely have existed in a vacuum of information about the real cost of long-term care reform. Aside from recent estimates of the CLASS Act, the Congressional Budget Office (CBO) in 1997 estimated legislation to create a comprehensive Medicaid personal care services program would cost between $10 billion and $20 billion per year.1 With few other CBO estimates of LTC legislation, federal policymakers have had little opportunity to weigh a variety of policy options relative to their federal budgetary effects.

The SCAN Foundation (TSF) commissioned Avalere Health, LLC (Avalere) to create a web-based, interactive model capable of addressing this information gap and contributing analytic foundation to the long-term care reform debate. The model is intended to show how a variety of approaches to creating a federal, public long-term care insurance program would affect not only premium amounts but other important policymaking criteria, such as participation rates and federal spending. This paper provides technical details about the methodology and assumptions we used to build the underlying Excel-based model that generates the website output.

Overview of Model and Methodology

Avalere constructed the website's underlying Excel-based model between April 2009 and February 2010 and convened an external Technical Advisory Group (TAG) three times to review the development of the model. We wish to express gratitude to the TAG for its input on the construction of the Long-Term Care Policy Simulator (the LTC-PS), review of the final product, and advice throughout the project.[1] Any issues that remain are solely the responsibility of Avalere.

Website Policy Options. The LTC-PS Model permits website users to design a new federally run LTC program through the selection of different policy options. In general, the Model allows users to vary policy options for either a benefit that pays cash or pays directly for services. It also either mandates enrollment of a certain population or allows enrollment to occur on a voluntary basis. The policy options that users are allowed to vary in the Model are:

- Participation: Mandatory or voluntary
- Type of benefit: Cash or services
- Eligibility: Attached to the workforce or open to all persons
- Vesting requirement: Zero or five years
- Daily benefit amount (for cash benefit): $50, $75, or $100
- Co-pay and deductible (for service benefit): 20 percent co-pay and $500 deductible or no co-pay and deductible
- Length of benefit: Lifetime, five years, four years, three years, or one year
- Low-income subsidy: Persons under 150 percent of the federal poverty level (FPL), persons under 100 percent of the FPL, or no subsidy
- Funded through premiums: 100 percent, 75 percent, or 50 percent

After selecting each of the options, the user can see outputs pertinent to a federally run LTC insurance program, including items such as monthly premium, potential Medicaid savings, estimated enrollment in the program, and percent of people with disabilities covered by the program.

---

[1] The Technical Advisory Group consisted of: Harriet Komisar, Ph.D., Hilltop Institute; Peter Kemper, Ph.D., Pennslyvania State University; Josh Wiener, Ph.D., RTI International; John Wilkin, FSA, MAAA, Actuarial Research Corporation; William Marton, Department of Health and Human Services, Assistant Secretary for Planning and Evaluation, Office of Aging and Disability Policy; and John Drabek, HHS/ASPE

Basic Model Construction. In order to produce output for this array of policy options, we created a model that includes two basic approaches to LTC reform. In one approach, the benefits provided would be cash, like Social Security. In the other approach, the benefits provided would be services, similar to Medicare. To begin, our model assumed that participation in both of these programs would be mandatory.

Estimating Beneficiaries. For either approach, however, we had to first estimate the population that would qualify for benefits in any given year. This required taking current estimates of the prevalence of disability at the level that would qualify for benefits and projecting those numbers into the future. The projections of prevalence were then used to develop estimates of how many people become newly disabled (incidence) each year and how long they remain disabled (continuance). The incidence and continuance projections are important because they allow us to estimate the costs of programs that pay benefits for defined periods of time. For example, if some portion of people receiving benefits live for four years after developing a severe disability, and the policy is designed to pay for five years of benefits, we know that the program will pay benefits for this group for only four years, not five. That fact has important implications for program costs. Incidence and continuance rate projections also allow for estimating the impact of the vesting requirement, which is the other policy variable related to time.

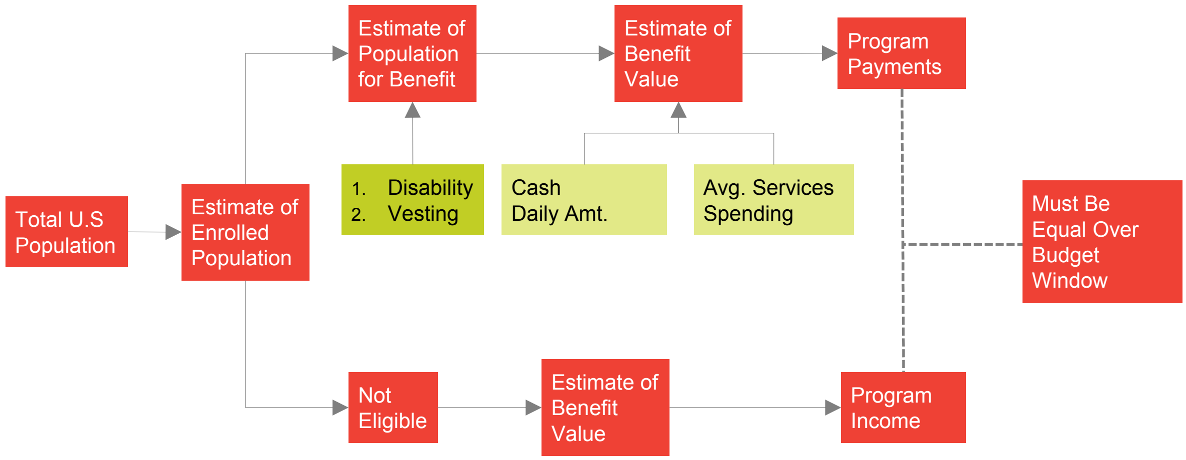
Estimating Costs per Beneficiary. Estimating the per-beneficiary costs for a program that pays cash is relatively straightforward. Cash that is not spent right away can accumulate and be used for a large purchase. We assumed that everyone qualifying for benefits would use their full cash allotment. This daily allotment, whether $50, $75, or $100, is multiplied by the number of people whose disability entitles them to benefits, provided they have met other program requirements such as vesting and work requirements. The result is the program cost.

Estimating per-beneficiary costs for a program that pays directly for services is more complicated because there is no hard cap on the amount of services the program will buy for the average beneficiary. To determine the average amount the program will spend for services per beneficiary, we looked at past utilization of LTC services. We also made assumptions about how service use would change with the availability of a program that paid for services not currently financed such as assisted living and home care. These assumptions allowed us to arrive at an average cost per beneficiary for the services benefit. Multiplying the average cost by the number of beneficiaries provides a total program cost.

Premiums. In the most basic set of policy options, the premium equals the total program cost divided by the healthy enrolled population, or those not currently receiving benefits. If the program is being subsidized by general revenue, the total cost is offset by the amount of the revenue subsidy before the premium is calculated.

See Exhibit 1 for a conceptual diagram of a model for a mandatory program.

EXHIBIT 1 Conceptual Model Framework



Voluntary Participation. Perhaps the greatest challenge in creating a LTC reform model is the attempt to estimate the effects of allowing people to choose whether or not to enroll. After building the basic Model, we created a set of rules that would generate an underlying participation rate for each set of policy options. These rules generated higher participation rates for options that would otherwise lead to lower premiums.

The overall participation rate generated by the rule was applied differentially by age in the Model. Different ages participated at different rates. In addition, we adjusted the disability rate within the enrolled population to account for higher participation among those most likely to need benefits in the future—a phenomenon known as "adverse selection." This methodology is discussed in more detail below.

Modeling Decisions and Assumptions. The output of the Model depends on many assumptions and estimates that users cannot vary. For example, the Model contains assumptions we made about the future: the percent of the population that will be severely disabled, the quantity of services they will use, and the number of people who will participate in a voluntary program. Other major modeling decisions include the cost of care in both the community and institutional setting and the impact of adverse selection in the voluntary program.

This paper will describe the assumptions we made and the basis for making them. Any modeling exercise is inherently uncertain given the vast amount of unknowable information about the future. For this Model, we used professional judgment. We also applied any pertinent data and/or research. We consulted other modeling experts and the TAG where appropriate.

- **Definition of Disability.** The term "disability" can mean many different things, depending on many factors. For the purpose of the Model, we defined disability to mean any individual who requires assistance with two or more Activities of Daily Living (ADLs), has a cognitive impairment such as Alzheimer's disease, or has a mental retardation or a developmental disability such as autism or cerebral palsy.

This definition closely resembles the definition of disability used by the Health Insurance Portability and Accountability Act (HIPPA), which is often used by private long-term care insurance programs.

- **Age of Model Population.** The Model is a cell-based estimation model built in Microsoft Excel 2007. It examines each age and each year in a separate cell. For most portions of the Model, we estimated the impact on only the ages 18 and older. The exception is for the estimates of disability prevalence, incidence, and continuance, where necessity dictated that the modelers estimate the entire population. All data from the surveys was first analyzed for cohorts of ages and then deconstructed into estimates for individual ages, ensuring that these individual estimates equaled the data for each cohort.

The remainder of this paper is laid out as follows: Section II outlines the steps taken for the full Model. Section III details the construction of our general population estimates. Section IV outlines the construction of the disability rates. Section V explains how the modelers derived their estimates of utilization for different settings of care. Section VI outlines the estimates for the service component of the Model. Section VII deals in depth with modeling of adverse selection and the impact of this estimation on other estimates. Section VIII discusses the work behind the estimates in the Model of voluntary participation. Section IX details the Medicaid estimates in the Model. Section X lists several of the limitations of the Model. Appendix 1 lists each of the data sources used in the Model. Appendix 2 describes in further detail some of the key data sets that we utilized.

Finally, we referenced a wide variety of articles on this subject published over the past 30 years. That contributed to our analysis. Instead of attempting to identify the precise contribution of each article, we have included a full bibliography of these sources at the end of the paper.

Section II: Model Construction

This section describes the step-by-step process we took to create the Model. Sections III-VIII describe the estimation methodologies for certain of these steps in more detail. The insurance program in the LTC-PS Model is designed to be actuarially balanced over the 75-year window. This, in short, means that the present value of total expected costs of the program – including benefit payments, administrative costs, and subsidies – must equal the present value of total expected income of the program—including premiums, federal funding, and interest payments. The estimated premium for each scenario output represents the average premium required in the initial year to accomplish an actuarially balanced model.

In order to construct these expected costs and expected income, we must estimate both the number of people participating in the program and receiving benefits as well as the number of people participating in the program and paying premiums. These are mutually exclusive categories; once a participant develops a severe disability and starts receiving benefits, he or she stops paying premiums. In order to calculate the total costs of the program and the total income, each of the following steps is applied to each age group above 18 for 75 years.

1. **Program Enrollment.** In order to determine costs and income, the Model must first estimate how many people are enrolled in the program. There are two key decisions in the Model applied to program enrollment: the eligibility requirement and the participation requirement.
   - **Eligibility Requirement.** The first option the user must select is whether individuals in the program will need to be attached to the workforce or if all people over 18 years of age will be allowed to enroll. If the workforce participation requirement is applied, we create "eligible to enroll" estimates as described in section III, part 2. If all people over 18 years of age are allowed to enroll, we exclude the currently disabled population from participation, due to the obvious adverse selection issues associated with this allowance. We do make an exception to this exclusion and allow any individual who both has a severe disability and currently working to enroll in the program (approximately 5 percent to 7 percent of the severely disabled population is employed).
   - **Participation Requirement.** Next, the Model user must select whether the program will be mandatory or voluntary. If it is a mandatory program, we do not apply any adjustment to the total estimate of people eligible to enroll. If it is a voluntary program, we adjust enrollment as described in section VII.

2. **Benefit Eligibility.** After determining the enrolled population, we determine the proportion of individuals who are eligible to receive benefits (i.e., who are vested). Users of the LTC-PS Model can select one of two options: no vesting requirement or a five-year vesting requirement.
   - **No vesting Requirement.** If this option is chosen, individuals enrolled in the program are eligible to receive benefits immediately.
   - **Five-year Vesting Requirement.** If the user opts for a five-year vesting requirement, we apply the length of employment factor described in section III, no. 4, to the population enrolled under the age of 65. For persons over 65 enrolled in the program, after the first five years of the LTC-PS Model (i.e., 2010-2015), we assume that they have met the five-year vesting requirement.
     - > **Policy Lapse.** In the private LTC insurance market, often an individual will enroll and begin paying premiums, only to stop paying premiums prior to developing a severe disability. This is referred to as policy lapse. From a modeling standpoint within the LTC-PS Model, we did not need to explicitly address this issue, as we are not tracking specific individuals across time. Instead, the Model simply estimates the number of people at any given age in any given year that are paying premiums and eligible to receive benefits.

3. **Qualified to Receive Benefits.** Once the Model has calculated the enrolled population and those eligible to receive benefits after having met the vesting

requirements, it must know how many enrolled and eligible people have a disability that qualifies them to receive benefits. Section IV outlines our method for constructing estimates of severe disability. For each age and year in the Model, there are two components of the disabled population: newly disabled and continuing disabled.

- **Newly Disabled.** Using the age-specific incidence rates as described in sections IV and VI, we calculate the number of individuals who are eligible to receive benefits who develop a severe disability in a given year. The calculated incidence rates are for an entire calendar year, but for modeling purposes we want to track only the average number of people who would receive benefits in their first year of need. We therefore discount a portion of the incident population in each year and include the remaining incident population in our total estimates for the following calendar year.
- **Continuing Disabled.** We also adjust the prior-year age-specific population with a disability to account for both the estimated number of individuals who cease to be severely disabled, either through death or improvement in condition. This is done via the continuance estimates as described in section IV, no. 2.

4. **Disabled Receiving Benefits.** While a person might be enrolled in the program and meet the vesting as well as the disability requirements to receive benefits, that person might have exhausted benefits in a program that pays for a specified period of time less than lifetime (i.e., one or three years). For any Model options with a limited benefit of less than lifetime, we apply a factor to account for people with disabilities who have already received the maximum amount of allowable benefits in the program. To estimate these factors, we use the continuance estimates as described in section IV.
    - As an example, if the Model user selects a one-year benefit, we calculate for each age the number of persons with a severe disability who are still disabled for more than one year. We remove them from the count of total disabled to construct this estimate.
    - One of the limitations of the Model lies in the interaction of a limited benefit and the non-continuance population. We are not able to estimate the number of persons who develop a disability, receive benefits for a short time, stop receiving benefits due to an improvement in their condition, but then develop a disability a second time and start receiving benefits again. While an actual LTC program would be able to track these individuals and stop benefits in a limited-benefit situation, we are unable to do the same from a modeling perspective.

5. **Amount of Benefit Payment.** After determining the number of people receiving benefits, the Model next calculates the amount paid for each recipient. There are two options for the user to select: a cash benefit or a services benefit.
    - **Cash Benefit.** Users can select a cash benefit amount of $50 per day, $75 per day, or $100 per day. This amount is increased by the estimated annual increase in the CPI-U, with the selected amount set at the first year that benefits are paid in

the program (e.g., for a Model option with no vesting requirement, the cash payments start in 2011 at the selected level. If the user selects a five-year vesting requirement, the cash payments start in 2015 at the selected level). The cash benefit is paid to all of the "disabled receiving benefits" population in the Model. In addition, the Model calculates the total based on the assumption that everyone receives the same level of benefit, regardless of level of disability or site of care.

  - In the aggregate, we assume that every beneficiary receives the full amount of the average cash payment. Since we are constructing our estimates at the aggregate level we do not need to estimate different payments for different levels of need. The Model assumes the amount paid to all beneficiaries averages out to the benefit amount selected. Some beneficiaries could receive higher than average benefits and some beneficiaries could receive lower than average benefits.

- **Service Benefit.** For the user who selects a service benefit for the Model, we use the methodology as outlined in sections VI and VII to estimate the type and cost of services being used by eligible beneficiaries with a severe disability. For any given year, we assume the ratio of community care to institutional care for each age remains constant. Any shift in the overall mix of services is caused by a shift in the average age of beneficiaries. On the cost front, we make different assumptions for Model options that have a co-pay and those that do not have a co-pay. In both cases, annual costs are increased by the expected growth in nominal wages.
  - **Co-pay Selected.** If the user opts for a co-pay, the Model applies only the 20 percent requirement to beneficiaries in the community setting. Since we adjust the institutional costs so that the program pays for only the service component of an institutional stay, we applied the co-pay only on the community setting in order to maintain a balance. All beneficiaries, however, pay any deductible.
    - **Low-income Subsidy Exception.** A beneficiary who is eligible under the low-income subsidy option (either 100 or 150 percent of the FPL) does not pay the co-pay or deductible in a service benefit. We include these costs in the total cost of the low-income subsidy, which is paid for through higher premiums for the non-subsidized population.
    - **Medicaid Interaction.** Medicaid remains the final safety net for this population, and we allow Medicaid to contribute towards the co-pay and deductible for any Medicaid-eligible beneficiary receiving benefits. If the low-income subsidy option is selected as well, Medicaid contributes only for a beneficiary who qualifies for Medicaid but is above the low-income subsidy threshold.
  - **No co-pay Selected.** If the user opts for no co-pay, the Model calculates the total non-housing cost associated with each type of care (community and institutional).
  - **Increase in Service Utilization.** In addition, depending on the co-pay requirement, we calculate different estimates of the expected increase in

community-based care for persons with a severe disability. As outlined in section VIII, part 1, we assume in the LTC-PS Model that a higher percentage of the population with a severe disability receiving care in the community will receive paid help under a new federally run LTC insurance program. The Model calculates different rates of increase depending on the co-pay requirement: the increase with no co-pay is twice that of the increase with a co-pay.

6. **Low-income Subsidy.** The low-income subsidy in the Model is internally financed. The cost of the subsidy is paid for by higher premiums to non-subsidized participants. Users are able to select one of three options for a low-income subsidy (LIS): all persons under 100 percent of FPL, all persons under 150 percent of FPL, and no LIS. For options that contain a low-income subsidy, we begin with the population estimates described in section III, part 3, and estimate the percentage of the population that would qualify based on the eligibility requirement described above. We assume any person who would be eligible and qualify for the subsidy would enroll in the program, regardless of premium level or the participation requirement.
    - **Costs Covered by Low-income Subsidy.** The Model assumes the program will cover any required spending by a subsidized participant. This includes all premiums for non-disabled participants, any co-pay and deductible for community-based beneficiaries with a disability in a service benefit, and the entire institutional cost – including housing costs – for a beneficiary with a disability in a service benefit.

7. **Level of Government Funding.** Users of the Model are able to create a partial government subsidy for all enrollees in the program. The user can select the percentage of total costs (including benefit payments, administrative costs, and any LIS) that will be covered by funds other than those collected from premium payments. These government payments are treated as a reduction in the total cost of the program that must be offset via premium payments to achieve an actuarially balanced program.

8. **Administrative Costs.** Any insurance program has administrative costs associated with marketing, premium collection, benefit payments, and other operational costs. The Model sets aside 4 percent of the annual premium collection to cover these administrative costs.

9. **Fund Balance.** For most insurance programs, there is an annual difference between premiums collected and benefits paid. Given that the LTC-PS Model is a new program that pays for a relatively low occurrence event, the program collects significantly more in premiums in the early years. As the program and the population ages, it then pays out these funds. For any annual excess collections, we assume the funds are invested in Treasury bonds at the CBO-estimated nominal interest rate.
    - **Government Spending Interaction.** One of the difficult concepts of a federally run LTC insurance program that is actuarially balanced is the effect of the

interest payments to the general fund. Since the government runs the program and the excess funds are invested in the government, the interest payments are not "new" monies coming into the program from outside the government. Rather, they are transfers within the government. As such, from a budgetary-accounting perspective, these transfer payments would not be treated as program income.

10. **Premium Calculations.** Finally, after making all of the above calculations, we have the total expected cost of the program for the next 75 years. These values are adjusted to 2010 dollars (the first year of the program) via the CBO-estimated nominal interest rate for each of the next 75 years. Once the total present value of all spending is estimated, we estimate the level of premiums required over the course of the same 75 years such that the 2010 present value of these payments equal the total costs.
    - **Premium Increases.** Unlike many private long-term care insurance program premiums, the Model increases the annual premium by the expected growth in CPI-U.
    - **Age-adjusted Premiums.** The Model does not explicitly calculate a different premium amount for each age. The Model instead calculates on the overall average premium for all enrollees. However, this premium can be thought of as "able to be age-adjusted," as long as the total collected premiums divided by the total enrollees equaled the average premium.

Section III: Population Estimates

In order to estimate the population that would be participating in the program, regardless of whether enrollment was mandatory or voluntary, we had to estimate the overall population. From that, we derived the population that would be eligible to enroll, pay premiums and receive benefits. Users of the Model's website are allowed to determine whether the program would be open to all persons over the age of 18 or if it would require an individual to have some attachment to the work force or be married to someone who has an attachment in order to enroll. The following provides the step involved in creating the estimate of people eligible to enroll.

1. **Estimating the Overall Population.** Our first step was to estimate the entire population, by age, from 2010 through 2085. We started with Social Security estimates of population, which contain all residents of the United States and account for the agency's expectations for changes in nativity, mortality, immigration, and emigration.

2. **Estimating Attachment to Work Force.** Next, we subdivided the population according to work status. Since one of the options for this model is to require some attachment to the work force for eligibility, we needed an estimate of the labor force (people working or looking for work) or not in the labor force but married to people

in the labor force. We also needed an estimation of retirement by age in order to account for individuals who are participating in the program for one or more years and retire but continue to pay premiums.

a. **Working.** To calculate employment, we used data from ACS. To identify workers, we used the variables for "Employed-at work" and "Employed with a job but not at work,"[2] which combined we called "Working." This was approximately 48 percent of the total population in 2007.

b. **Looking for Work.** We also created, as an initial calculation, estimates of the number of unemployed persons as recorded in ACS. Using the initial estimate of approximately 6 percent unemployment[3], we varied this rate annually by the projected unemployment rate as published by the CBO. (This unemployment rate is a percentage of the labor force. When expressed as a percentage of the total population, the same figure is only 3 percent.)

c. **Labor Force.** The labor force, which is the combination of people working, unemployed, or "looking for work," comprises approximately 51 percent of the total population. For future estimates of the size of the labor force, we assumed the percentage of people at each age in the labor force remains constant at the initially estimated rate over the next 85 years.

d. **Not in the Labor Force but Married.** Our next step was to subdivide the 49 percent of the population not in the labor force. Again, using the ACS, we divided this cohort into the following groups: in school; married, widowed, divorced, separated, and never married. Of these subgroups, we initially included the married and widowed portions in our population that would be eligible to enroll in the program if there is a working requirement. For the option in the Model requiring attachment to the work force, we exclude students or individuals who are neither in nor attached to the labor force. Of the total population, we estimate 27 percent are in school, 16 percent are not in the labor force but married or widowed, and 6 percent are neither in nor attached to the labor force.

e. **Retirees Who Pay Premiums.** To estimate retirement, we used the ACS to first estimate the percent of individuals by age that are retired. We then created a "retirement incidence" rate, which is the difference in retirement between two ages adjusted for estimated mortality. We used this retirement incidence rate to estimate the number of newly retired individuals each year who would already be enrolled in the Avalere LTC Model program while working and who will continue to participate upon retirement.

2. **Low-Income Individuals.** After constructing these four basic groups of individuals by age, we also needed to estimate the number of potential enrollees and beneficiaries below 100 percent of the Federal Poverty Level (FPL) as well as below 150 percent of FPL. These estimates are necessary to allow us to

---

[2] "Employed, with a job but not at work" is approximately 1 percent of the total population, and largely represents persons on temporary leave such as maternity

[3] This figure represents the unemployment rate in the 2007 ACS survey.

estimate the impact of varying the program's low-income subsidy on premiums and on Medicaid spending.

To construct the poverty estimates, we used the CPS/ASEC. This data provided us with an overall estimated size of the poverty population. It also allowed us to subdivide this group into workers and non-workers. Similar to our subdivisions of the ACS variables, the CPS allowed us to estimate individuals by age that are below each poverty threshold and are also neither working nor attached to the work force. Based on the CPS/ASEC, we estimated 13 percent of the population has income below 100 percent of FPL and that 47 percent of this group was either under the age of 15 or not attached to the workforce. We also estimated an additional 9 percent of the population has income between 100 and 150 percent of FPL and that 52 percent of this group was either under the age of 15 or not attached to the workforce. We have assumed these ratios remain constant over the course of the Model.

3. **Vesting.** The Model allows users to choose between two vesting requirements: zero and five years. In order to estimate the effect of a five-year vesting requirement for the Model, we collected estimates of the percent of the population that has attained permanent eligibility for disability benefits under the Social Security Disability Insurance (SSDI) program but are not yet receiving benefit payments. SSDI requires people to contribute for a minimum of 20 quarters before they are permanently eligible for SSDI disability payments. Our model requires a similar five-year contribution of premiums before participants would be eligible for benefits, if the user selects the five-year vesting requirement. The eligibility ratio is a low 40 percent for 30-year olds, increases to 80 percent for 50-year olds, and reaches a maximum of approximately 88 percent for the 65+ population. (Using this assumption, there is always a portion of participants in the Model who never become eligible for benefits.)
    - An interesting side analysis that emerged from the construction of the vesting curve relates to the apparent decline in vesting for the older population. The reason for the decline relates to the assumed vesting rates for men and women. A higher percentage of men initially qualify for permanent benefits. But as the population ages, the overall ratio shifts towards women, resulting in what appears to be a decline in the average vesting rate.

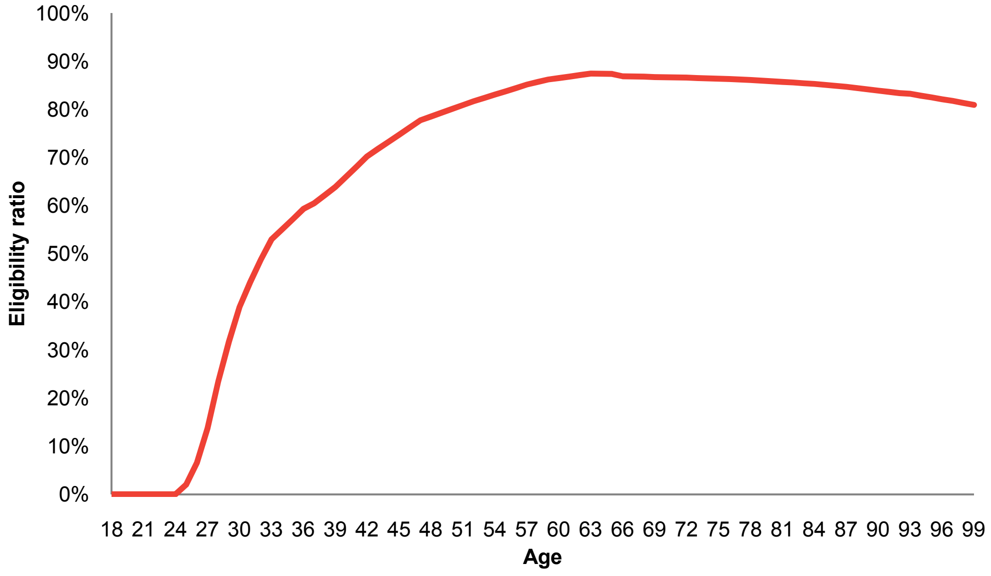
Exhibit 2 contains the estimated composition of the 2010 population based on the above calculations. Exhibit 3 displays our vesting curve, reflecting the information from the SSDI.

EXHIBIT 2 Population Characteristics, 2010

Category	No. of Persons (millions)	% of Total Population
Total population	315.2	

Over 18 years old	238.2	75.6%
Labor force	160.2	50.8%
Working	145.8	46.3%
Looking for work	14.4	4.6%
Not in labor force	91.0	28.9%
Married/widowed	50.7	16.1%
In school	16.4	5.2%
Never married/divorced	18.6	5.9%
Below 100% FPL	41.6	13.2%
Attached to workforce	30.4	9.6%
Not attached to workforce	11.2	3.6%
Below 150% FPL	71.2	22.6%
Attached to workforce	55.5	17.6%
Not attached to workforce	15.7	5.0%

EXHIBIT 3 Vesting Curve



This methodology gave us the population that would be paying premiums and eligible to receive benefits under the different policy scenarios available through the Model. The next step in building the Model was to estimate the portion of the population paying premiums and eligible to receive benefits that would qualify for benefits.

Section IV: Disability Estimates

The LTC-PS Model requires that we estimate the total number of people with a disability in any given year (prevalence), the number of people newly disabled in a given year (incidence), and the length of time they remain disabled (continuance). Incidence is important because the program will not cover all individuals with a disability at any given point. Continuance is important because the Model allows users to vary the amount of time over which benefits will be paid (i.e., 1, 3, 4, 5 years, or lifetime).

The creation of incidence and continuance estimates is inherently difficult because there are few sources of information on the number of people who develop a disability as well as the length of time they remain disabled. Therefore, we estimated prevalence, incidence, and continuance by combining four disparate data sets: the 2004 Survey of Income and Program Participation (SIPP), Wave 5, for disability prevalence in the community; the 2004 National Nursing Home Survey (NNHS) for disability prevalence in a nursing home; the Individual Disability Experience Commission (IDEC) table of disability incidence and continuation for the under-65 population; and transition matrixes as published by Eric Stanton/Yee/Manton using the 1984, 1989, and 1994 National Long-Term Care Survey (NLTCS). The following describes our method in more detail.

1. **Prevalence.** We first estimated disability prevalence for individuals in the community by age using the 2004 SIPP. Specifically, we defined a person as "disabled" if he or she needed help with two or more activities of daily living (ADL); had Alzheimer's Disease or any other serious problem with confusion or forgetfulness; or had a mental retardation or a developmental disability such as autism or cerebral palsy. This definition most closely matches the HIPPA disability requirement. In total, we estimated 3 percent of the over-15 population in the community has a severe disability.

   We next estimated disability prevalence for individuals in a nursing home by age in the 2004 NNHS. Specifically, we defined a person as "disabled" if he or she needed limited, extensive, or total assistance with two or more ADLs; was in an Alzheimer's or dementia specialty unit in the nursing home or had impaired decision making ability; or was admitted to the nursing home directly from an intermediate care facility for the mentally retarded (ICF/MR). In total, we estimated 91 percent of the over-15 population residing in a nursing home has a severe disability.

   Since these two surveys represent distinct populations (SIPP does not include individuals in an institution such as a nursing home and NNHS excludes individuals outside of the nursing home), we felt comfortable combining the estimates to develop a total HIPPA-equivalent disability prevalence estimate. When combined, we estimate slightly over 3 percent of the total US population has HIPPA-eligible disability. Of this group, 18 percent reside in a nursing home and 82 percent reside in the community.

There has been considerable debate concerning an apparent decline in the disability prevalence over the last decade, including the magnitude and cause of the decline. We chose to model a continued modest decline in the overall prevalence, at a rate of 0.5 percent per year through 2025, after which we allow the overall prevalence of disability to change with the age of the population. As a result, when the effect of the aging population is combined with this assumed decline in the prevalence rate, our average disability prevalence remains at slightly above 3 percent from 2010 through 2025, at which point it begins to increase slightly, reaching 4.6 percent by 2085.

2. **Incidence and Continuance.** For the continuation rates, we built separate tables for the under-65 and over-65 populations. We constructed a disability continuance table for the under-65 population using the IDEC continuance worksheet. We used the published 90-day continuance rates from IDEC, again to use the HIPPA requirement that the disability be long-term in nature. For the over-65 population, we developed continuance rates using a series of transition matrices developed by Stanton & Yee via the NLTCS data, which uses the HIPPA definition of disability.

   After constructing continuance rates from both of these sources, we created non-continuance rates, or the percentage of individuals with a disability in a given year that ceased to be disabled in the following year. There are two reasons a person ceases to be disabled: mortality and recovery. We separated our non-continuance rate into an estimate of mortality and an estimate of recovery, using the same data sources we used to construct the overall continuance rates. We capped our annual modeled mortality rate at the overall mortality rate for the same age for all individuals (disabled and non-disabled) as published by the SSA to ensure that total population mortality was never greater than our modeled mortality.

   After constructing prevalence and continuance estimates for each age, we were able to estimate individual age incidence rates via the following formula: Prevalence in year 2 (P2) = Prevalence in year 1 (P1) + Incidence in year 2 (I2) minus non-continuance in year 2 (NC2). Rearranging the terms, we solve for incidence: I2=P2-P1+NC2.

Exhibit 4 contains our estimated disability incidence curve by age for 2010. Exhibit 5 displays our estimated prevalence curve by age for 2010.

EXHIBIT 4 Estimated Incidence Curve, 2010

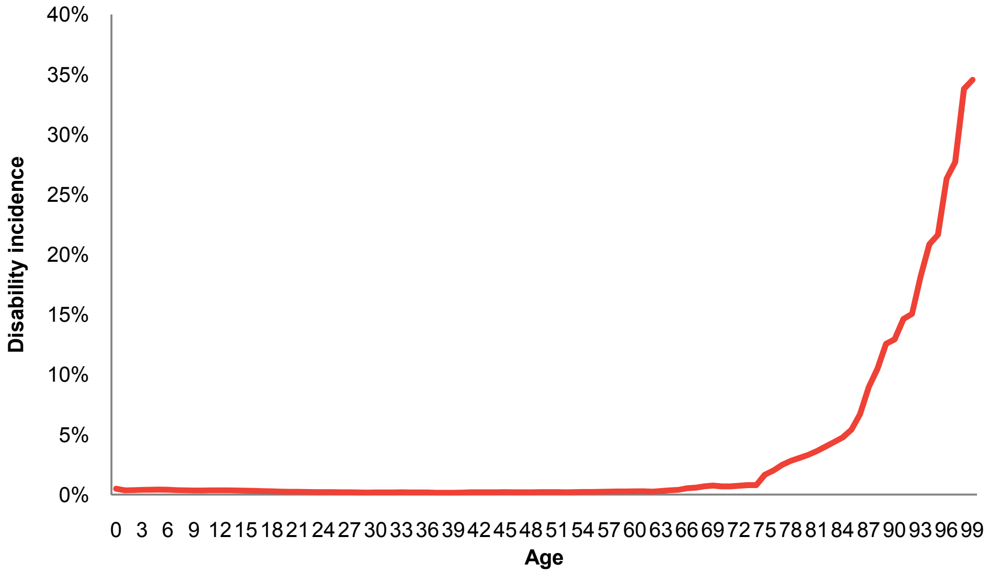
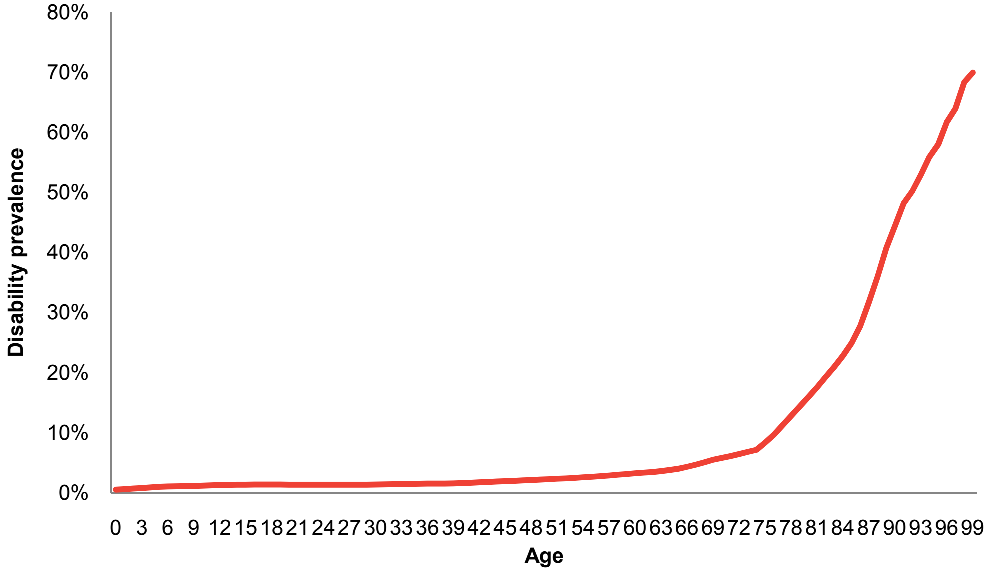


EXHIBIT 5 Estimated Prevalence Curve, 2010



Section V: Settings of Care

In order to estimate the effects of a services benefit, which would pay for services in a nursing facility, assisted living, and home setting, we first had to estimate a baseline of service use in an institutional and community setting. For the purposes of the LTC-PS Model, we included assisted living facilities (ALF) as institutional, largely due to the necessity to estimate housing and service costs separately.

1. **Determine Population Residing in Institution vs. Home Setting.** We first determined the percentage of individuals with a disability residing in either the institutional or community setting. We began with the percentage of all individuals

with a severe disability from the SIPP and NNHS as our initial estimate. Using the two surveys, our initial estimate was 82 percent of the population with a disability, as defined above, reside in the community and 18 percent reside in a nursing home.

2. **Determine Population in Community Receiving Paid Help.** Specific to the community setting, we determined the percentage of individuals receiving paid help. The SIPP indicates the primary source of help for disabilities. Our initial estimate indicated roughly 19 percent of the severely disabled residing in the community received paid help. However, we believe this could be more a factor with how the SIPP asks the question, rather than a true indication of people receiving paid help. SIPP simply asks for the primary source of assistance and includes options such as spouse, child, parent, or sibling. As explained in further detail below, we adjusted the Medicaid portion of the baseline to account for higher utilization and costs than the surveys suggested (described in section VIII), as well as the community-based utilization and spending in the Model to assume significantly more people will receive paid help in the community setting under the new program.

3. **Determine ALF Population.** Our next step was to remove an estimation of the disabled population residing in an ALF from our community setting and add them to the nursing home population to create an "institutional" setting population. We first used data from the MetLife survey of ALF residents, which estimates in 2009 there are approximately 900,000 individuals living in an ALF. We then used information from the LifePlans survey of ALF residents, which allowed us to both subdivide the total population into age cohorts as well as estimate the percentage of residents who have a HIPPA-qualifying disability. The LifePlan survey indicates nearly 80 percent of ALF residents meet the HIPPA disability trigger. Combined, we estimate slightly over 700,000 individuals are residing in an ALF and have a HIPPA-qualifying disability. Finally, we shifted this population out of our SIPP-generated community population and added them to our NNHS-generated nursing home population to create our "institutional" population.

4. **Non-Medicaid Service Cost.** After removing the Medicaid population from both the institutional and community setting (described below in section VIII), we developed the estimated cost of care for the non-Medicaid population in each setting. We used 2008 rates published by MetLife regarding the average hourly rate for a home health aide ($20/hr), the average daily rate for a semi-private nursing home room ($191/day), and the average monthly rate for an ALF ($3,031/month). For the ALF setting, the average published by MetLife does not fully incorporate the cost of ALFs that offer additional care to residents. Therefore, we increased the initial estimate to include the MetLife-reported cost of extra care ($368/month). For all of these estimates, we increased the costs annually by the expected change in nominal wages.

   Finally, for use in the Model, we did not want to include the cost of housing for the institutional population. After discussion with our TAG, we determined that including the cost of housing could create an incentive in a services-type benefit for individuals to move into an institutional setting, since the new LTC insurance program would pay for the entire cost. We therefore assumed, of the published MetLife rates, that 25 percent of the nursing home cost and 50 percent of the ALF cost represent housing and would not be reimbursed by the new insurance program. We believe these estimates represent appropriate amounts that the new program would reimburse under a services benefit. In effect, this becomes a federally set rate for the program.

The creation of these setting of care estimates allowed us to then make assumptions about the impact of a new public insurance benefit on service use. With that estimation, we could then estimate spending under the new program.

Section VI: Service Benefit

The introduction of a long-term care insurance product will likely lead to both an increase in the number of people requesting paid help, the amount of hours these people will request help, and a shift in the site of care between an ALF and nursing home. In a cash benefit model, these increases do not change the nature of the program, as all beneficiaries would receive the pre-determined amount of cash regardless of the amount of services used. However, for a service benefit model, since the service benefit in the LTC-PS Model is meant to cover all costs (other than housing in the institutional setting and any co-pay in the community setting), the experts we consulted agreed that we should include an increase in usage above what is currently observable in SIPP and NNHS. In addition, as explained in greater detail below, we did not attempt to include an estimated shift in the site of care between the institutional setting and the community setting.

1. **Assumptions About an Increase in Community-Based Utilization.** For the community setting, we increased the number of people with disabilities that would receive paid help. We also increased the average amount of help received.

   To address the expected increase in the number of persons with a severe disability receiving paid care in the community, we applied a different factor to account for different co-pay assumptions. When the option “no co-pay” is selected, we assumed the increase would be four-fold, from a current 15 percent of eligible individuals receiving paid care to nearly 60 percent. When the option “20 percent co-pay” is selected, we assumed the increase would only be two-fold, from the current 15 percent to an estimated 30 percent. While we acknowledge that the estimates of paid help from SIPP are likely underestimated due to the nature of the question, we believe it likely that a portion of the community-based disabled population will continue to receive care solely from their immediate family.

   To estimate the amount of help received by individuals with disabilities in the community, we increased the number of hours per week of paid help from the current estimated 10 hours (an estimated developed from a combination of SIPP and MetLife data) to 15 hours per week. This had the effect of increasing the average cost of care from $214 per week to $320 per week in 2010. We then increased this weekly rate by the expected growth in nominal wages for the course of the Model.

2. **Assumptions About the Shift from Nursing Facility to ALF.** For the institutional setting, beyond removing the estimated cost of housing as discussed in section V, we also needed to address a likely shift in the site of care between nursing homes and ALFs. Specifically, we believe the current trend away from nursing homes in favor of ALFs will continue. The trend could even be accelerated via a federally run long-term care insurance program that paid for the service costs of residing in an ALF, given that Medicaid does not fully cover ALF costs like the new program would. Currently, we estimate approximately 72 percent of the institutional population with a severe disability resides in a nursing facility, while 28 percent resides in an ALF. These estimates were developed via our previously discussed analysis of the population residing in an ALF. We then modeled a decline in the nursing facility population in favor of an ALF at a rate of 0.5 percent decline per year, reaching and remaining at 62 percent in 2030 onwards.

   We did not attempt to include an estimated shift between the community setting and institutional setting as a result of the new program. The reason we did not make any assumption for this shift is that the evidence is weak and mixed. While it is possible that such a shift could occur, the shift could go in either direction, given a desire by some individuals to remain in the home as long as possible versus the comfort and security an ALF could provide. As such, we kept the current division of the population relatively static over the course of the Model, with any changes caused by the aging of the population.

   As mentioned above, this discussion applies only for portions of the Model under a service benefit. If the cash benefit option is selected, we assume every person with a HIPPA-qualifying disability will receive benefits as long as he or she has enrolled in and qualified for the program.

Section VII: Adverse Selection

In a mandatory LTC insurance program, the rate of disability for participants will match the overall population average. Premiums will reflect the mix of people with disabilities and people without disabilities in the overall population. However, in a voluntary program, there is the possibility that certain individuals will have better knowledge of their own likelihood for disability. Those with knowledge that they will definitely require some sort of long-term care will be more likely to enroll in a program that pays these costs. This leads to higher than average costs for the program, which in turn leads to higher premiums, which can lead to less participation among those with lower probability of disability. Called adverse selection and sometimes referred to as a death spiral, this effect at its worst results in an insurance program that is financially unsustainable.

The inverse of this situation is termed advantageous selection. Individuals may lack knowledge of their future expected need for long-term care but may instead be risk averse and wish to sign up for the protection offered by long-term care insurance. Many times this risk aversion can also lead to a less risky lifestyle, which can lower the probability of certain types of disability.

The amount of adverse and advantageous selection in the current LTC insurance market is a subject of debate. While some individuals likely do have better knowledge of potential future needs as a result of personal medical information or family history, the studies done to date have failed to show higher probability of disability among insured individuals. There are three factors that can account for much of this: risk underwriting by private long-term care insurance companies, the offsetting factors of adverse and advantageous selection, and the role of Medicaid as a safety-net program for low-income individuals which makes them less likely to purchase private long-term care insurance. Each of these factors has been cited in research as a possible reason for a lack of evidence of adverse selection.

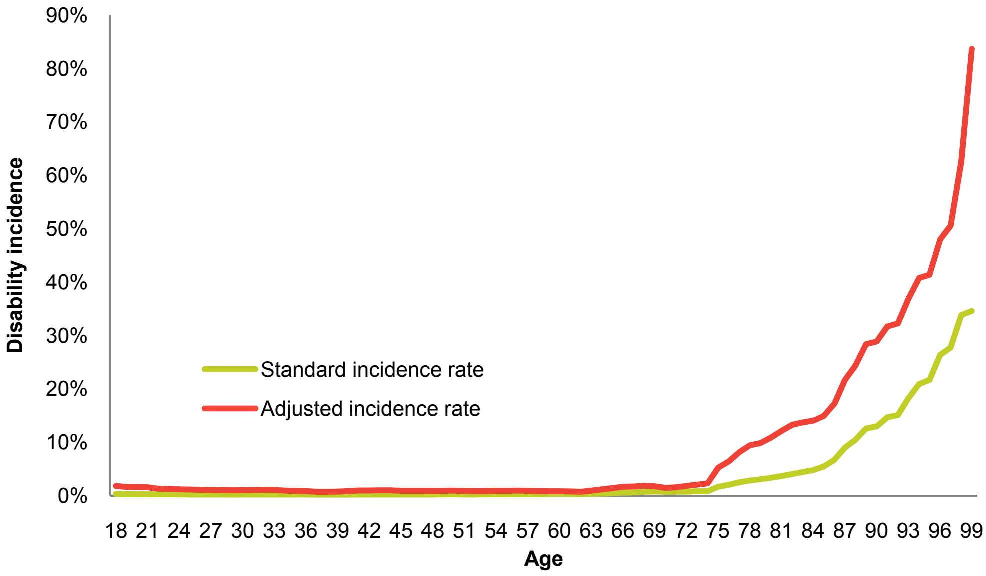
For the Model, the impact of adverse selection becomes more acute because we assume that there is no risk underwriting in this federal program. We treat the availability of this new federal program in much the same manner as the general Medicare program. Individuals are eligible to receive benefits as long as they have contributed for the required length of time, and the level of contribution is not determined by personal health factors. While the user is allowed to select a requirement that participants be attached to the workforce and a requirement that individuals contribute to the program for five years before becoming eligible for benefits, neither of these requirements can completely eliminate the effect of adverse selection. While we can expect some amount of advantageous selection would partially offset this effect, we also now have to consider the impact of the private long-term care insurance market. That market could potentially “cherry-pick” the low-risk individuals, thus exacerbating the impact of adverse selection in the Model. Finally, we believe there are likely a number of individuals who desire this form of insurance but are unable to purchase it due to lack of affordability in the private market. We believe this pent-up demand could also increase the potential impact of adverse selection in the Model relative to the current private LTC insurance market.

In order to estimate the role of adverse selection in the Model, we first developed an estimate of the number of people by age who will develop a severe disability over the next five years. Next, for a given rate of assumed overall participation in the program, we compared the number of people that we assumed would enroll in the program against the total estimated incidence of disability for the entire eligible population over the next five years. Under a pure adverse selection scenario, people who would develop a severe disability over the next five years would all enroll in the program, which we termed "perfect knowledge." To calculate the impact of this "perfect knowledge" scenario, we created alternate incidence rates using the individuals who develop a severe disability over the next five years in the numerator and the estimated enrollment in the program (which we calculated separately) in the denominator. As the total estimated enrollment increases, the alternate incidence rate declines until it reaches the overall population incidence rate for a program enrollment of 100 percent.

Finally, to address the unlikely nature of "perfect knowledge," we adjusted these alternate incidence rates downward to account for a portion of the population that would not have "perfect knowledge" but would instead represent the overall average incidence rate. We also changed this weighting factor over time to account for the likely pent-up demand in the early years of this new social program. We began with an assumed 75 percent weighting on "perfect knowledge" incidence and 25 percent on average incidence, declining to 25 percent on "perfect knowledge" incidence within 10 years. Each of these rates was also unique to each age as well as each assumed level of overall participation. However, we applied the impact of adverse selection only to the voluntary portion of the Model.

Exhibit 6 displays an example of this adjusted incidence rate to reflect adverse selection.

EXHIBIT 6 Incidence Curve Adjusted for Adverse Selection, 2010 *(assumes 10 percent enrollment)*



Section VIII: Age-adjusted Voluntary Participation

One of the most challenging aspects of constructing a model that estimates voluntary participation in an insurance product is the relationship between premiums and participation. We believe the level of participation in a voluntary, federally run LTC insurance program will largely be based on the premium. To estimate premiums in an actuarially balanced insurance program, we must estimate both expected costs as well as expected income. Both costs and premium income are directly estimated via the participation in the program, putting us back where we started. As a result, premiums depend on participation, but participation depends on premiums.

There are economic models that can be used to estimate voluntary enrollment in an insurance plan, based on the expected utility of the plan to each potential enrollee. This method would require estimating the cost-benefit tradeoff for separate cohorts within the Model to determine if the proposed package of benefits would provide enrollees with greater expected value than the cost of the program. However, these economic models are best applied to a single benefit package, given the complexity of the calculations. Since the Model has nearly 4,200 possible permutations, Avalere determined that a separate approach was necessary.

Instead of attempting to construct economic estimates of the utility of each permutation of the Model, we created an alternate method to estimate the overall participation in the program. We assigned point values to each of our policy options, with options that would result in lower premiums receiving higher points. We used these points to calculate total estimated enrollment. For example, in looking at the option “daily benefit amount,” we assigned a point value of zero to the input $100, a point value of one to the input $75, and a point value of two to the input of $50. We did not assign point values to the options for “participation” or “type of benefit.” The mandatory participation option has 100 percent participation. We did not wish to cause the selection of cash or services to alter potential enrollment. In addition, we assigned inverse point values to the option for low-income subsidy. Even though adding a low-income subsidy will increase the premium (since the subsidy is financed via premiums from non-subsidized participants), allowing all individuals below the subsidy threshold free participation will undoubtedly lead to higher enrollment. Exhibit 7 displays the point values for each option in the Model.

EXHIBIT 7 Point System for Voluntary Participation

Category	Input Variable	Participation point value
Deductible	Yes	1
	No	0
Cash amount	$50	2
	$75	1
	$100	0
Eligibility	Working	1
	Any age	0
Vesting	0 years	0
	5 years	1
Waiting period	0 days	0
	90 days	1
Length of benefit	Lifetime	0
	1 year	3
	3 years	2
	4 years	2
	5 years	1
Subsidy level	None	0
	100% FPL	1
	150% FPL	2
Funded thru general revenues	0%	0
	25%	1
	50%	2

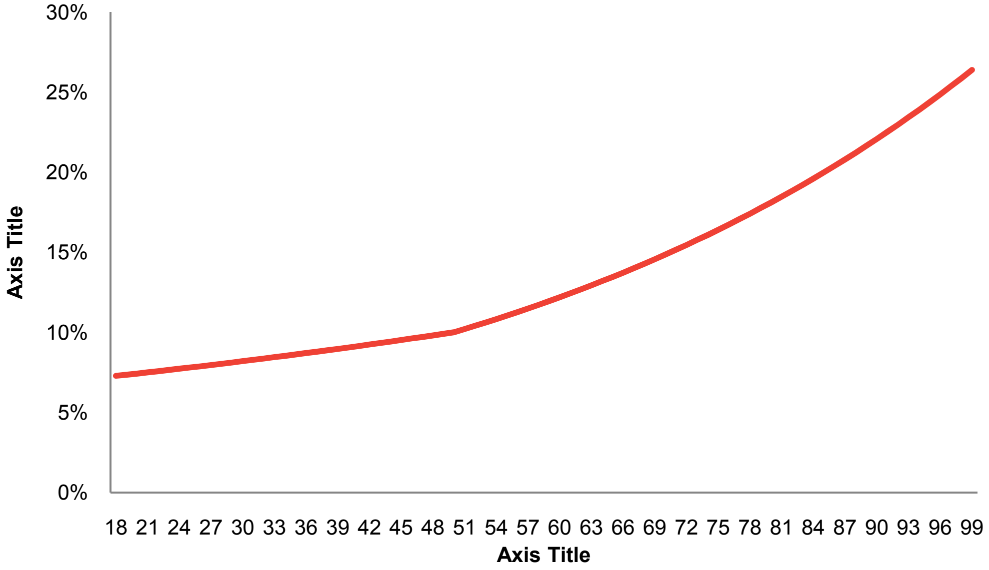
After creating the point values, we chose our minimum and maximum estimated enrollment for the program of 5 percent and 35 percent. Based on discussions with our experts, we believe the upper and lower bounds of this range represent reasonable enrollment expectations. We acknowledge that for some higher premium levels generated by the Model, the expected enrollment could be optimistic. However, instead of excluding certain premium levels from the output, we determined it would be more instructive for users to understand the level of premium required to make the program balance and allow users to individually determine if their premium output could sustain the needed level of participation. Exhibit 8 shows the estimated enrollment rates for different point values.

EXHIBIT 8 Voluntary Participation Ranges by Points

Value	Take-up rate
0	5%
1	8%
2	10%
3	13%
4	15%
5	18%
6	20%
7	23%
8	25%
9	28%
10	30%
11	33%
12	35%

After estimating an overall participation rate based on our point value system, we applied age-adjusted participation rates. Since it is highly likely that participation will increase with age as individuals approach and begin to plan for retirement, we needed to allow for our participation estimate to also increase with age. We chose the age of 50 as our inflection point, assuming that the average participation developed via the point system would equal participation at age 50. We then increased participation at a rate of 2 percent for each age above 50 and decreased participation at a rate of 1 percent for each age below 50. This adjustment was applied as a growth rate. If overall participation at age 50 is 20 percent, participation at age 49 is 19.8 percent (50 percent x 0.99) and participation at age 51 is 20.4 percent (50 percent x 1.02). After experimenting with different factors, we chose these growth rates because they maintain an overall participation rate equal to our desired rate from the point value system. Exhibit 9 shows an example of this application for a theoretical 10 percent overall adoption rate.

EXHIBIT 9 Voluntary Enrollment Rates by Age, Overall Average Enrollment of 10 percent



We acknowledge that participation could increase at a faster rate under a new federally run program if either the government or other entities apply increased marketing efforts. The effect of an increased rate of adoption on the overall model is mixed. If the marketing efforts attracted older individuals that are nearer to becoming recipients of the program, there would be less time for the program to collect premiums to pay for this needed care. The result would be higher average premiums for the entire program. If the marketing efforts attracted younger individuals with many years before potentially needing benefits, there would be more time for the program to collect premiums. The result would be lower average premiums for the entire program. In addition, any marketing effort would lead to an overall increase in participation, resulting in lower average premiums.

In addition to the overall participation described above, we modeled a separate impact of the interaction between a low-income subsidy and Medicaid in a voluntary program. We believe the likely adoption by low-income individuals will be tied to the level of the subsidy as well as the expected cost of the premium. When the option “no subsidy” is selected for the LIS, we assume only 25 percent of individuals who would otherwise receive paid care from Medicaid would enroll in the program if the premium is below $50 per month, and this adoption rate declines to 0 percent for premiums above $150 per month. Exhibit 10 displays the values of this matrix that we constructed.

EXHIBIT 10 Low-income Subsidy and Premium Interaction Matrix

		Low-income Subsidy		
		None	100% FPL	150% FPL
Premiums	>50	25%	50%	75%
	50-80	20%	45%	70%
	81-100	15%	40%	65%
	101-120	10%	35%	60%
	121-150	5%	30%	55%
	150+	0%	25%	50%

Section IX: Medicaid Estimates

One of our key underlying policy assumptions for the LTC-PS Model is that the new, federally run LTC insurance program would provide benefits for eligible participants before Medicaid payments. Effectively Medicaid would remain a “payer of last resort.” As such, we needed to create estimates of both current spending estimates by Medicaid for the population in question (the baseline) as well as how this spending would be impacted by policy options that the Model’s users can vary. The following describes the steps we undertook to estimate the impact of policy choices on Medicaid spending.

1. **Determining Medicaid Utilization.** For the baseline estimates, we first estimated the number of people receiving Medicaid payment for care provided in either a nursing home or home and community-based setting. We began with information in both SIPP and NNHS. Each of these surveys has information on the source of payment for any care received. We utilized this detail from the surveys to estimate the percentage of people with severe disabilities in each setting that had Medicaid as a payer. According to the surveys, approximately 61 percent of the disabled population residing in a nursing home and 7 percent of the disabled population residing in the community and receiving paid help had Medicaid as a payer. Using these rates, we calculated that nearly 0.9 million nursing home residents with a severe disability and 0.5 million persons with a severe disability living in the community were receiving help for their disability and had Medicaid as a primary payer.

   While we were fairly comfortable with the nursing home estimate, we believed the community estimate was much too low. Specifically, we felt that due to the nature of the paid help question in SIPP – a potential response to the survey question “Who is the primary provider of assistance with your disability?” – that respondents were likely reporting family members. But they were also receiving paid help from the Medicaid program via either Medicaid home health or personal care services or a Home and Community Based Services (HCBS) Medicaid waiver program.

To address the apparent underreporting of Medicaid utilization, we referenced the total estimated population receiving Medicaid home and community based services as published by the Kaiser Commission on Medicaid and the Uninsured. Using the same base year as the SIPP data (2004), Kaiser reported an estimated 2.7 million individuals received home-based care from Medicaid at some point during the year. To adjust this figure to represent a single point-in-time estimate comparable to the data from SIPP as well as remove any non-disabled individuals who qualify for Medicaid home care via alternate mechanisms, we applied a ratio slightly higher than the average relationship between Kaiser-estimated rates of average monthly Medicaid enrollment in June 2004 and total Medicaid enrollment in all of 2004. This ratio is approximately 71 percent, which if applied directly to the Medicaid home-based care recipient estimate of 2.7 million would still overestimate for purposes of the Model. That's because some individuals could qualify for Medicaid home-based care and not qualify for community care in the Model. We removed an additional 5 percent to account for these individuals, leaving an estimated 1.8 million persons receiving home-based care paid for by Medicaid. We therefore inflated our initial estimates of 0.5 million persons with a severe disability in the community to 1.8 million.

We then re-calculated the ratio of Medicaid beneficiaries to total beneficiaries for the community setting, resulting in a revised estimate of 26 percent of persons with a disability residing in the community who receive paid help for their disabilities from Medicaid.[4] We applied this revised community estimate along with the nursing home estimate of 61 percent to each year's estimated disabled population in each setting to calculate the number of individuals with a disability in any given year at any given age that would be receiving Medicaid-financed assistance with their disability.

2. **Determining Medicaid Spending.** After creating estimates of the size of each Medicaid population, we also needed to determine the average per-capita Medicaid spending for these residents. This estimate of Medicaid costs allows us to determine the potential for savings to Medicaid from the implementation of this federally run LTC insurance program.

   Having previously determined the size of the Medicaid population in each setting (adjusted for the ALF population adjustment described previously), we constructed a national average cost for these patients. For nursing home patients, we combined data from *A Report on Shortfalls in Medicaid Funding for Nursing Home Care, October 2008*, published by the American Health Care Association (AHCA) and adjusted these data to match the total estimated spending by Medicaid in nursing homes as published by the National Health Expenditures (NHE). In the nursing home setting, we assumed the per diem is equal to the national average per diem (approximately $125 per day in 2010). For the community setting, we utilized data

---

[4] Johnson and Weiner, using the 2002 HRS, found approximately 27 percent of older people with severe disabilities were Medicaid eligible, and approximately 35 percent of older people with severe disabilities received paid home care.

published in the same Kaiser report we used to develop the estimated size of this population. This report estimates 2006 annual Medicaid payments for an individual receiving home care was $13,320. We adjusted this community setting data to 2010 rates using the growth in nominal wages as published by the BLS from 2006 to 2010.

Once we determined the average Medicaid spending per person, we were able to develop an estimate of total Medicaid spending for the population with severe disabilities included in the Model. For purposes of calculating Medicaid savings in the Model, we estimated the portion of the baseline applicable to participants in the specific scenario (adjusted for the low-income subsidy interaction described previously).[5] For Model outputs of a services benefit, we assumed Medicaid would cover any co-pay and deductible associated with new benefit. For Model outputs of a cash benefit, we calculated the difference between expected Medicaid spending on the beneficiary and cash payments from the program. If expected Medicaid spending was higher than the cash payment, the Medicaid savings equaled the amount of cash paid, and if expected spending was lower than the cash payment, the Medicaid savings equaled total estimated Medicaid spending. We did not allow for a “personal care allowance” portion of the cash payment in the Model.

Finally, in calculating the estimated federal Medicaid savings for each output, we used an average Federal Matching Assistance Program (FMAP) rate of 57 percent, the same rate that the CBO uses when estimating federal Medicaid spending or savings. We apply this 57 percent to the total estimated Medicaid savings (which includes a state portion) to calculate only the federal portion.

Section X: Limitations

Due to the significant number of disparate data sets and assumptions used to create the LTC-PS Model, there are a number of limitations regarding the analysis. Beyond the issues already highlighted in this paper, we note the following points:

- **Disability Estimates.** Throughout the course of creating the Model, the single biggest issue we encountered was the lack of consistent estimates regarding the number of individuals with severe disabilities. Many of the data sets we examined had different ways of measuring disability, which in turn led to different estimates of total prevalence. In addition, there is no single data set that has information containing incidence and continuance of disability, the key measures needed for the Model. In order to develop the Model, we combined four data sets, which could have created certain biases in our parameters.
- **Participation Rates.** Estimating the number of people who will participate in a voluntary new program such as the one designed in the Model is extremely complex.

---

[5] As further explained in section X, we did not make any assumptions about delayed entry into Medicaid as a result of the program. If a participant in the Avalere LTC Model was estimated to have Medicaid as a payer, we assumed that person would continue to qualify for Medicaid benefits despite receiving benefits from the new federally run, long-term care insurance program.

Participation will likely be driven by a combination of factors, with a primary consideration being the premiums. However, premiums are estimated to offset total costs, which are estimated to account for the number of people receiving benefits, which are estimated based on the number of enrollees. Our point system for estimating participation provides a way to address this issue, but it is entirely based on our approximations and could understandably be over- or under-estimating actual enrollment.

- **Adverse Selection.** Another inherently complex estimation centers on the level of adverse selection. There is considerable debate among researchers regarding the magnitude of adverse selection and its impact on expected costs of a long-term care insurance program. We followed what we believe to be fairly standard actuarial assumptions regarding the magnitude of adverse selection but acknowledge that different analysts could reach different conclusions.
- **Medicaid Interactions.** One of the assumptions regarding potential Medicaid savings we used in our model is that the introduction of the new program will not lead to a delay of Medicaid eligibility for any individual. Most states set Medicaid eligibility partly based on income and assets, and the introduction of a long-term care insurance program could delay people from having to use personal savings to pay for this care. Therefore, the program could result in delayed eligibility for Medicaid, leading to higher savings. However, given the complexity of the interactions between income, assets, and Medicaid eligibility, we chose not to address the issues. We instead assumed any individual who would qualify for Medicaid without the long-term care insurance program would continue to qualify with the program.
- **Federal costs or savings.** Since the LTC-PS Model is meant to estimate a new, federally run LTC program, there will be associated federal costs and savings with this program. While we address some of the straightforward costs including Medicaid savings, premium income, and benefit payments, any programs such as the one envisioned in this model will likely lead to changes in tax receipts as well. The interaction between insurance premiums and tax payments is fairly complex and beyond the scope of this model.

Appendix 1: Data Sources

To construct this model, we used the following data sources:

- 2004 Survey of Income and Program Participation (SIPP) Wave 5
- 2004 National Nursing Home Survey (NNHS)
- Society of Actuaries (SOA) Individual Disability Experience Commission (IDEC) Incidence and Continuance Tables
- Disability Transition Matrices as constructed by Eric Stallard, Robert Yee, and Ken Manton from the National Long Term Care Survey (NLTCS)
- Social Security Trustees Report population estimates for 2000-2085
- Social Security Administration Life Tables
- Social Security Administration Estimated Number of Fully Insured Workers
- 2008 American Community Survey (ACS)
- 2008 Census Bureau Current Population Survey (CPS) Annual Social and Economic Supplement (ASEC)
- Long-Term Economic Projections from the Congressional Budget Office (CBO)
- Center for Medicare and Medicaid, Office of the Actuary *National Health Expenditures*
- 2008 MetLife Mature Market Institute *The MetLife Market Survey of Nursing Home and Assisted Living Costs*
- 2008 MetLife Mature Market Institute *The MetLife Market Survey of Adult Day Services and Home Care Costs*
- 2009 LifePlans Inc. *Cognitive and Functional Disability Trends for Assisted Living Facility Residents*
- 2009 Kaiser Commission on Medicaid and the Uninsured *Medicaid Home and Community-Based Service Programs: Data Update*

Appendix 2: Description of Key Data Sources

Of the data sources listed in Appendix 1, there are four that provided the inputs to allow us to construct our incidence, prevalence, and continuance factors that are key to the Model. We describe each of these data sources in greater detail below.

2004 Survey of Income and Program Participation (SIPP), Wave 5

- **Use in the LTC-PS Model:** SIPP provided estimates of prevalence of disability in the community setting, as well as Medicaid coverage and amount of paid help
- **Source:** US Census Bureau
- **Design:** Annual survey of 14,000 to 36,700 households
- **Demographics:** U.S. civilian non-institutionalized population over the age of 15
- **Measuring disability:** To construct our estimates of severe disability, we relied on the following data in SIPP:

  - Count of activities of daily living (ADL) that the person needs the help of another person. ADLs include transfer, bathing, dressing, walking, eating, and toileting.
  - We included an individual under cognitive impairment if they were not included under the ADL definition and SIPP indicated they had “Alzheimer’s disease or any other serious problem with confusion or forgetfulness”.
  - We included an individual under mental retardation/development disability if they were not included under the ADL definition or the cognitive impairment definition and SIPP indicated the person had a mental retardation or a developmental disability such as autism or cerebral palsy.

2004 National Nursing Home Survey (NNHS)

- **Use in the LTC-PS Model:** NNHS provided estimates of prevalence of disability in the nursing home setting
- **Source:** US Centers for Disease Control
- **Design:** Survey conducted every five years of 1,174 nationally representative nursing homes
- **Demographics:** All current residents of US nursing homes
- **Measuring disability:** To construct our estimates of severe disability, we relied on the following data in NNHS:
  - Count of activities of daily living (ADL) that the person needs limited, extensive, or total assistance. ADLs include transfer, bathing, dressing, walking, eating, and toileting.
  - We included an individual under cognitive impairment if they were not included under the ADL definition and NNHS indicated the person was either in specialty unit within the nursing home dedicated to Alzheimer’s disease or dementia or if the person had an impaired decision-making ability.
  - We included an individual under mental retardation/development disability if they were not included under the ADL definition or the cognitive impairment definition and NNHS indicated the person was either directly admitted to the nursing home from an intermediate care facility for the mentally retarded (ICF/MR) or the person was in a specialty unit within the nursing home dedicated to MR/DD.

Society of Actuaries (SOA) Individual Disability Experience Commission (IDEC)

- **Use in the LTC-PS Model:** We used the IDEC tables to construct disability continuance estimates for the under-65 population
- **Source:** Society of Actuaries
- **Design:** Claim incidence and termination study of twelve individual disability income carriers. Claim experience used in analysis covers 1990-1999 time period.
- **Demographics:** Covered lives from twelve long-term care insurance carriers representing approximately 64% of the US individual disability income market in 1995.

- **Notes on IDEC:** The IDEC tables are presented in spreadsheet format, which allow users to select key variables concerning the population in question, including age, gender, occupation, type and nature of disability, and any elimination period. Once a user selects these options, the Model provides estimated continuance rates until the person reaches the age of 65. We gathered these continuance rates for each age between 18 and 65 and each gender, allowing for any type of severe disability, requiring a 90-day elimination period (to exclude any short-term disabilities) and setting occupation to a equal mix of class 1 (white collar, professional, executive occupation) and class 2 (supervisory and other skilled clerical and skilled technical people). We then created a single continuance estimate for each age by weighting the output by the overall population.

National Long-Term Care Survey (NLTCS)

- **Use in the LTC-PS Model:** We used transition matrices prepared by Eric Stallard, Robert Yee, and Ken Manton using different waves of the NLTCS to construct disability continuance estimates for the over-65 population
- **Source:** NLTCS is administered by the US Census Bureau and published by the National Institute of Aging and Duke University
- **Design:** The NLTCS is a longitudinal survey that tracks the same individuals every 5 years to determine health and functional status, health expenditures, Medicare service use, and the availability of personal, family and community resources for care giving.
- **Demographics:** NLTCS surveys a sample of over 35,000 US residents over the age of 65. As individuals in any survey drop from the sample due to mortality, NLTCS replaces with new individuals.
- **Notes on NLTCS:** Stallard, Yee, and Manton have prepared a series of analyses using the subsequent waves of the NLTCS to estimate disability incidence, prevalence, and continuance. The continuance estimates are largely presented by the authors as transition matrices, which we have used in the Model to construct overall continuance estimates.

References

Cohen, M.A., Shi, X., and Miller, J.S. 2009. *Cognitive and Functional Disability Trends for Assisted Living Facility Residents.* Society of Actuaries.

Stallard, E. 2008. *Estimates of the Incidence, Prevalence, Duration, Intensity and Cost of Chronic Disability among the U.S. Elderly.* Society of Actuaries.

Manton, K.G., Corder, L.S., and Stallard, E. 1993. "Estimates of Change in Chronic Disability and Institutional Incidence and Prevalence Rates in the U.S. Elderly Population From the 1982, 1984, and 1989 National Long Term Care Survey." Journal of Gerontology: Social Sciences 8(4): S153-66.

Kemper, P., Komisar, H.L., and Alexcih, L. 2005. "Long-Term Care Over an Uncertain Future: What Can Current Retirees Expect?" Journal of Inquiry 42: 335-350.

Wang, H., Zhang, L., Yip, W., and Hsiao, W. 2006. "Adverse selection in a voluntary Rural Mutual Health Care health insurance scheme in China". Social Science and Medicine 63: 1236-1245.

De Donder, P., and Hindriks, J. 2008. "Adverse selection, moral hazard and propitious selection". Journal of Risk and Uncertainty 38(1): 73-86.

Belli, P. Year. *How Adverse Selection Affects the Health Insurance Market.* Harvard School of Public Health.

American Health Insurance Plans. 2007 *Who Buys Long-Term Care Insurance: A 15-year Study of Buyers and Non-Buyers, 1990-2005.*

Burman, L.E., and Johnson, R.W. 2007. *A Proposal to Finance Long-Term Care Services Through Medicare With an Income Tax Surcharge.* Working Paper No. 8, Georgetown University Long-Term Care Financing Project.

Manton, K.G., Corder, L., and Stallard, E. 1997. *Chronic disability trends in elderly United States populations: 1982-1994.* Proceedings of the National Academy of Sciences 94: 2593-98.

American Academy of Actuaries. 1999. *Long-term Care: Actuarial Issues in Designing Voluntary Federal-Private LTC Insurance Programs.* Public Policy Monograph.

Social Security Administration. 2008. *Characteristics of Disabled-Worker Beneficiaries Receiving Workers' Compensation or Public Disability Benefits Compared With Disabled-Worker Beneficiaries Without These Additional Benefits.* Office of Policy: Office of Disability and Income Assistance Policy. Research and Statistics Note No. 2008-01.

Oster, E., Shoulson, I., Quiad, K., and Dorsey, E.R. 2009. *Genetic Adverse Selection: Evidence From Long-Term Care Insurance and Huntington Disease.* National Bureau of Economic Research: Working Paper 15326.

Stallard, E., and Yee, R.K.W. 1999. *Non-Insured Home and Community-Based Long-Term Care Incidence and Continuance Tables.* Prepared for the Non-Insured Home and Community Experience Subcommittee of the Long-Term Care Experience Committee.

Rupp, K., Davies, P.S., and Strand, A. 2008. *Disability Benefit Coverage and Program Interactions in the Working-Age Population.* Social Security Bulletin: Vol 68, No. 1.

Spillman, B.C. 2005. *Assistive Device Use Among the Elderly: Trends, Characteristics of Users, and Implications for Modeling.* Prepared for Office of Disability, Aging and Long-Term Care Policy, Office of the Assistant Secretary for Planning and Evaluation, U.S. Depart of Health and Human Services. Contract #HHS-100-97-0010.

Fang, H., Keane, M.P., and Silverman, D. 2008. "Sources of Advantageous Selection: Evidence from the Medigap Insurance Market". Journal of Political Economy 116(2): 303-350.

Miller, J.S., Shi, X., and Cohen, M.A. 2008. *Private Long-Term Care Insurance: Following an Admission Cohort over 28 Months to Track Claim Experience, Service Use and Transitions.* Prepared for Office of Disability, Aging and Long-Term Care Policy, Office of the Assistant Secretary for Planning and Evaluation, U.S. Depart of Health and Human Services. Contract #HHS-100-02-0014.

Spillman, B.C. 2005. *The Impact of Disability Trends on Medicare Spending.* Prepared for Office of Disability, Aging and Long-Term Care Policy, Office of the Assistant Secretary for Planning and Evaluation, U.S. Depart of Health and Human Services. Contract #HHS-100-97-0010.

Greene, V.L., Lovely, M.E., Miller, M.D., and Ondrich, J.I. 1995. "Reducing Nursing Home Use Through Community Long-Term Care: An Optimization Analysis." Journal of Gerontology: Social Sciences 50B(4): S259-268.

Purushotham, M. and Muise, N. 2006. *Long-Term Care Insurance Persistency Experience.* LIMRA International and Society of Actuaries.

Davey, A., Femia, E.E., Zarit, S.H., Shea, D.G., Sundstrom, G., Berg, S., Smyer, M.A., and Savla, J. 2005. "Life on the Edge: Patterns of Formal and Informal Help to Older Adults in the United States and Sweeden". Journal of Gerontology: Social Sciences 60B(5): S281-288.

Freedman, V.A., Crimmins, E., Schoeni, R.F., Spillman, B.C., Aykan, H., Kramarow, E., Land, K., Lubitz, J., Manton, K., Martin, L.G., Shinberg, D., and Waidmann, T. 2004.

"Resolving Inconsistencies in Trends in Old-Age Disability: Report from the Technical Working Group". Demography 41(3): 417-441.

Finkelstein, A., and McGarry, K. 2006. "Multiple Dimensions of Private Information: Evidence from the Long-Term Care Insurance Market". The American Economic Review 96(4): 938-958.

Murtaugh, C.M., and Litke, A., 2002. "Transitions Through Postacute and Long-Term Care Settings: Patterns of Use and Outcomes for a National Cohort of Elders." Medical Care 40(3): 227-236.

Brown, J.R., and Finkelstein, A. 2008. "The Interaction of Public and Private Insurance: Medicaid and the Long-Term Care Insurance Market." The American Economic Review 93(3): 1083-1102.

McNeil, J.M. 2000. *Employment, Earnings, and Disability.* Prepared for the 75th Annual Conference of the Western Economic Association International.

ElJay, LLC. 2008. *A Report on Shortfalls in Medicaid Funding for Nursing Home Care.* Prepared for the American Health Care Association.

Kaiser Commission on Medicaid and the Uninsured. 2009. *Medicaid Home and Community-Based Service Programs: Data Update.* Issue Paper #7720-03.

Mollica, R.L. 2009. *State Medicaid Reimbursement Policies and Practices in Assisted Living.* Prepared for the National Center for Assisted Living and the American Health Care Association.

2009 Overview of Assisted Living. A collaborative research project of the American Association of Homes and Services for the Aging; American Seniors Housing Association; Assisted Living Foundation of America; National Center for Assisted Living; and National Investment Center for the Seniors Housing and Care Industry.

The MetLife Market Survey of Adult Day Services & Home Care Costs: 2008. MetLife Mature Market Institute.

The MetLife Market Survey of Nursing Home & Assisted Living Costs: 2008. MetLife Mature Market Institute.

Prepared by:
Ila Broyles / Eric Hammelman / Anne Tumlinson / Scott Weier

Corresponding Author:
Eric Hammelman, ehammelman@avalerehealth.net

Avalere Health LLC
1350 Connecticut Ave. NW
Suite 900
Washington, DC 20036

www.avalerehealth.net