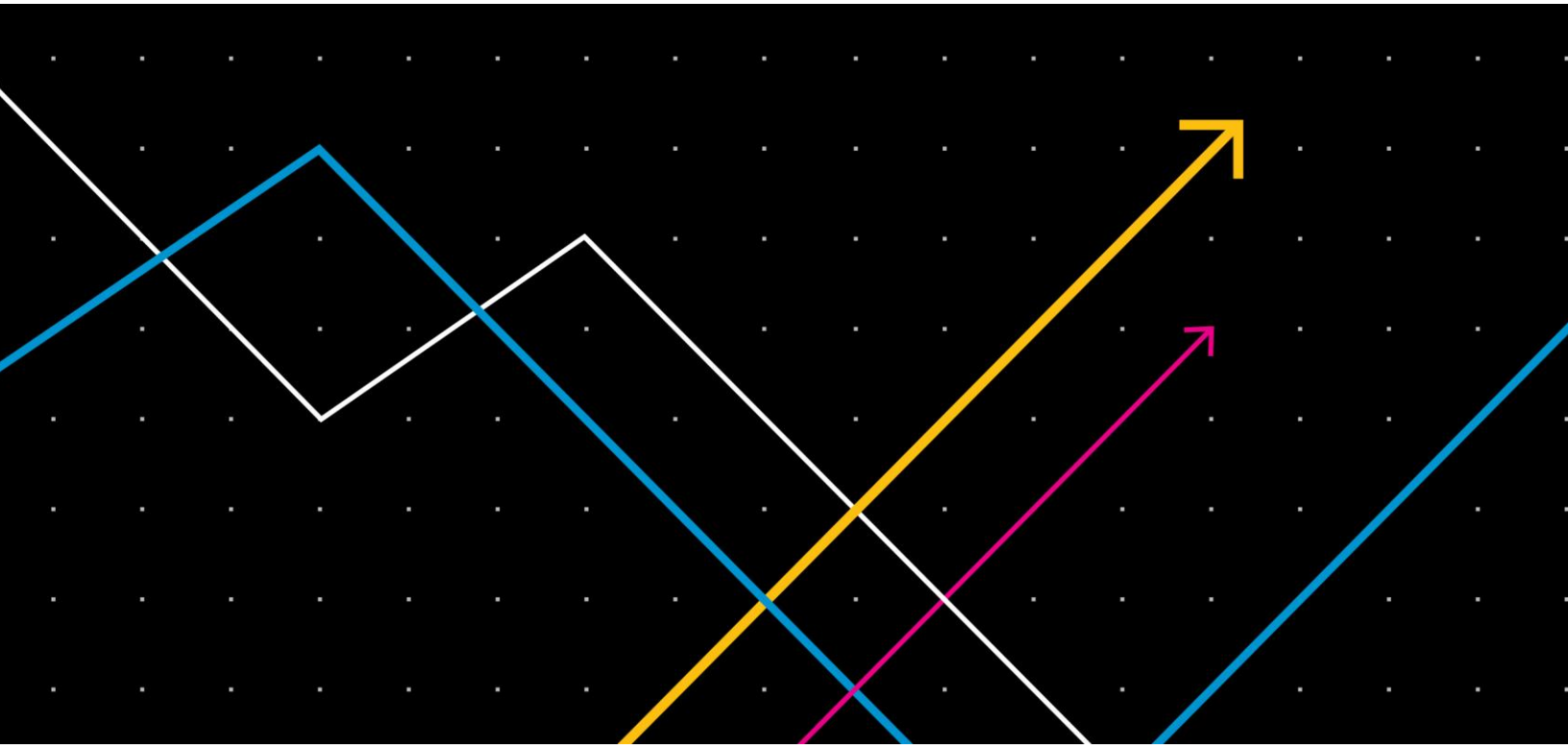

RESEARCH REPORT

Microsimulation Analysis of Financing Options for Long-Term Services and Supports

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This report is one component of a larger initiative assessing alternative financing options for long-term services and supports in collaboration with Milliman, Inc. All reports associated with the initiative can be found at http://www.thescanfoundation.org/ltc-financing-initiative.

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Acronyms

AALTCI	American Association for Long-Term Care Insurance
ADL	Activities of Daily Living
ATRA	American Tax Relief Act of 2012
CBO	Congressional Budget Office
CFR	Code of Federal Regulations
CI	Cognitive Impairment
CPI	Consumer Price Index
DYNASIM	Dynamic Simulation of Income Model
FMAP	Federal Medical Assistance Percentage(s)
GDP	Gross Domestic Product
HCBS	Home and Community Based Services
HIPAA	Health Insurance Portability and Accountability Act
HMO	Health Maintenance Organization
HRS	Health and Retirement Study
IADL	Instrumental Activities of Daily Living
LTSS	Long-Term Services and Supports
MCBS	Medicare Current Beneficiary Study
MDS	Long Term Care Minimum Data Set
MSIS	Medicaid Statistical Information System
MSP	Medicare Savings Program
NHATS	National Health and Aging Trends Survey
NLTCS	National Long Term Care Survey
OASDI	Old-Age Survivors and Disability Insurance
OOP	Out of Pocket
PDV	Present Discounted Value
QI	Qualified Individuals
QMB	Qualified Medicaid Beneficiary
SIPP	Survey of Income and Program Participation
SLMB	Specified Low-Income Beneficiary
SOI	Statistics of Income
SPMSQ	Short Portable Mental Status Questionnaire
SSI	Supplemental Security Income
TICS	Telephone Interview for Cognitive Status

Microsimulation Analysis of Financing Options for Long-Term Services and Supports

Older adults face a significant risk of developing chronic health problems and becoming unable to perform basic tasks on their own. In 2011, 7.7 million adults ages 65 and older received help with activities of daily living (ADLs) (Freedman and Spillman 2014), which include such tasks as bathing, dressing, eating, using the toilet, and getting out of bed. About 6 million adults in the same age group—nearly one-sixth of the population ages 65 and older—have more severe needs, requiring help with at least two ADLs for 90 or more days or having severe cognitive impairment.[1]

Most of this assistance, known as long-term services and supports (LTSS), is provided informally at home by unpaid family caregivers. According to unpublished Urban Institute analysis of data from the 2004 National Long-Term Care Survey, only 9 percent of adults age 65 or older with severe cognitive impairment or two or more ADL limitations received any nursing home care over 12 months, excluding care in a skilled nursing facility, nearly a quarter (23 percent) received help from paid home care providers About half (53 percent) of aged adults with severe LTSS needs received unpaid care from family members or friends. Unpaid caregivers often experience physical, emotional, and financial strains (e.g., Pinquart and Sorensen 2003, 2007; Roth et al. 2009). For example, 22 percent of caregivers say their care activities made their health worse (National Alliance for Caregiving and AARP Public Policy Institute 2015). About half of working age adults who provide care to their frail parents work full time (Johnson and Wiener 2006), and some evidence suggests that caregivers must reduce their work hours to accommodate their care responsibilities (Butrica and Karamcheva 2014; Johnson and Lo Sasso 2006; Van Houtven, Coe, and Skira 2013).[2]

Paid LTSS is most commonly provided at home by paraprofessional caregivers and in nursing homes or other residential care settings. Although less common than care provided by family members, paid

[1] This estimate is based on unpublished tabulations by Brenda Spillman at the Urban Institute of 2011 data from the National Health and Aging Trends Study.

[2] Recent surveys, however, reveal that only a minority of caregivers report significant burdens (National Alliance for Caregiving and AARP Public Policy Institute 2015; Spillman et al. 2014). In fact, two-thirds of caregivers in the 2011 NHATS report positive aspects of the caregiving experience, including gaining confidence about their own abilities, learning that they could deal with difficult situations, bringing them closer to the care recipient, and gaining satisfaction from the quality care provided to the recipient (Spillman et al. 2014).

LTSS is costly, especially when measured over a lifetime. In 2015, the median cost of home health aide services is $20 per hour and the median cost of nursing home care is $80,000 per year (Genworth 2015), although costs vary widely across the country. Urban Institute projections indicate that the average American turning 65 today will incur about $138,000 in expenses for severe LTSS needs over the rest of their lives (Favreault and Dey 2015).[3] These future costs could be financed by investing $69,500 at age 65, under the assumption that the investment earns average returns. However, lifetime costs vary widely. Forty-eight percent of adults turning 65 today will likely never experience severe LTSS needs and another 10 percent will incur some expenses but less than $25,000 worth, while 21 percent will incur more than $150,000 in lifetime expenses and 15 percent will incur more than $250,000.

Because high LTSS expenses are rare but some people experience catastrophic costs, this risk seems insurable, either by government or the private sector, yet the US has not yet developed a national policy for LTSS financing. Medicare does not provide extended coverage for LTSS needs.[4] Standard health insurance and Medigap policies do not cover LTSS, and relatively few people purchase private long-term care insurance because of high premiums, the potential crowd-out of demand by Medicaid, and adverse selection—which limits the size of the market and drives up premiums (Brown and Finkelstein 2007). Sales of private long-term care policies and certificates have declined from 528,000 in 2005 to 395,000 in 2012 (Cohen 2014).

As a result, many families needing long-term care rely first on unpaid family members before turning to paid services when more intensive care becomes necessary, paying out of pocket until their financial resources run out and then enrolling in Medicaid. However, because people with LTSS needs may qualify for Medicaid after they deplete most of their resources, Urban Institute projections indicate that Medicaid will pay for about one-third of lifetime costs associated with severe LTSS needs for people turning 65 today, while about half of their costs will be paid out of pocket by families (Favreault and Dey 2015). (Estimates of the proportions of costs that various payers cover are quite sensitive to analytic choices, for example hoe one treats the room and board component of residential care expenses.) The potentially catastrophic consequences of becoming disabled and needing long-term care is arguably the gravest financial risk that older adults face.

[3] These estimates cover only those costs associated with severe LTSS needs and exclude the often substantial sums spent coping with less severe disabilities.

[4] When individuals have both medical (for example, for postacute care) and LTSS needs, Medicare may provide services in skilled nursing facilities or at home to beneficiaries who otherwise would have received LTSS alone.

People who lack the resources for LTSS can receive poor or inappropriate care (Komisar, Feder, and Kasper 2005). This care gap can not only harm those who need assistance but also increase costs for Medicare, which pays for the hospitalizations and other medical treatments that often result from acute episodes caused by inadequate assistance (Komisar and Feder 2011).

The lack of an adequate policy for LTSS financing also creates risks for public programs. LTSS needs will grow over time as the population ages. Urban Institute projections indicate that between 2015 and 2055, the number of older Americans with severe LTSS needs will increase 140 percent, reaching 15.1 million (Favreault and Dey 2015). Over the same period, the US population ages 65 and older will increase 80 percent and the population ages 85 and older will increase 190 percent (US Census Bureau 2014). As the demand for LTSS rises, more older adults are likely to turn to state Medicaid programs—financed partly by the federal government—to cover part of their costs. Rising Medicaid spending may strain government budgets at both at the federal and state levels. Because individuals do not qualify for Medicaid until they have exhausted nearly all of their financial resources, the reliance on the program to cover long-term care expenses may also reduce individual savings incentives, another reason to develop more comprehensive long-term care policies.

Policymakers, advocates, and researchers have tried unsuccessfully for decades to create alternative LTSS financing mechanisms. In 1990, for example, the US Bipartisan Commission on Comprehensive Health Care—also known as the Pepper Commission after its first chairman, Rep. Claude Pepper (D-FL)—proposed social insurance for home and community-based care and for the first three months of nursing home care for all Americans, regardless of income (US Bipartisan Commission on Comprehensive Health Care 1990). The Clinton administration's unsuccessful 1993 health reform plan included a new state-run home care program for people with severe disabilities, with no restrictions on eligibility based on age or financial resources (Wiener, Estes, Goldenson, and Goldberg 2001).

In the most recent attempt, Congress passed the Community Living Assistance Services and Supports (CLASS) Act as part of the Affordable Care Act in 2010, creating a national program of voluntary long-term care insurance. However, the law was never implemented by Obama administration and was repealed by Congress in 2013. That same year Congress created the Commission on Long-Term Care, which articulated a framework for considering future financing proposals (Commission on Long-Term Care 2013). However the 100-day process was challenged by many factors, including the lack of available statistical modeling to evaluate various policy proposals.

To better understand how policy changes could expand the role of insurance in the financing of LTSS, the Urban Institute and Milliman examined several alternative programmatic options and estimated their potential impact on families' out-of-pocket expenses and LTSS spending by other payers. This report describes Urban's simulations of three new insurance programs, including a front-end-only benefit that provides coverage relatively early in the period of disability but caps benefits, a back-end benefit with no lifetime limit, and a combined comprehensive benefit. Key aspects of these analyses are described in a recent *Health Affairs* article (Favreault, Gleckman, and Johnson 2015). Milliman examined the potential impact of reforming the private long-term care insurance market, and those results are available in Giese and Schmitz (2015). Additional analyses of the potential impact of Medicaid reforms and expanded retirement savings options on LTSS financing are described in Favreault, Haaga, Johnson, and Johnson (2015).

We used dynamic microsimulation techniques to compare likely outcomes under each new insurance program to expected outcomes under current policies. These programs could be operated by the government or private carriers. Our simulations projected overall costs and benefits and examined how they varied by multiple characteristics of the older population, including sex, income, birth cohort, and years of LTSS needs.

Data limitations restricted our analysis to adults ages 65 or older, although we recognize that as many as half of the people with LTSS needs are younger than 65 (Kaye, Harrington, and LaPlante 2010). Additionally, we considered only those expenses associated with severe LTSS needs, defined as having limitations with two or more ADLs for at least 90 days or severe cognitive impairment. This is the level of need that triggers benefits from private long-term care insurance under the Health Insurance Portability and Accountability Act (HIPAA) of 1996.

Our efforts represent the first look at some simplified options and highlight both the capabilities of our microsimulation model and its potential to inform the policy debate. One advantage of using dynamic microsimulation to model detailed LTSS needs and program participation is the ability to ask a wide range of "what if?" questions about policy changes. For example, we can consider how new insurance programs could shift cost burdens for LTSS. We can ask what would happen if Medicaid asset test rules were tightened or loosened or if the trend toward greater provision of home-based services were to continue. We can also model the effects of future changes in other model functions. For example, we can examine how our projections would change if longevity were to increase more rapidly

than currently anticipated, if ADL disability rates were to increase or decrease relative to our assumptions, or if effective treatments for dementia were to emerge.[5]

An important advantage of dynamic microsimulation models is their ability to capture how life circumstances, including health outcomes, differ by socioeconomic status. These models allow analysts to look at the full distribution of outcomes, not just averages, for the overall population and for various subgroups.

There is a great deal of uncertainty surrounding our projections, of course, and they require making many assumptions, many of which affect the outcomes. Each of the programs we modeled is very simplified and thus excludes many details, but we specified enough provisions so that the programs can be compared across key dimensions. Additional model runs will be necessary to refine the plan specifications before policy recommendations can be made. The contribution of this report is not to identify a detailed program that most efficiently and equitably finances LTSS. Rather, this report highlights the value of microsimulation in identifying the strengths and weaknesses of broad program types and the tradeoffs that policymakers must consider when weighing different approaches to financing LTSS.

Previous Analyses

Our research builds on several earlier studies that have modeled lifetime LTSS needs and the effects of alternative financing policies. One important analysis of the distribution of lifetime LTSS needs was Kemper, Komisar, and Alecxih (2005/2006), which projects LTSS needs and costs after age 65 for adults reaching that milestone in 2005. Other studies examine LTSS needs at a point in time, including Congressional Budget Office (2013), Kaye, Harrington, and LaPlante (2010), and O'Shaughnessy (2014). Another branch of this literature examines specific components of disability, such as expected duration of cognitive impairment (Lièvre, Alley, and Crimmins 2008; Murtaugh, Spillman, and Wang 2011; Suthers, Kim, and Crimmins 2003). Stallard (2011) examines disability and LTSS experiences of individuals a few decades ago, using 1984-1994 data from the National Long-Term Care Survey. Other recent studies include Friedberg, Sun, Webb, Hou, and Li (2014) and Hurd, Michaud, and Rohwedder (2014).

[5] Improving treatment options for Alzheimer's disease is a priority area for the federal government (US Department of Health and Human Services 2014).

Several policy groups and commissions have highlighted challenges associated with financing LTSS and proposed various solutions (Bipartisan Policy Center 201;, Commission on Long-Term Care 2013; Leading Age Pathways 2013; Long-Term Care Financing Collaborative 2015; O'Leary 2014).

An influential study that simulated alternative LTSS financing options is Wiener, Illston, and Hanley (1994), published more than 20 years ago. The authors developed a baseline projection of LTSS needs and payers and simulated a range of LTSS financing alternatives, including an expanded package of Medicaid benefits, the introduction of social insurance, and public subsidies for private insurance. Within each of these alternatives, the authors examined the impact of key parameters, varying, for example, the extent to which proposals covered front-end versus back-end costs or focused on institutional care versus home and community based services (HCBS). Rivlin and Wiener (1988) examined a similar range of policy options but also considered some alternatives, such as home equity conversions.[6] Tumlinson, Hammelman, Stair, and Wiener (2013) conducted a more recent study using a somewhat less elaborate model (described in Broyles, Hammelman, Tumlinson, and Weier 2010) and juxtaposed the effects of mandatory and voluntary LTSS financing approaches, with a focus on premium prices and potential Medicaid savings.

Financing Policy Options

We analyzed the following three new broad insurance options: a program with a front-end benefit that begins after a 90-day waiting period and covers a maximum of two years of need, a catastrophic-only or back-end program that begins after a waiting period of two years but provides a lifetime benefit thereafter, and a comprehensive program that begins after a 90-day waiting period and provides a lifetime benefit. Each option was modeled as voluntary insurance and as a universal mandatory program for workers. For the voluntary options, we included subsidized and unsubsidized versions. Appendix table 1 summarizes the parameters of each plan.

[6] Another study from around this same time period, less detailed in its description of projection methods, is Cohen, Kumar, McGuire, and Wallack (1992). Crown, Burwell, and Alecxih (1994) also examine a specific subset of LTSS financing changes, increases in Medicaid asset tests for nursing homes. Kemper, Spillman, and Murtaugh (1991) similarly focus on nursing home policies.

Benefits

The three new insurance options have a common benefit structure. Each would provide a daily cash benefit of $100 in 2015 that would increase 3 percent per year. Cash benefits could be used for both traditional services (such as paying providers in care settings) and nontraditional services (such as paying family caregivers, purchasing transportation, or modifying a home). Enrollees would qualify for benefits once they developed severe LTSS needs—that is, requiring help with at least two ADLs for 90 or more days or having severe cognitive impairment. This is the same high level of need that currently triggers private long-term care insurance benefits. The programs differ, however, by when benefits begin and how long they last.

Premiums

Enrollee premiums would fund the voluntary programs, and a payroll tax would fund the mandatory programs. Like the current Medicare payroll tax (but unlike the Social Security tax), the LTSS tax would not be subject to a wage cap. Only employees—not employers—would be subject to the payroll tax.

The levels of premiums and payroll tax would be set to cover all program costs (including administrative expenses). However, the subsidies available to low-income enrollees in the voluntary programs would be financed by general tax revenues collected outside the LTSS program. The subsidized voluntary insurance programs would fully subsidize people who meet Social Security insured status requirements and who have incomes below 150 percent of the federal poverty level.[7] This assistance would be gradually phased out and end when income reached 200 percent of poverty. In the mandatory programs, the uncapped payroll tax would subsidize premiums for people with low incomes.

The mandatory programs would levy administrative costs equal to 2.5 percent of taxes and 3.75 percent of benefits paid. We assumed that the voluntary programs would require 50 percent higher administrative costs than mandatory programs.[8]

[7] In 2015 this threshold was set at $17,655 for a single individual and $23,895 for a couple.

[8] We also assumed that enrollees would additionally pay premium taxes of 2.5 percent but would not pay any sales commissions.

Eligibility

Adults younger than age 70 in 2018 (so born in 1948 or later) would be eligible to enroll in the new programs, but no enrollees would be eligible for benefits until age 65. Participants would not be subject to underwriting, unlike people who have private insurance. However, to help limit the number of enrollees in the voluntary programs who had preexisting disabilities and who would drive up costs, enrollees in these programs would not qualify for benefits until they had paid premiums for at least five years. Similarly, participants in the mandatory programs would need to have 40 quarters of employment covered by Social Security (about 10 years of work) to qualify for benefits, but these quarters could have been earned before the LTSS programs began. (The amount of earnings required for a quarter of coverage in 2016 is $1,260.) Unlike Medicare or Social Security, the mandatory LTSS insurance programs we modeled do not cover workers' spouses. Payments into the programs would begin in 2016, with benefits commencing in 2018 for the mandatory programs and 2021 for the voluntary programs (when the vesting requirement is first met). The new insurance programs would be the primary LTSS payer, with Medicaid the secondary payer.

Data and Methods

We simulated the impact of each policy option using DYNASIM3, the Urban Institute's dynamic microsimulation model designed to analyze the long-run distributional consequences of retirement and aging issues. Starting with a representative sample of individuals and families, the model "ages" the data year by year, simulating such demographic events as births, deaths, marriages and divorces, and such economic and health events as labor force participation, earnings, hours of work, disability onset and recovery, retirement, and use and costs of long-term services and supports. As the model ages the population, it calibrates many key demographic and economic outcomes to the intermediate assumptions of the Old-Age Survivors and Disability Insurance (OASDI) and Medicare Trustees' Reports (Board of Trustees, Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds 2014; Boards of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds 2014).[9] The model projects outcomes through 2087, generating lifetime projections for some cohorts and projections covering much of the life course for others.[10]

[9] We calibrate fertility, mortality, net immigration, covered employment rates, and the prevalence of Social Security Disability Insurance benefit receipt by age and sex. Economy-wide wage and price growth, as well as all the Social Security parameters that are based on them, follow the Trustees' intermediate series, as does the share of total

DYNASIM3's starting population is a sample from the pooled 1990-1993 panels of the Survey of Income and Program Participation (SIPP). To age the population, we estimate transition and other equations using an array of high-quality longitudinal data sources. DYNASIM's LTSS projections draw information from a wide range of cross-sectional and longitudinal sources, including the Health and Retirement Study (HRS), Medicare Current Beneficiary Study (MCBS), and National Health and Aging Trends Survey (NHATS). Because DYNASIM's underlying population is nationally representative, its weighted projections yield national totals for various population groups and for program costs. As a result, it can also be used to determine relative costs of various interventions, although the model's focus is distributional.

Appendix Tables 2 through 5 provide summary information on the specification of our LTSS models, with a focus on our health and disability measures (Appendix Table 2), presence and quantity of LTSS use (Appendix Table 3), LTSS payer attribution (Appendix Table 4), and Medicare and Medicaid assignments (Appendix Table 5). The appendix tables describe each model's functional form, predictors, and estimation data source and sample. Detail on other functions, like earnings, pensions, and wealth, are available in Favreault, Smith, and Johnson (2015).

As the tables indicate, the HRS underlies the models of health, disability status (including limitations with ADLs and instrumental activities of daily living (IADLs) and cognitive impairment), LTSS use, and private long-term care insurance coverage.[11] These models are highly interdependent. For example,

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earnings that falls below the annual cap on earnings subject to Social Security taxes (known as the taxable share). This share reflects earnings dispersion, in that earnings are more likely to exceed the taxable cap as the skewness of the earnings distribution rises. We also calibrate DYNASIM to Medicare projections, particularly by matching the Medicare Trustees' assumptions on excess cost growth—the amount by which Medicare spending outpaces GDP growth. This is important because the Trustees expect Medicare costs to grow significantly under current law. Because many older adults qualify for Medicaid through the system's medically needy programs, medical cost growth affects the likelihood and prevalence of Medicaid eligibility.

[10] Nearer-term projections are more reliable than the less certain longer-term projections. Nonetheless, future DYNASIM releases will extend the simulation horizon to 2090, the end of the 75-year forecasting horizon for many government programs. Even though such distant projections are highly speculative, they help capture lifetime experience, which improves our understanding of the nature of LTSS financing risks.

[11] Our measure of cognitive impairment is based on scores from the Telephone Interview for Cognitive Status (TICS) in the HRS (Ofstedal, Fisher and Herzog 2005). This is a fairly standardized battery of questions to assess memory and cognitive status. The survey asks self-respondents to rate their memory and any changes in their memory since the previous interview, and then administers a cognitive test. The test asks respondents to repeat a list of 10 nouns immediately and again five minutes later; subtract 7 from 100 and then subtract 7 from the result successively another four times; and count backwards from 20. Respondents are also asked to identify the date and day of the week, the current U.S. president and vice president, and two common objects ("cactus" and "scissors") based on the interviewer's description. We use these responses to create a cognitive index score by awarding one point for each correct answer (or component of an answer), for a maximum total of 35 points. We classify

earlier processes predict subsequent processes, and we model some processes jointly, such as use of nursing home, home care, and residential care. We typically employ complex econometric specifications in our models to best capture patterns over time. Most equations incorporate many predictor variables, including age, education, income, marital status and spouse disability, nativity, race and ethnicity, presence of children, and other attributes.

One challenge is how to capture trends in LTSS outcomes. When there is a clear trend, such as the decline in mortality, we follow the Social Security Trustees' assumptions. Otherwise, we typically assume that the underlying propensity to develop LTSS needs or use LTSS continues at current levels, but that the aggregate rates observed change as the composition of the population shifts. For example, as the population becomes better educated, more people in the population will experience the rates for more highly educated adults, but the rate for an adult with a certain level of education will not change. Modeling choices become difficult, however, when there is no scientific consensus about long-term trends, such as with disability.[12] In the case of ADL and IADL disability, we resolve the issue by basing projections on relative age—years of remaining life expectancy—and assuming that disability rates remain constant across cohorts for adults at the same relative age.[13] All else equal, projected disability rates will fall over time when measured at years since birth—standard age—because longevity is increasing. However, changes in risk factors could offset these changes.

To model LTSS payments, we estimate various parameters from MCBS data and develop various algorithms to simulate eligibility for public insurance programs. DYNASIM assigns personal income and payroll taxes and eligibility for means-tested public programs using appropriate rules and laws; the model mimics tax forms and the application and eligibility verification processes for various public

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respondents as having severe cognitive impairment if they score 7 or fewer points and mild cognitive impairment if they score between 8 and 13 points.

[12] Different measures of disability yield significantly different estimates of disability prevalence (for example, Freedman and Spillman 2014b). One recent comprehensive study of multiple datasets concludes that trends in old-age disability may vary by age (Freedman, Spillman, Andreski, et al. 2013).

[13] We define relative age based on life expectancy in 2002, the midpoint of our HRS estimation sample. We assume that healthy life expectancy increases a half year for every full-year increase in total life expectancy. In one recent cross-country study, Salomon et al. (2012) estimate that the ratio of health life expectancy gain to total life expectancy gain falls with age. They find that one year of life expectancy gain leads to about 0.85 years of healthy life expectancy at birth, but only about 0.75 years at age 50, suggesting our estimate of half at age 65 is reasonable in a comparative framework. Looking at older ages and focusing on the U.S. population, Manton, Gu, and Lowrimore (2008) estimate a more favorable situation, with gains in healthy life expectancy (relative to total life expectancy) of 73 to 80 percent at age 75 and 71 to 79 percent at age 85. This suggests that a somewhat more aggressive assumption may be appropriate, but we maintain the more conservative approach to limit the chance of underpricing products that cover LTSS expenses.

programs.[14] For application-based public programs like Supplemental Security Income (SSI) and Medicaid, some individuals choose not to apply for benefits for which they are eligible (i.e., take-up rates generally fall well below 100 percent). We draw from the literature to assign SSI and Medicaid take-up levels using algorithms and equations that account for need, as the literature generally shows that take-up is higher for those with lower income and assets.[15] We calibrate participation parameters so that DYNASIM Medicaid projection results track Medicaid Statistical Information System (MSIS) data over the period for which historical information is available (currently 2011). Likewise, when we model private long-term care insurance payments for LTSS, we use a rule-based approach and account for features of the simulated plans—including elimination periods, lifetime and daily benefit maxima, inflation protection—and premiums that are consistent with the plan features and issue age.

We set current and past LTSS prices equal to average or median prices reported in the literature by state of residence, setting (home care, residential care, nursing home), and whether Medicaid is the payer (Genworth 2014, 2015; Eljay 2014; Fossett and Burke 2010; Grabowski, Feng, Intrator, and Mor 2004; Mollica 2009; Ng et al. 2014). Prices vary markedly across states. Within states, Medicaid prices tend to be substantially lower than overall prices, and much lower than Medicare prices for similar services.[16] For those receiving Medicare-covered services that overlap with LTSS, DYNASIM assigns higher prices. For those paying out of pocket, DYNASIM varies LTSS prices somewhat based on income,

[14] The tax calculator uses annual projected tax unit income and assets from the SIPP panels matched to a Statistics of Income (SOI) data file that includes itemized deductions and other variables needed to calculate personal income taxes. The tax calculator uses current law federal income tax rules, including provisions of the American Tax Relief Act of 2012 (ATRA). Tax provisions affecting the treatment of Social Security benefits have not changed since 1993, but the share of Social Security benefits included in taxable income is continually increasing under current law partly because the threshold levels for including benefits in taxable income are not indexed for inflation. The tax calculator requires information about future tax law. With the exception of the Social Security thresholds, which are assumed to remain constant over time, DYNASIM inflates thresholds in the tax calculations—such as those used to set progressive tax rates—by projected changes in the Consumer Price Index (CPI) through 2024 and by wage growth thereafter.

[15] For example, Ettner (1997), Gardner and Gilleskie (2012), Haber, Adamache, Walsh, Hoover, and Bir (2003), Pezzin and Kasper (2002), Rupp and Sears (2000), Sears (2001/2002), and U.S. Government Accountability Office (2012) examine take-up of Medicaid and Medicare Savings Programs (MSP). It is often difficult to measure Medicaid eligibility in survey data because datasets that effectively measure disability and service use do not always measure income and assets well. DYNASIM's take-up parameters tend to fall on the high side of those reported in the literature. They are consistent with those studies that rely on survey data matched to administrative records (e.g., Sears 2001/2002), which are likely to be more reliable than studies based on survey data alone.

[16] To give a few concrete examples of populous states, Eljay (2014) reports 2013 Medicaid nursing home rates of $179 and $221 for New York and California, respectively. For that same year, Genworth reports median prices of $230 and $332 for semi-private rooms in these states, and for the preceding year Metlife (2013) reports mean prices of $249 and $356.

so that some lower-income families use lower-cost providers—especially for home care. DYNASIM also assumes that some higher-income families—especially those covered by private long-term care insurance—use higher-cost providers.[17] We do not currently apply higher prices for dementia care than standard care.[18] After the last year of historical price data, prices for nursing homes and residential care grow at the same rate as the average national wage, based on the OASDI Trustees' intermediate assumptions, because the provision of LTSS tends to be labor intensive. For home care, prices grow somewhat more slowly, at the average of wage and price growth, again based on the OASDI Trustees' intermediate assumptions, reflecting recent trends in lower-wage workers' compensation and other aspects of the LTSS workforce in private homes.[19] Although this appendix focuses on how we simulate the status quo, it bears noting that the price differential between Medicaid and other payers poses challenges when simulating changes to current LTSS financing arrangements.[20]

Because each data source that we use to develop DYNASIM's LTSS capacities has different strengths and weaknesses, we compare our projection results with a range of other data sources. For example, although we use HRS to project residential care, we calibrate these projections to data from NHATS (Freedman and Spillman 2014a) and NCHS (for example, Caffrey, Harris-Kojetin, Rome, Sengupta 2014). Similarly, the HRS self-reports of time in nursing homes do not distinguish between

[17] We assign these differential rates probabilistically based on income relative to the federal poverty level. We prefer this measure because it accounts for the lower living expenses associated with shared living arrangements. Specifically, we assume that a fraction of those with income less than five times the poverty level who are not covered by Medicaid pay between two-thirds and 95 percent of the median rate in the state in which they live. (Rates vary by hours of service used and income range). For those with higher income and who are covered by private long term care insurance, a select percent pay rates of up to 10 percent higher than the median for their state. Most people not covered by Medicaid do pay the state-specific market rate. No one pays less than two-thirds or more than 110 percent of the market rate as reported by Genworth.

[18] The 2013 MetLife study reported that about 80 percent of nursing homes providing care for dementia or Alzheimer's disease charge the same rate for patients with dementia as for other patients. The average rate for the remaining 20 percent of nursing homes (that charge higher rates for dementia patients) slightly exceeded the national average. Karon, Wiener, Greene, Khatutsky, and Johnson (2014) consider how residential care prices vary. They find that facilities with specialized services for people with dementia (and that will not discharge patients due to cognitive impairment) charge higher rates (on average roughly $1,000 per month more in 2010). Also, patients needing care with a higher number of ADL limitations tend to pay higher rates. Future iterations of DYNASIM will incorporate these findings.

[19] Martin, Lowell, Gozdziak, Bump, and Breeding (2009), for example, find that the work force providing home care is disproportionately foreign born and that many foreign-born direct care workers are unauthorized. Government statistics also reveal that this work force is disproportionately female, African-American, Hispanic, and less educated relative to the overall work force.

[20] For example, fewer workers may enter care occupations if wages fall because many patients face lower prices under new policy options, and providers may be less willing to offer services. As one recent press account describes (Thomas 2015), policies on acute care, post-acute care, and custodial care are likely to interact in important ways.

long-term stays for custodial care and short-term stays for strictly post-acute care, so we use NLTCS data matched to administrative records and the MCBS to understand how nursing home care is distributed across these two service types.[21] To improve our projections of private long-term care insurance, we have worked with data from several partners as well as published studies by the Society of Actuaries (2011) and private industry groups. We look carefully at the literature, including those studies that have produced similar long-range projections and studies that focus on historical patterns.

One challenge for dynamic microsimulation is producing aggregate totals and distributional estimates that both line up with historical data. This is especially difficult when outcomes are highly skewed, as with earnings and wealth, where the top fraction of one percent of the distribution holds an extraordinary share of the total. For modeling LTSS, a large part of the challenge is obtaining aggregate data that provide such detail on the distribution and allow disaggregation of the complex constellation of services that constitutes LTSS (see, for example, Technical Appendix in Bipartisan Policy Center 2014). We address the challenge by combining data from as many sources as possible and relying on a panel of expert advisors to help assign future parameters that require discretion.

Outcome measures

Because DYNASIM ages its population year by year, focusing on calendar years, projections can be displayed in various ways. For example, we can examine key outcomes year by year, comparing the prevalence of LTSS needs or average costs in 2015, 2025, and 2035, say. Or, we can compare them longitudinally, examining cumulative LTSS experience from age 65 to death).[22] When calculating either type of measure, we generally prorate needs, expenditures, and cost shares in the year of death. [23]

[21] We generally assume, for example, that post-acute services in a skilled nursing facility that occur within weeks of admission to (or discharge from) a nursing home are LTSS, but that short-term post-acute spells when an individual does not meet HIPAA disability standards are not. To compute these levels, we examined several alternative definitions of Medicare-covered services that might reasonably be considered LTSS.

[22] We use the terms "longitudinal" and "lifetime" interchangeably for ease of presentation, but recognize that many of our longitudinal measures are better classified as old-age measures because we only consider service use at ages 65 and older.

[23] More broadly, an individual's health and disability status, and thus program eligibility, may vary over the course of a year. Our disability concepts (ADL and IADL limitations and cognitive impairment) are best interpreted as averages over a year. However, we forecast nursing home use and residential care in days and formal home care use in hours. We adjust service use projections and prorate "years disabled" when an individual dies during the course of a year.

Many of our longitudinal analyses closely mirror those from the earlier study by Kemper, Komisar, and Alecxih (2005/2006), which projected LTSS needs for individuals turning 65 in 2005 (or born in 1940) using another empirically based microsimulation model.

When describing patterns of LTSS need and formal/paid LTSS use, we focus on usage at the level specified in HIPAA: a need for assistance with at least two ADLs[24] that is expected to last at least 90 days or need for substantial supervision for health and safety threats due to severe cognitive impairment. This measure is highly sensitive to how we classify time needing services. For example, LTSS needs of 100 days in each of three successive years can be classified as either three years of needs or less than one year of need, because 300 service days is less than the 365 days that span a year. Because of its relevance to cost projections, we focus on estimating the number of service days, but we recognize that understanding the amount of calendar time over which needs endure is also useful, policy-relevant information that can help individuals plan for their future LTSS needs.

For individuals who use nursing homes, we presume a HIPAA level of need with at least one ADL limitation (rather than two in the community). Many assisted living spells and home care spells occur prior to reaching the HIPAA level.[25] However, we generally report only help and costs that reflect HIPAA levels because of their special policy relevance and because most paid services are provided to older adults with that level of need.[26]

One of our key outcome measures is the present discounted value (PDV) of lifetime LTSS costs after age 65. Our PDV measure totals these counts, discounting them by the OASDI Trustees' ultimate real interest rate of 2.9 percent for every year that they are incurred past age 65. Because the Trustees assume long-range price growth averages 2.7 percent, this amounts to a nominal discount rate of about 5.6 percent in the long run. We present all lifetime cost projections in constant 2015 dollars. The PDV can be interpreted as the lump sum that one must set aside at age 65 to finance the expected stream of LTSS payments until death. Our assumed interest rate implies that $1,000 of LTSS costs incurred at age 85 are worth $565 in PDV terms (in constant 2015 dollars). We examine both this value's mean and its distribution, including how costs are distributed across payers and population subgroups. We typically round dollar amounts to the nearest $10 or $100 depending on the statistic, reflecting the inherent imprecision of our projections.

[24] The ADLs enumerated in the statute are eating, toileting, transferring, bathing, dressing, and continence.

[25] See, for example, our earlier discussion of Stallard (2011). Murtaugh and Spillman (2012) estimate average disability durations of 2.4 years pre-HIPAA eligibility and 1.7 years at the HIPAA level.

[26] Cohen, Gordon, and Miller (2011) describe how private insurance companies implement benefit triggers.

We make a number of assumptions to allocate LTSS costs to payers. We focus on point-of-service LTSS costs in these assignments. This approach likely leads us to understate family out-of-pocket costs for LTSS; after all, everyone who has ever paid personal income tax to federal or state governments has in essence contributed to Medicaid LTSS, but we ignore these contributions to be consistent with the prior literature.[27] When describing Medicaid outlays in the paper and in this document, we refer specifically to Medicaid LTSS outlays, not a broader conception of Medicaid spending.

Cost shares for Medicaid, which we compute by following program eligibility rules, are considered out-of-pocket expenses (for a discussion of Medicaid cost shares, see for example chapter 2 in O'Keeffe et al. 2010). When individuals receive reduced SSI benefits because they are residing in an institution that Medicaid pays for, we assume that the reduction in SSI is not an out-of-pocket expense per se, consistent with the law that the their full benefit is not payable (see for example Program Operations Manual System, Section 00520.011, Social Security Act, Section 1611(e)(1)(B); 20 Code of Federal Regulations [CFR] 416.212, 416.414).[28] We produce detailed projections of Medicare cost shares including premiums and out-of-pocket payments for both LTSS and non-LTSS service using MCBS data, but include here only explicit LTSS cost shares (for example, days 21 through 100 in a Skilled Nursing Facility, which currently require a daily copayment of $157.50), not premiums or the payroll taxes individuals paid earlier in life to finance this coverage. In allocating costs to Medicare, we compute program eligibility and then assign LTSS spells based on their duration (i.e., shorter spells are more likely to be classified as Medicare spells than longer ones).[29] Similarly, we do not include private LTCI premiums, either for those who eventually go on claim or those who do not, to the family contributions at ages 65 and older again to stay consistent with a focus on out-of-pocket at the point of service, rather than total costs. We follow private plan rules carefully to be sure that elimination periods have been fulfilled, that program maxima are not exceeded, and so forth when paying benefits to those who claim them.[30] For other public expenditures, we use a simple regression for those—mostly men—receiving

[27] We have produced DYNASIM calculations elsewhere that reflect such contributions. For example, we have examined the relationship between Social Security taxes (both payroll taxes and personal income taxes paid on benefits) and Social Security benefits. Similarly, we have compared Medicare benefits to Medicare payroll taxes, premiums, contributions to the Medicare Trust Fund from taxation of Social Security benefits, and surtaxes on higher-income beneficiaries.

[28] If we assume that SSI payments are an out-of-pocket cost, then total expenditures by payer would exceed the overall totals, because SSI payments would be included in both the out-of-pocket totals and the Medicaid totals. (SSI does not transfer funds to state or federal Medicaid programs).

[29] Friedberg, Sun, Webb, Hou, and Li (2014) provide a useful discussion of Medicare's role in LTSS. See also Jacobson, Neuman, and Damico (2010) and Tumlinson (2015).

[30] We make the conservative assumption that those with coverage whose disabilities reach qualifying levels collect benefits as soon as possible. This assumption is somewhat inconsistent with some experience studies that report a

institutional care from the Veterans Administration, based on MCBS data. We assign participation in programs, most notably personal care services, authorized under the Older Americans Act (OAA) based on intensity of home care (U.S. Department of Health and Human Services, Administration on Aging, Administration for Community Living).

Population and classification variables

In many of these tables, we focus on individuals turning age 65 in certain years, for example between 2015 and 2019, or born in certain years, like 1976 to 1980 for our fully phased in analyses.[31] We focus on the population age 65 and older due in part to limitations in the HRS data.[32] In future work, we hope to extend the LTSS components of the model to include the population younger than 65, perhaps in stages (ages 51 to 64 and then those less than age 51).

We cross-tabulate outcomes by various characteristics including gender, health and marital status at age 65, non-housing wealth quintile at age 65, and household-size-adjusted income quintile at age 65.[33] DYNASIM's income projections include earnings, pensions, Social Security, SSI, and asset income (defined as the annuitized value of financial assets using a multivariate annuity function) for both oneself and, if married, one's spouse.

Simulation assumptions

Participation in voluntary programs: Our assumptions about the mix of participants in any voluntary program that we model, especially how they vary between those with high and low likelihoods of using

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small share of eligible prospective claimants delay collecting benefits after notifying their insurance company that they are disabled (Miller, Shi, and Cohen 2008).

[31] For these longitudinal analyses, we need to observe cohorts through the age at which an overwhelming share of them have died. We thus typically limit our longitudinal analyses to individuals born through 1980.

[32] Although the survey includes people ages 51 and older, LTSS prevalence is much lower prior to age 65 and usage patterns differ, making it challenging to model LTSS use by younger people reliably. Also, HRS does not measure cognitive status comprehensively until age 65.

[33] We divide income by the federal poverty level to adjust for family size; this adjustment recognizes that two or more people can live together more cheaply than they could if each maintained a separate household. We have produced alternative metrics, such as per capita income (which does not adjust for family size). Similarly, metrics that include imputed rental income are also available. We use quintiles based on the population ages 65 and older. We can use cohort-specific percentiles (to capture one's position relative to one's peers more directly).

services, influence the pricing and distributional effects of a simulation. Prices will need to be higher if those with high likelihood of using services enroll disproportionately. Conversely, if healthier individuals with lower likelihood of using services enroll at high rates, then prices can be lower.

However, because these LTSS financing options do not yet exist, there are no reliable data on how many people would likely participate in them. Consequently, we based our participation rates on judgment based on theory and experience surrounding adverse selection and affordability of premiums. In setting participation rates, we focused on how the mix of enrollees would change with program features, particularly those features that would affect adverse selection. We generally assume that those with high probabilities of using services will enroll in voluntary programs at much higher rates than others. We use five factors to assign probabilities of enrolling: wealth percentile, income percentile, self-reported health status, number of ADL limitations, and cognitive status (no impairment, mild impairment, severe impairment).

Because premiums would account for a high share of income for many enrollees, we assumed that no one would enroll in the voluntary front-end or back-end programs unless his or her household income was in the top 40 percent nationally, and that no one would enroll in the comprehensive program unless his or her household income was in the top 20 percent. We assumed that those wealthy adults who had higher probabilities of using services and surviving the benefit waiting periods would be more likely to purchase coverage.

After accounting for adverse selection, we make small adjustments to participation probabilities in voluntary programs to account for observed differences in participation in private insurance under current market conditions. For example, people without children are more likely to participate than people with children, and women are more likely to participate than men. We assume that individuals with a taste for private insurance, as evidenced by their choice to purchase private insurance under baseline conditions, are marginally more likely to enroll in the new programs. This results in some individuals who otherwise would have been covered switching to the new programs.

For illustrative purposes, we assumed comparable participation in the voluntary front-end and back-end programs. We acknowledge, however, that financially sophisticated consumers might be more likely to purchase back-end coverage at the prices in our model, given their greater ability to self-insure against front-end risk. A sophisticated approach to modeling demand would significantly improve our understanding of the likely impact of new insurance programs. However, the exercise here was focused on developing the illustrative effects of each financing option under plausible scenarios to get a sense of the trade-offs involved in, and the relative benefits of, each alternative.

Participation in mandatory programs: In our simulation analyses of mandatory programs that are financed with a payroll tax, we assume that the tax is levied on employees, not employers. As a consequence, we assume no wage offset.[34] We implicitly assume that workers react to the payroll tax solely by consuming less each year. We further assume no changes in employment and hours worked. Future analyses should test sensitivity to these assumptions.[35] They are more likely to be problematic the larger the size of the payroll tax.

Pricing: Program premiums and tax rates were set iteratively to cover program benefits and administrative costs, given assumed participation rates and the health mix of enrollees. For the voluntary front- and back-end programs with and without subsidies, we use premium prices developed by Giese and Schmitz (2015) for starting values.[36] We then modestly adjust these premium estimates to increase consistency with the DYNASIM projections, which necessarily differ because of different assumptions about the distribution of the risk of developing LTSS needs LTSS, transaction costs, reserve requirements, and other factors. For developing premiums for the comprehensive programs and payroll tax rates for the mandatory programs, we use DYNASIM alone. We ensured that the revenues collected by the mandatory programs, including interest earned on each program's trust fund balance, would be sufficient to cover expected payouts over the 75-year projection period. However, the mandatory plans are not necessarily solvent indefinitely, and could run out of money after the 75-year projection period.

Components of distributional effects: Two of the primary outcomes that we examine are the effects of the proposals on Medicaid LTSS enrollment and expenditures. When considering Medicaid interactions, we account for the fact that some individuals are required to contribute significant shares of their income toward their care. So when we show effects on Medicaid, we show net effects. That is, we

[34] If the payroll tax were levied on employers, it is conventional to assume that employers would compensate in some way so that the tax would not raise payroll costs much. One way to achieve this would be, for example, to reduce the annual salary increases that they would otherwise have provided to their employees. We make no such assumptions in the current estimates, but sensitivity analyses surrounding this assumption could be helpful for future simulations.

[35] Sensitivity analyses allowing employment effects to vary with earnings could be informative. Higher-wage workers, who would pay larger income amounts under an uncapped payroll tax, might be particularly likely to respond, shifting their compensation into fringe benefits that would not be subject to the payroll tax. (High-wage workers are generally thought to have more ability to shift their income into different types of compensation.)

[36] These estimates were based on assumed participation levels and health and LTSS need status output from DYNASIM and on the *2014 Milliman Long-Term Care Guidelines.* The database supporting the 2014 *Milliman Long-Term Care Guidelines* reflects the private insurance market's experience of more than twenty-nine million life-years of exposure, including more than $25 billion in incurred claims for approximately 475,000 claimants. Milliman's premium estimates incorporated assumed participation levels that varied by health and LTSS need status and reflected the resulting morbidity levels based on those participation levels.

account for the reduction in Medicaid outlays while also accounting for changes in cost shares (i.e., people no longer receiving Medicaid no longer need to contribute to their Medicaid costs).

At this stage, our representation of the distributional effects of these policies is incomplete. Although we account for many potential spillovers and interactions, we do not account, for example, for change in income tax liability due to changes to the income tax deductions of individuals with high medical expenses who itemize these deductions. We hope to account for this interaction in future work. Historical data can help give some perspective on the potential size of the effect resulting from this omission.[37]

Importance of simulated program features: Because we are simulating a cash benefit, rather than service reimbursement, we assume nearly universal take-up of the benefit at the maximum daily benefit amount. In the mandatory program, we assume that 90 percent of all people who are simulated to be eligible claim the benefit. For the voluntary (given added salience of the premium payment), we assume that 100 percent claim the benefit.

Simulation timing and censoring of projections

When interpreting longitudinal results, it is important to keep in mind that people in different generations (or "birth cohorts") will experience different shares of their life—including different shares of their prime working years—under the simulated programs as they phase in. For some, experiences with the programs may continue after our last projection year (2085 for our LTSS analyses), so we have not completely projected their lifetime experience with the program. (In technical terms, their experiences are "censored"). We focus in several analyses on the 1976 to 1980 birth cohorts because people in this cohort have most of their relevant lifetimes reflected in the projections. The youngest members of the cohort would have reached age 105 by our last projection year and the oldest would have reached age 109, so we capture nearly all of their LTSS spending.[38] These people would be ages 36

[37] One recent Congressional Research Service report estimated that in 2011, just under one third (32 percent) of filers itemized their deductions on their tax returns, with the share itemizing increasing steadily by income (Lowry 2014). Among itemizers, between 1 and 12 percent deduct medical expenses, again depending on income, with those in the $50,000-100,000 having the highest shares with such deductions. For those taking medical expense deductions, average deductions range from $7,200 (for those in the $20,000 to $50,000) to over $100,000 (for those with over $1 million). LTSS users may be disproportionately represented among those itemizing large amounts of medical expenses.

[38] According to cohort life tables from the Social Security Administration, less than 0.5 percent of men's and less than one percent of women's lives lived in these cohorts would have been completed through age 107, the rough midpoint of the interval.

to 40 when premiums payments started. They are thus part way into their careers when payroll taxes for mandatory programs would begin and below the starting simulation age for paying the premiums for the voluntary programs. Given their age at program commencement, their estimated lifetime payroll tax payments under the mandatory program would be lower than those of their counterparts who are younger and will begin paying payroll tax closer to the point when they enter the labor force. To consider the payroll tax effects of the fully phased-in program, it is thus helpful to look at cohorts who are 15 or even 20 years younger.

Caveats and comparability notes

We have combined data from a wide array of data sources to project our best guess of LTSS needs and use in coming decades under both current law and a series of policy options. This representation is nonetheless quite stylized. Data on financing LTSS are quite limited in many respects, especially for analysts wishing to examine outcomes longitudinally. Standard measurement challenges for survey research are amplified in a dynamic microsimulation context, in which multiple data sources are being combined through the starting samples, aging parameters, and alignment.

Readers should be cognizant of the challenges inherent in measuring concepts like LTSS need. Modest differences in question wording or measurement of function can lead to markedly different estimates of disability prevalence. As a consequence, we strongly advise against focusing solely on any single cross-sectional or lifetime estimate of LTSS needs. Nuance is essential for understanding disability patterns given the measurement challenges. Similarly, it is important to bear in mind that the line between services that are post-acute and LTSS may be ambiguous. Even our rule-based assignments for public programs like Medicaid need to include eligibility algorithms, and we must develop these based on findings from an inconclusive literature.

When comparing DYNASIM projections to other data sources, it is important to distinguish measures that reflect service at any time during the year from measures that look at a single point in time (e.g., a survey date). For example, calculations from the NLTCS 2004 survey data linked to the Long Term Care Minimum Data Set (MDS) suggest that roughly twice as many people will spend time in a nursing home over the course of a year than are observed in a nursing home at a single point in time, an estimate that increases to 2.8 times as many if stays in skilled nursing facilities are included.[39] Likewise, given the important role institutional settings play in providing LTSS, any estimates that reflect the

[39] Similarly, Hurd, Michaud, and Rohwedder (2014) report that about three times as many people receive nursing home care over a two-year period than at a point in time.

disability characteristics of the noninstitutional population will differ substantially from our projections, which attempt to replicate the total population.

A final caveat is that projecting lifetime outcomes for several decades is inherently challenging and uncertain. Our model contains many underlying assumptions about processes for which leading experts are sharply divided, including disability, mortality, relative attractiveness and availability of LTSS service types, the future of the private long-term care insurance market, and growth in costs for health services more broadly. We draw heavily from the assumptions of lead government forecasting groups and rely on expert reviewers and advisors, but will continue to review assumptions as new data and research become available. As better information becomes available, we will update these projections to improve their reliability and validity.

These results represent a preliminary attempt to advise policymakers and the public about the risk of needing LTSS. As discussions of financing policies for LTSS evolve, it will be important to check the robustness of these and other estimates and to update regularly as new data become available. Administrative data that were not available for this study could prove particularly helpful given limitations in the public-use data on which our model overwhelmingly relies.

Results

Prices

The premiums and payroll tax rate required to finance the new insurance programs would vary widely. Premiums for voluntary programs would depend on the age at which participants enrolled, with younger enrollees paying less than participants who enroll at older ages because younger enrollees would, on average, pay premiums longer. For those who enrolled at age 45, annual 2016 premiums for the unsubsidized voluntary programs would range from $1,210 for the front-end program to $1,900 for the back-end program to $2,400 for the comprehensive program (table 1). Annual premiums would be about three times as high for participants who wait until age 65 to enroll. Premiums are lower in the subsidized plans for those who enroll at age 65 or later because the subsidies reduce adverse selection in the enrollee pool. For the mandatory programs, we estimate that the payroll tax rate would range from about 0.60 percent of earnings for the plan offering the front-end benefit to about 0.75 percent for the plan offering the back end benefit and 1.35 percent for the plan offering comprehensive benefits.

Half of workers contributing to the voluntary plans would pay no more than 3 or 4 percent of their earnings to the plan each year. Table 2 reports the median ratio of annual enrollee contributions to annual earnings, for enrollees with at least one Social Security-covered quarter of earnings who contribute to a plan. (Fully subsidized participants are not included in the table.) The estimates are restricted to workers ages 65 and younger, because many older workers are employed part-time and thus have unusually low earnings. In the unsubsidized plans, the median share of enrollees' earnings going to premiums is 2.7 percent for the front-end plan, 3.6 percent for the back-end plan, and 4.3 percent for the comprehensive plan. Low earners pay a higher percentage, and high earners pay a lower percentage. Women devote a larger share of earnings to premiums than men, because they generally earn less.[40] In the mandatory plans, all workers contribute a flat percentage of their pay, regardless of earnings.

Table 3 shows the average and median present discounted value of lifetime contributions by enrollees, for different five-year birth cohorts. The present values are evaluated at age 65. As the programs phase in, early cohorts contribute much less to the mandatory programs than later cohorts, because members of early cohorts could not contribute to the plans at relatively young ages, before the plans existed. Early birth cohorts do not receive favorable treatment in the voluntary programs, because these programs vary annual premiums by enrollment age so that expected contributions approximate expected payouts. Lifetime contributions are lower in the mandatory plans than the voluntary plans because we assumed lower administrative costs in the mandatory plans and adverse selection raises premiums in the voluntary programs. In addition, lifetime contributions are lower in the subsidized plans than the unsubsidized plans because subsidies reduce or eliminate contributions for some enrollees, and the relatively high participation rates in the subsidized plans limit adverse selection and thus lower premiums.

Although lifetime contributions to the new insurance programs are substantial, they consume only a small share of lifetime earnings (table 4). Among program enrollees born between 1976 and 1980 with at least 40 Social Security-covered quarters of earnings who contribute to a plan, half contribute no more than 0.4 percent of lifetime earnings in the front-end mandatory program, no more than 1.3 percent in the back-end unsubsidized voluntary program, and no more than 1.6 percent in the comprehensive subsidized voluntary program.

[40] If we were to compare premiums to family or household earnings rather than individual earnings, men's and women's costs would appear more similar.

Coverage

Coverage rates vary widely across the new insurance programs. We estimate that 8.6 percent of 65-year-olds born between 1976 and 1980 would have private long-term care insurance coverage under current policies—the baseline (table 5). Only a slightly higher percentage would have coverage through private insurance or a new insurance program if one of the unsubsidized voluntary options were available. We assume that overall coverage rates would be about 2 percentage points lower under the unsubsidized voluntary comprehensive plan than the unsubsidized voluntary front-end and back-end benefit programs, because premiums would be substantially higher under the comprehensive program. Overall coverage rates would be about twice as high if one of the subsidized voluntary options were offered instead of the unsubsidized options. For example, we assume that about 20 percent of 65-year-olds born between 1976 and 1980 would be enrolled in the subsidized voluntary front-end benefit program. By contrast, about 96 percent of cohort members would be enrolled in the mandatory programs.

Coverage rates also vary widely by family income. Baseline coverage rates for private long-term care insurance increase sharply with income, rising from 6 percent for those in the third income decile to 9 percent for those in the seventh decile and 20 percent for those in the top decile. Coverage patterns by income are similar under the new unsubsidized voluntary insurance options. Subsidized voluntary options would, however, significantly boost coverage rates for low-income adults. For example, about four-fifths of those in the bottom income decile and two-fifths of those in the second decile would be covered, because their premiums would be fully or partly subsidized. The mandatory programs would exclude 11 percent of adults in the bottom decile of family income and 3 to 4 percent of adults with slightly more income because they would not have worked the required 10 years to quality or they may not meet the legal status requirements.

Our projections also show that adults in excellent health would enroll in the unsubsidized voluntary programs at about twice the rate as adults in fair or poor health (table 6). By contrast, adults in fair or poor health would be more likely to enroll in the subsidized voluntary programs than those in excellent health. The mandatory programs' work requirement means that adults in excellent health would be more likely to enroll in those programs than those with health problems, but the differences would be relatively small.

Overall, mandatory programs would cover about five times as many older adults in 2050 as the voluntary subsidized programs, and about nine times as many older adults as the voluntary unsubsidized programs. The share of adults ages 65 and older covered through existing insurance or

new voluntary plans would decline over time, as the existing private insurance market shrinks (table 7). By contrast, coverage rates under the mandatory programs would increase over time as the programs become more fully phased in and fewer workers are excluded for failing to meet the work requirements.

Benefit Receipt

Many more older adults would receive benefits from the mandatory programs than the voluntary programs, and the subsidized voluntary programs would provide benefits to more older adults than the unsubsidized ones (table 8). Benefit receipt rates under all programs, however, would grow rapidly over time. By 2060, the back-end benefit programs would provide benefits in 2060 to 396,000 adults if voluntary and unsubsidized, 1.1 million adults if voluntary and subsidized, and 5.7 million adults if mandatory.

Relatively few older adults would ever receive benefits through the voluntary programs, especially if they were not subsidized. For example, only about 2 percent of adults born between 1976 and 1980 would ever receive benefits through the unsubsidized voluntary front-end and back-end benefit plans and less than 1 percent would receive benefits through the unsubsidized voluntary comprehensive plan (table 9). More people would ever receive benefits through the subsidized voluntary plans, but no more than about 6 percent. By contrast, about a third of adults would receive benefits through the mandatory programs at some point during their lives. Overall benefit receipt rates vary by about 10 percentage points among enrollees across plans, for example, with between 32 and 42 percent of enrollees born after 1960 ever receiving benefits.

Benefit receipt rates are higher among high-income adults than low-income adults for the unsubsidized voluntary plans, but lower for high-income adults than low-income adults for the subsidized voluntary plans (table 10). These patterns reflect differences in enrollment. High-income adults dominate enrollment in the unsubsidized plans, and thus they are more likely than others to receive benefits. However, many low-income adults participate in the subsidized plans, and thus are relatively likely to receive benefits through those programs. Benefit receipt rates do not vary as much by income when we consider only those enrolled in the programs (table 11).

Program Spending

The new insurance programs would grow rapidly over time. Between 2040 and 2060, spending by the unsubsidized voluntary back-end benefit program would increase from $8.1 billion to $43.8 billion, the subsidized voluntary back-end benefit program would increase from $34.1 billion to $132.9 billion, and the mandatory back-end benefit program would increase from $159.9 billion to $660.1 billion (table 12). In 2060, benefits paid per enrollee ages 65 or older would range from $4,100 to $4,500 in the front-end programs, from $7,400 to $9,800 in back-end benefit programs, and from $9,900 to $13,600 in the comprehensive programs. Benefits paid per aged enrollee receiving benefits would be much higher, of course, reaching $129,400 in the mandatory comprehensive program in 2060.

Table 13 reports the average sum of lifetime benefits received by enrollees born between 1976 and 1980 who ever receive benefits from each new insurance program. The back-end benefit programs would provide nearly twice as much lifetime benefits as the front-end benefit programs, and the comprehensive programs would pay even more. Under the mandatory programs, for example, average lifetime benefits among those who ever collect would be $80,700 in front-end benefit program, $153,300 in the back-end benefit program, and $194,600 in the comprehensive program. (Average present discounted values of lifetime benefits received by users, discounted to age 65 and reported in table 14, would be only about half as large as the average sum of expenditures.) Lifetime benefits would be substantially higher among those who live survive to very old ages and those with multiple years of cognitive impairment and severe LTSS needs. Under the mandatory comprehensive plan, for example, average lifetime spending would reach $273,000 for users who survive to age 95, compared with just $62,700 for users who die before age 75. Users with severe cognitive impairments for two or more years would average $276,300 in lifetime benefits from the mandatory comprehensive program, compared with just $143,600 for users with less than a year of severe cognitive impairment.

Relative to other payers of LTSS, the new voluntary insurance programs would be fairly small. In 2060, for example, the subsidized voluntary back-end benefit plan would pay $170.2 billion for LTSS for enrollees with severe needs, compared with $737.2 billion paid by Medicaid for aged LTSS and $1,183.7 billion paid out of pocket by families (table 15). The subsidized voluntary back-end benefit, then, would cover only 8 percent of total LTSS costs incurred by older adults with severe LTSS needs.

The mandatory comprehensive plans would have much larger impacts on LTSS spending. In 2060, the front-end benefit plan would cover 19 percent of total LTSS costs incurred by older adults with severe LTSS needs, the back-end benefit plan would cover 31 percent, and the comprehensive plan would cover 39 percent.

Tabulations of average lifetime benefits received under each program by members of different birth cohorts reveal similar patterns. Under the mandatory back-end benefit program, members of the 1976 to 1980 birth cohort would collect lifetime benefits worth $59,900 when summed over their lifetime (table 16), or $30,000 in present discounted value (table 17). Under both measures, the mandatory back-end benefit program would cover about 30 percent of total LTSS spending.

Each dollar spent by the new insurance programs can be used to offset spending by Medicaid or private insurance, offset out-of-pocket spending by families, or fund services that would otherwise not be provided or would be provided by unpaid family caregivers. Table 18 reports the percentage of program spending that is applied to each of these alternatives. Spending by the unsubsidized voluntary programs would generally mostly reduce out-of-pocket spending. Each dollar spent in 2060 by the back-end benefit program, for example, would reduce out-of-pocket spending by 46 cents. The unsubsidized voluntary programs would not reduce LTSS Medicaid spending much because most enrollees would have relatively high incomes and would not receive Medicaid benefits if the program were not available. Much of the spending by the subsidized voluntary back-end plans and comprehensive plans would offset Medicaid spending, because many low-income people would be covered by the subsidized plans, and a lower share of spending would reduce out-of-pocket spending than in the unsubsidized plans. The spending by the mandatory back-end benefits and comprehensive plans would be fairly evenly split between reducing Medicaid spending, reducing out-of-pocket spending, and financing new services.

Table 19 displays the average sum of lifetime out-of-pocket LTSS spending from age 65 to death for adults born between 1976 and 1980 who ever have severe LTSS needs after age 65, shows how it would change under each new insurance program, and shows how patterns vary by personal characteristics. (Table 20 repeats the analysis using the present discounted value of lifetime out-of-pocket spending.)

The mandatory back-end benefit plan and comprehensive plan would modestly reduce the number of older adults receiving LTSS Medicaid benefits over time (table 21). In 2060, for example, the mandatory comprehensive plan would reduce the number of LTSS Medicaid beneficiaries from 4.1 million to 3.4 million, or 17 percent. The voluntary plans and mandatory front-end benefit plan would have much more modest effects.

The unsubsidized voluntary plans would have relatively little impact on out-of-pocket spending or LTSS Medicaid spending, because enrollment would be quite low (table 22). The subsidized voluntary back-end benefit and comprehensive plans would modestly reduce LTSS Medicaid spending, because

they enroll significant numbers of low-income adults. The mandatory back-end benefit and comprehensive programs would substantially reduce Medicaid spending. In 2060, for example, Medicaid LTSS spending would be 31 percent below baseline levels under the mandatory back-end benefit plan and 35 percent below baseline under the mandatory comprehensive plan. All the mandatory plans would significantly reduce out-of-pocket spending. In 2060, for example, out of-pocket spending would fall 13.9 percent under the front-end benefit plan, 16.8 percent under the back-end benefit plan, and 24.1 percent under the comprehensive plan.

Conclusions

Our simulations highlight trade-offs that policymakers must confront when designing new LTSS insurance programs. One of the most important choices is whether to create a voluntary program or a mandatory one. Any successful voluntary program must overcome several challenges, including price, perceived value, adverse selection (when those who purchase coverage have a disproportionate risk of claiming benefits), and moral hazard (when insured consumers may demand more care than those paying completely out of pocket). In general, people who are in fair or poor health, have functional limitations, or are experiencing cognitive decline are much more likely to purchase voluntary insurance than people who are healthier. This problem is exacerbated in the absence of medical underwriting, which is standard in private insurance but which would be replaced with vesting in the new programs we modeled. Typically, as adverse selection increases, premiums rise and further discourage low- or average-risk consumers from buying. Any purely voluntary program that fails to control adverse selection is at risk of not being financially sustainable in the long term. To cover those most at risk of needing LTSS, voluntary programs would have to provide subsidies for low-income people.

The drawback of a mandatory program, of course, is that it requires nearly everyone to participate, even those who have legitimate reasons to opt out. Additionally, as the mandatory programs we modeled phase in they provide large windfalls to older cohorts, who would contribute to the programs for less time than younger cohorts but who would qualify for the same level of coverage. These cross-generational transfers do not exist in the voluntary programs, which charge premiums that are designed to cover expected benefits received by each cohort.

Other important considerations involve the size of the daily benefit provided, financing mechanisms, the level of subsidies, and the timing of benefits. For example, will the program make benefits available early in a spell of LTSS needs but for only a limited time, or will they be provided for a

longer period but restricted to people who have already experienced significant LTSS costs? The programs we modeled that offered back-end or catastrophic benefits offset Medicaid spending more than programs that offered front-end benefits, but programs with front-end benefits devoted a larger share of program resources to reducing family out-of-pocket spending or financing services that enrollees would not otherwise receive or would receive only from unpaid family caregivers.

Ultimately, the most appropriate insurance program will depend on policymakers' objectives. Is the principal goal to reduce Medicaid spending? Is it to improve later-life financial security for middle-income people by reducing family out-of-pocket spending? Or is it to provide services to older adults with unmet needs or to reduce burdens on family caregivers? Our simulations can help policymakers weigh these trade-offs.

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Tables

Table 1. Premiums and Taxes for New Unsubsidized Insurance Programs, 2016

	Front-end	Back-end	Comprehensive
Unsubsidized annual premiums, voluntary programs ($)			
Issue age			
age 45	1,210	1,900	2,400
age 55	1,870	2,940	3,570
age 65	3,680	5,250	7,480
Subsidized annual premiums, voluntary programs ($)			
Issue age			
age 45	1,210	1,900	2,330
age 55	1,870	2,930	3,470
age 65	3,200	4,560	6,500
Payroll tax rate, mandatory programs (%)	0.6	0.75	1.35

Source: Authors' estimates from DYNASIM3 and adapted from Giese and Schmitz (2015) for front-end and back-end voluntary programs.

Note: Comprehensive voluntary premiums are highly speculative. The relatively high premium prices would limit the pool of potential buyers and would likely generate very high levels of adverse selection. This could in turn lead to a program that is ultimately unsustainable at prices that the market would support. These estimates should thus be interpreted especially cautiously.

Table 2. Median Ratio of Annual Enrollee Contributions to Annual Earnings, 2016 to 2050 (%)

	Voluntary						Mandatory		
	No Subsidies			With Subsidies					
	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
All	2.7	3.6	4.3	2.7	4.2	4.2	0.6	0.8	1.4
Year									
2020	3.0	4.1	5.5	3.0	4.7	4.7	0.6	0.8	1.4
2030	2.9	3.9	4.1	2.9	4.4	4.0	0.6	0.8	1.4
2040	2.3	3.1	4.3	2.3	3.6	4.1	0.6	0.8	1.4
2050	2.6	3.5	4.5	2.6	4.0	4.4	0.6	0.8	1.4
Income quintile									
Bottom	c	c	c	c	c	c	0.6	0.8	1.4
Second	6.4	8.8	21.1	6.4	10.0	16.1	0.6	0.8	1.4
Third	5.3	7.1	9.4	5.2	8.1	9.2	0.6	0.8	1.4
Fourth	3.6	4.9	6.7	3.6	5.6	6.5	0.6	0.8	1.4
Top	1.9	2.6	3.7	1.9	3.0	3.6	0.6	0.8	1.4
Gender									
Men	2.4	3.3	3.9	2.4	3.7	3.7	0.6	0.8	1.4
Women	3.0	4.0	4.7	3.0	4.6	4.5	0.6	0.8	1.4

Source: Authors' estimates from DYNASIM3.

Note: Estimates are restricted to program enrollees ages 65 or younger with at least one Social Security-covered quarter of earnings during the year who pay program premiums or taxes. C= cell size too small to be reliable.

Table 3. Average and Median Present Discounted Value of Lifetime Enrollee Contributions by Birth Cohort (2015 constant dollars)

	Voluntary						Mandatory		
	No Subsidies			With Subsidies					
	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
Average									
1951-55	44,100	53,500	91,300	19,600	26,500	25,800	1,600	2,000	3,700
1956-60	40,400	50,600	85,900	21,600	30,600	27,800	2,900	3,700	6,600
1961-65	37,500	48,000	81,800	21,900	31,700	27,600	5,100	6,400	11,400
1966-70	38,800	49,800	78,400	24,400	35,400	31,000	8,900	11,200	20,100
1971-75	39,100	50,400	79,200	25,500	37,200	33,900	12,300	15,400	27,700
1976-80	41,400	53,400	74,900	25,900	37,700	32,300	15,300	19,200	34,500
1981-85	42,500	54,800	86,700	28,500	41,600	38,800	19,700	24,600	44,400
1986-90	46,300	59,600	96,400	31,400	45,700	42,800	24,500	30,600	55,100
1991-95	47,200	60,800	94,800	32,000	46,600	41,500	28,900	36,100	65,000
Median									
1951-55	48,100	58,200	101,100	13,600	19,400	12,600	1,000	1,300	2,300
1956-60	43,100	54,600	89,200	17,500	24,600	13,300	1,900	2,400	4,400
1961-65	39,900	52,400	89,100	17,500	25,500	15,400	3,700	4,600	8,200
1966-70	40,900	54,400	82,200	21,700	32,500	18,900	6,300	7,900	14,200
1971-75	41,500	55,800	81,900	24,000	34,900	22,900	7,700	9,600	17,400
1976-80	42,600	57,300	79,700	25,000	37,300	16,200	10,300	12,800	23,100
1981-85	45,700	61,400	91,800	28,900	41,300	24,800	13,300	16,700	30,000
1986-90	48,400	64,900	96,800	36,000	51,700	27,800	16,700	20,900	37,600
1991-95	48,700	65,400	95,200	38,100	54,300	24,200	20,100	25,100	45,200

Source: Authors' estimates from DYNASIM3.

Note: Estimates are restricted to program enrollees who survive to age 65. The table reports the present value of lifetime contributions, discounted to age 65 using a real interest rate of 2.9 percent. Monetary amounts are converted to 2015 constant dollars using the change in the consumer price index and rounded to the nearest $100. The projections do not extend past 2085, so the table does not reflect all premiums paid at very old ages by members of later birth cohorts.

Table 4. Median Ratio of Lifetime Enrollee Contributions to Lifetime Annual Earnings for Enrollees Born between 1976 and 1980 (%)

	Voluntary						Mandatory		
	No Subsidies			With Subsidies					
	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
All	1.0	1.3	1.6	0.8	1.2	1.6	0.4	0.4	0.8
Gender									
Men	0.6	0.9	1.5	0.6	0.9	1.2	0.4	0.4	0.8
Women	1.3	1.7	2.1	1.2	1.8	2.2	0.4	0.4	0.8
Income quintile at age 65									
Bottom	c	c	c	0.8	1.1	0.0	0.3	0.4	0.6
Second	1.2	1.6	c	1.0	1.5	1.5	0.3	0.4	0.7
Third	1.2	1.4	c	1.0	1.5	1.9	0.4	0.4	0.8
Fourth	1.2	1.5	1.6	1.1	1.7	1.5	0.4	0.5	0.8
Top	0.8	1.0	1.7	0.7	1.1	1.4	0.4	0.5	0.9
Health status at age 65									
Excellent	1.0	1.3	1.8	0.8	1.2	0.8	0.4	0.5	0.8
Very good	0.9	1.2	1.6	0.9	1.4	1.7	0.4	0.5	0.8
Good	1.1	1.5	2.1	1.1	1.6	2.2	0.4	0.4	0.8
Fair	1.1	1.4	2.0	0.9	1.2	1.3	0.3	0.4	0.7
Poor	1.0	1.3	c	0.7	1.1	1.4	0.3	0.4	0.7
Marital status at age 65									
Married	1.1	1.4	1.6	1.2	1.7	2.8	0.4	0.5	0.8
Unmarried	1.0	1.3	2.2	0.7	1.0	1.3	0.3	0.4	0.8
Wealth quintile at age 65									
Bottom	c	c	c	1.0	1.5	0.0	0.3	0.4	0.7
Second	0.9	1.2	c	0.7	1.1	1.4	0.3	0.4	0.8
Third	1.0	1.4	c	0.6	0.9	1.0	0.4	0.4	0.8
Fourth	1.2	1.5	2.0	0.9	1.3	1.4	0.4	0.4	0.8
Top	1.0	1.3	2.1	1.0	1.4	2.4	0.4	0.5	0.8
Age at death									
Less than 65	0.3	0.4	0.5	0.3	0.5	0.5	0.3	0.4	0.7
65-74	0.7	0.9	0.6	0.5	0.7	0.6	0.3	0.4	0.7
75-84	1.0	1.4	1.7	0.9	1.4	1.8	0.3	0.4	0.8
85-89	1.0	1.3	2.7	0.8	1.2	1.3	0.4	0.4	0.8
90-94	1.2	1.6	3.0	1.2	1.7	2.5	0.4	0.5	0.8
95+	1.3	1.7	2.0	1.2	1.8	2.1	0.4	0.5	0.8

Source: Authors' estimates from DYNASIM3.

Note: Estimates are restricted to program enrollees who survive to age 65, have at least 40 Social Security-covered quarters of earnings, pay program premiums or taxes, and, for the voluntary programs, never allow their coverage to lapse. Contributions and earnings are converted to 2015 constant dollars using the change in the consumer price index and discounted to age 65 using a real discount rate of 2.9 percent. C= cell size too small to be reliable.

Table 5. Percentage of 65-Year-Olds Born between 1976 and 1980 Covered by Each New Insurance Program or a Baseline Private Insurance Policy, by Family Income Decile

		Voluntary						Mandatory		
		No Subsidies			With Subsidies					
	Base-line	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
All	8.6	10.9	10.9	9.0	19.7	19.7	17.9	96.4	96.4	96.4
Family Income Decline										
Bottom	2.2	2.4	2.4	2.4	81.8	81.8	81.8	89.3	89.3	89.3
Second	2.7	2.9	2.9	2.7	40.7	40.7	39.9	96.1	96.1	96.1
Third	6.1	6.9	6.9	6.3	14.1	14.1	13.5	97.3	97.3	97.3
Fourth	5.7	7.1	7.1	5.7	7.9	7.9	7.3	97.0	97.0	97.0
Fifth	6.7	8.7	8.7	6.8	9.8	9.8	8.6	98.8	98.8	98.8
Sixth	6.9	9.1	9.1	7.3	9.4	9.4	7.9	98.1	98.1	98.1
Seventh	9.0	11.5	11.5	9.5	11.5	11.5	9.6	97.8	97.8	97.8
Eighth	12.2	15.4	15.4	12.8	15.4	15.4	12.8	98.2	98.2	98.2
Ninth	16.0	18.8	18.8	16.4	18.8	18.8	16.4	98.4	98.4	98.4
Top	20.4	23.5	23.5	21.3	23.5	23.5	21.3	98.0	98.0	98.0

Source: Authors' estimates from DYNASIM3.

Note: The baseline category shows the share covered by private insurance policy when the analysis assumes no new insurance programs.

Table 6. Percentage of Adults Born between 1976 and 1980 Covered by Each New Insurance Program at Age 65, by Personal Characteristics

	Voluntary						Mandatory		
	No Subsidies			With Subsidies					
	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
All	5.1	5.1	0.6	14.2	14.2	9.8	95.3	95.1	96.5
Gender									
Men	4.7	4.7	0.5	13.8	13.8	9.9	96.4	96.4	97.6
Women	5.5	5.5	0.7	14.6	14.6	9.6	94.1	93.9	95.3
Income quintile at age 65									
Bottom	c	c	c	60.8	60.8	60.4	92.4	92.4	92.5
Second	1.9	1.9	c	6.1	6.1	4.9	96.7	96.6	96.9
Third	3.9	3.9	c	4.7	4.7	1.6	98.0	97.7	98.4
Fourth	6.3	6.3	0.6	6.4	6.4	0.7	96.6	96.2	98.6
Top	10.6	10.6	1.4	10.7	10.7	1.4	95.2	95.2	97.8
Health status at age 65									
Excellent	7.9	7.9	0.6	12.9	12.9	5.6	97.2	96.9	98.8
Very good	6.0	6.0	0.9	13.2	13.2	8.3	96.6	96.4	98.1
Good	4.6	4.6	0.6	15.4	15.4	11.6	96.1	96.1	97.3
Fair	3.9	3.9	0.5	17.2	17.2	13.6	94.2	94.1	95.1
Poor	3.3	3.3	c	22.5	22.5	19.2	94.2	94.0	94.9
Marital status at age 65									
Married	4.9	4.9	0.4	10.0	10.0	5.6	95.9	95.8	97.4
Unmarried	5.7	5.7	0.9	23.8	23.8	19.2	95.9	95.7	96.7
Wealth quintile at age 65									
Bottom	c	c	c	24.5	24.5	23.9	93.4	93.4	93.5
Second	0.9	0.9	c	11.7	11.7	10.9	97.9	97.9	98.4
Third	2.7	2.7	c	12.8	12.8	10.2	97.4	97.1	98.0
Fourth	5.2	5.2	0.3	14.1	14.1	9.3	96.3	96.1	97.8
Top	14.4	14.4	2.2	15.6	15.6	3.8	94.1	93.9	97.1
Age at death									
Less than 65	4.9	4.9	0.6	4.9	4.9	0.6	91.9	91.9	92.9
65-74	6.6	6.6	0.6	19.1	19.1	13.2	96.4	96.1	97.8
75-84	5.2	5.2	0.6	16.3	16.3	11.9	95.1	95.0	96.3
85-89	5.3	5.3	0.4	15.9	15.9	11.0	96.0	96.0	97.1
90-94	5.2	5.2	0.7	15.2	15.2	10.6	96.4	96.3	97.6
95+	4.2	4.2	0.7	11.8	11.8	8.4	96.2	96.0	97.8

Source: Authors' estimates from DYNASIM3.

Note: The baseline category shows the share covered by private insurance policy when the analysis assumes no new insurance programs. Estimates are restricted to adults who survive to age 65. C= cell size too small to be reliable.

Table 7. Number and Percentage of Adults Ages 65 or Older Covered by Each New Insurance Program or a Baseline Private Insurance Policy, 2030-2070

		Voluntary						Mandatory		
		No Subsidies			With Subsidies					
	Base-line	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
Number of enrollees (thousands)										
2030	7,673	8,416	8,416	7,768	15,837	15,837	15,202	67,800	67,800	67,800
2040	7,785	8,955	8,955	7,934	17,305	17,305	16,338	76,452	76,452	76,452
2050	7,753	9,196	9,196	7,905	17,130	17,130	15,895	81,999	81,999	81,999
2060	8,392	9,874	9,874	8,529	16,963	16,963	15,665	89,928	89,928	89,928
2070	9,181	10,727	10,727	9,318	16,960	16,960	15,585	97,789	97,789	97,789
Percentage of adults ages 65 or older										
2030	10.1	11.1	11.1	10.3	20.9	20.9	20.1	89.6	89.6	89.6
2040	9.3	10.7	10.7	9.5	20.7	20.7	19.5	91.3	91.3	91.3
2050	8.8	10.5	10.5	9.0	19.5	19.5	18.1	93.3	93.3	93.3
2060	8.9	10.4	10.4	9.0	18.0	18.0	16.6	95.2	95.2	95.2
2070	9.0	10.5	10.5	9.1	16.6	16.6	15.3	96.0	96.0	96.0

Source: Authors' estimates from DYNASIM3.

Note: The baseline category shows the share covered by private insurance policy when the analysis assumes no new insurance programs

Table 8. Number of Adults Receiving Benefits from Each New Insurance Program, by Year (Thousands)

	Voluntary						Mandatory		
	No Subsidies			With Subsidies					
	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
2030	29	24	5	137	127	147	709	712	934
2040	88	141	22	379	557	539	2,167	2,659	3,377
2050	172	296	57	631	1,034	927	3,416	5,043	6,174
2060	237	396	43	619	1,142	915	3,712	5,708	6,890
2070	268	415	48	596	1,115	879	4,126	6,485	7,798

Source: Authors' estimates from DYNASIM3.

Table 9. Percentage of Adults Who Ever Receive Benefits from Each New Insurance Program, by Birth Cohort

	Voluntary						Mandatory		
	No Subsidies			With Subsidies					
	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
Entire birth cohort									
1951-55	1.6	1.5	0.3	5.6	5.3	4.3	33.4	31.2	33.5
1956-60	1.8	1.8	0.2	6.1	5.8	4.5	34.6	32.5	34.8
1961-65	2.0	2.0	0.2	6.0	5.8	4.2	33.8	31.8	33.9
1966-70	2.3	2.1	0.3	5.8	5.5	3.9	34.6	32.8	34.7
1971-75	2.3	2.2	0.2	6.1	5.9	4.1	35.0	33.2	35.1
1976-80	2.2	2.1	0.3	5.7	5.4	3.9	35.6	33.4	35.7
1981-85	2.2	2.1	0.3	5.5	5.2	3.6	35.9	33.8	36.0
Birth cohort members who enrolled in the program									
1951-55	41.8	40.1	50.0	33.0	31.0	31.3	36.2	33.9	36.3
1956-60	36.9	36.2	43.8	36.7	35.0	36.6	36.7	34.4	36.8
1961-65	34.0	32.5	34.5	34.0	32.7	34.1	35.5	33.4	35.7
1966-70	35.1	32.6	37.3	36.3	33.9	37.0	35.6	33.8	35.8
1971-75	37.2	35.9	32.3	39.0	37.6	39.6	35.8	34.0	35.9
1976-80	38.4	36.2	38.3	38.7	36.6	39.0	36.3	34.1	36.4
1981-85	39.1	36.3	42.4	39.6	37.3	40.6	36.6	34.3	36.7

Source: Authors' estimates from DYNASIM3.

Table 10. Percentage of Adults Born between 1976 and 1980 Who Ever Receive Benefits from Each New Insurance Program, by Personal Characteristics

	Voluntary						Mandatory		
	No Subsidies			With Subsidies					
	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
All	2.2	2.1	0.3	5.7	5.4	3.9	35.6	33.4	35.7
Gender									
Men	1.7	1.6	0.2	5.0	4.7	3.6	31.4	29.2	31.4
Women	2.7	2.6	0.4	6.4	6.1	4.1	40.0	37.7	40.0
Income quintile at age 65									
Bottom	c	c	c	23.0	21.8	22.9	35.1	32.9	35.1
Second	0.8	0.8	c	3.0	2.9	2.5	43.9	41.6	43.9
Third	1.7	1.5	c	1.9	1.7	0.8	40.1	38.1	40.2
Fourth	2.9	2.8	0.2	2.9	2.8	0.2	40.4	37.5	40.4
Top	5.3	4.9	0.8	5.3	4.9	0.8	39.4	36.7	39.5
Health status at age 65									
Excellent	3.4	3.1	0.1	5.2	4.9	1.9	40.3	37.6	40.5
Very good	3.0	2.8	0.5	6.2	5.9	3.8	39.9	37.3	39.9
Good	2.2	2.0	0.2	6.1	5.5	4.3	39.1	36.4	39.1
Fair	1.8	1.8	0.3	6.7	6.5	5.3	40.3	38.6	40.3
Poor	1.2	1.2	c	8.9	8.7	7.5	41.2	38.9	41.3
Marital status at age 65									
Married	2.4	2.2	0.2	3.7	3.4	1.5	38.0	35.6	38.1
Unmarried	2.6	2.4	0.4	10.6	10.2	8.7	42.8	40.3	42.9
Wealth quintile at age 65									
Bottom	c	c	c	9.1	8.6	8.8	37.6	35.5	37.6
Second	0.4	0.3	c	4.6	4.2	4.2	39.8	36.7	39.8
Third	1.2	1.1	c	5.1	4.9	3.9	40.3	38.1	40.5
Fourth	2.3	2.2	0.2	6.1	5.8	4.1	41.1	38.7	41.1
Top	7.0	6.6	1.1	7.4	7.0	1.8	40.1	37.5	40.1
Age at death									
Less than 65	0	0	0	0	0	0	0	0	0
65-74	0.7	0.4	0.0	1.6	1.2	1.0	7.2	6.3	7.2
75-84	1.5	1.3	0.2	4.5	4.2	3.2	23.2	20.8	23.2
85-89	2.9	2.7	0.2	7.6	7.2	5.0	39.8	36.5	39.8
90-94	3.0	2.9	0.4	7.9	7.6	5.4	50.5	48.2	50.5
95+	3.7	3.6	0.6	8.7	8.4	5.8	69.1	66.3	69.3

Source: Authors' estimates from DYNASIM3.

Note: C= cell size too small to be reliable.

Table 11. Percentage of Program Enrollees Born between 1976 and 1980 Who Ever Receive Benefits from Each New Insurance Program, by Personal Characteristics

	Voluntary						Mandatory		
	No Subsidies			With Subsidies					
	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
All	38.4	36.2	38.3	38.7	36.6	39.0	36.3	34.1	36.4
Gender									
Men	32.9	30.3	28.0	34.9	33.1	36.2	31.9	29.7	31.9
Women	43.0	41.2	45.7	42.2	40.0	41.9	40.9	38.6	41.0
Income quintile at age 65									
Bottom	c	c	c	37.7	35.7	37.7	37.1	34.7	37.1
Second	40.7	40.7	c	48.2	47.1	51.5	44.3	41.9	44.3
Third	38.8	34.3	c	39.5	35.5	48.0	40.4	38.3	40.4
Fourth	40.9	40.2	23.1	40.9	40.2	28.6	40.7	37.7	40.7
Top	44.1	41.1	46.9	44.1	41.1	46.9	39.4	36.8	39.5
Health status at age 65									
Excellent	39.3	36.0	12.5	38.3	36.2	33.3	40.3	37.6	40.5
Very good	44.2	41.8	56.5	44.4	42.1	45.4	40.2	37.6	40.2
Good	43.0	39.7	28.6	38.4	35.2	36.9	39.6	36.8	39.6
Fair	40.6	40.6	62.5	37.6	36.9	38.4	41.3	39.5	41.3
Poor	37.5	37.5	c	39.8	38.6	38.7	42.0	39.6	42.1
Marital status at age 65									
Married	43.4	40.8	40.0	34.6	32.2	26.8	38.5	36.1	38.6
Unmarried	40.4	38.4	44.8	43.8	41.8	45.1	43.4	40.8	43.4
Wealth quintile at age 65									
Bottom	c	c	c	36.9	35.0	36.5	39.2	36.9	39.2
Second	42.9	35.7	c	39.1	35.6	38.5	40.0	37.0	40.0
Third	38.5	34.6	50.0	38.6	36.8	38.2	40.7	38.5	40.8
Fourth	38.8	36.9	37.5	41.5	39.5	43.1	41.5	39.1	41.5
Top	43.4	41.4	44.2	43.6	41.6	46.5	40.2	37.6	40.2
Age at death									
Less than 65	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65-74	10.0	5.7	0.0	8.4	6.3	7.8	7.2	6.2	7.2
75-84	25.4	22.0	28.6	26.5	24.8	27.3	23.4	20.9	23.4
85-89	48.0	45.9	30.0	46.0	43.8	44.6	40.1	36.8	40.1
90-94	52.1	51.0	54.5	51.0	48.7	50.0	51.3	48.9	51.3
95+	75.3	74.1	76.9	70.4	68.0	68.1	69.9	67.1	70.1

Source: Authors' estimates from DYNASIM3.

Note: C= cell size too small to be reliable.

Table 12. Annual Program Benefits Paid under Each New Insurance Program, 2030-2070 (2015 constant dollars)

	Voluntary						Mandatory		
	No Subsidies			With Subsidies					
	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
Total benefits paid (billions)									
2030	1.7	0.9	0.3	6.2	5.1	7.3	32.6	31.2	48.7
2040	4.5	8.1	1.7	21.3	34.1	38.4	118.9	159.9	230.6
2050	12.8	23.9	6.0	49.2	86.4	88.8	259.0	410.90	572.4
2060	23.0	43.8	5.9	62.1	132.9	118.7	385.9	660.1	891.4
2070	40.0	70.8	8.8	89.1	187.7	161.3	618.2	1,055.9	1,439.5
Total benefits paid per enrollee ages 65 or older									
2030	600	300	900	600	500	900	500	500	700
2040	900	1,800	3,000	1,500	2,600	3,900	1,600	2,100	3,100
2050	2,200	4,400	8,100	3,500	6,200	9,300	3,200	5,100	7,000
2060	4,100	7,700	9,900	4,500	9,800	13,600	4,300	7,400	10,000
2070	6,800	12,000	14,000	7,000	14,800	21,200	6,400	10,900	14,800
Total benefits paid per enrollee ages 65 or older receiving benefits									
2030	600	300	900	600	500	900	500	500	700
2040	900	1,800	3,000	1,500	2,600	3,900	1,600	2,100	3,100
2050	2,200	4,400	8,100	3,500	6,200	9,300	3,200	5,100	7,000
2060	4,100	7,700	9,900	4,500	9,800	13,600	4,300	7,400	10,000
2070	6,800	12,000	14,000	7,000	14,800	21,200	6,400	10,900	14,800

Source: Authors' estimates from DYNASIM3.

Note: Monetary values are converted to 2015 constant dollars using the projected change in the consumer price index.

Table 13. Average Sum of Lifetime Benefits Received by Enrollees Born between 1976 and 1980 Who Ever Receive Benefits from Each New Insurance Program, by Personal Characteristics (constant 2015 dollars)

	Voluntary						Mandatory		
	No Subsidies			With Subsidies					
	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
All	82,600	164,100	218,100	83,000	174,200	222,900	80,700	153,300	194,600
Gender									
Men	76,900	160,000	239,800	78,600	150,600	189,800	77,200	133,000	170,600
Women	86,200	166,500	208,600	86,400	192,800	252,200	83,500	169,300	213,600
Income quintile at age 65									
Bottom	c	c	c	83,100	176,800	224,400	83,100	178,300	218,200
Second	99,900	157,600	c	90,600	208,600	245,800	82,000	183,700	221,600
Third	73,600	202,400	c	71,600	181,000	111,100	80,400	158,400	197,600
Fourth	84,400	145,000	113,600	84,400	145,000	126,900	80,300	137,200	182,100
Top	82,000	166,100	254,800	82,000	166,800	255,600	78,900	126,800	170,000
Health status at age 65									
Excellent	83,100	204,800	527,600	85,100	178,700	216,900	81,000	147,000	193,300
Very good	81,700	154,400	225,600	80,700	162,000	208,600	79,900	140,500	182,200
Good	82,000	153,900	208,500	80,500	161,800	201,400	79,600	150,300	190,200
Fair	83,600	135,500	144,200	85,000	173,300	239,200	82,500	164,700	205,300
Poor	87,800	229,700	c	88,600	224,700	266,100	82,900	189,300	228,200
Marital status at age 65									
Married	79,800	156,500	217,300	80,000	168,700	218,800	80,000	143,200	183,400
Unmarried	86,500	174,700	218,700	84,600	177,100	224,000	81,700	167,500	210,200
Wealth quintile at age 65									
Bottom	c	c	c	85,100	206,200	254,500	82,900	180,300	220,000
Second	82,900	271,800	c	81,900	189,000	235,500	80,800	170,100	210,200
Third	79,800	114,600	c	81,000	141,000	190,600	80,900	150,900	190,700
Fourth	83,400	224,300	110,400	83,000	190,300	196,700	79,600	145,200	186,000
Top	82,200	145,300	235,700	82,900	147,800	213,600	80,100	132,500	177,300
Age at death									
Less than 65	.	.	.	.	.	.	.	.	.
65-74	44,300	42,000	c	50,800	43,100	63,000	52,300	43,200	62,700
75-84	77,400	90,100	123,100	75,600	111,300	150,900	69,200	92,600	125,300
85-89	73,300	114,300	184,100	77,500	129,500	174,900	74,000	108,200	141,500
90-94	90,900	192,000	249,900	87,400	164,800	203,800	81,800	134,300	178,900
95+	89,700	218,800	247,200	91,800	270,200	348,400	90,200	221,400	273,000

(continued)

Source: Authors' estimates from DYNASIM3.

Note: The table reports average total value of total LTSS expenditures, summed from age 65 until death. Expenditures are not adjusted for time of receipt. Monetary values are converted to 2015 constant dollars using the projected change in the consumer price index. c=cell size too small to be estimated reliably.

Table 14. Average Present Discounted Value of Lifetime Benefits Received by Enrollees Born between 1976 and 1980 Who Ever Receive Benefits from Each New Insurance Program, by Personal Characteristics (2015 constant dollars)

	Voluntary						Mandatory		
	No Subsidies			With Subsidies					
	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
All	47,400	86,300	116,500	49,000	93,000	122,500	45,400	78,800	102,000
Gender									
Men	45,300	87,200	129,600	47,900	85,000	110,200	44,200	70,900	92,700
Women	48,700	85,800	110,800	49,900	99,400	133,300	46,300	85,000	109,400
Income quintile at age 65									
Bottom	c	c	c	50,600	96,300	124,800	50,400	96,800	121,000
Second	59,500	81,900	c	50,800	104,400	125,100	48,400	96,800	119,800
Third	45,700	108,000	c	43,700	96,500	64,500	44,800	79,700	101,700
Fourth	47,000	75,000	69,000	47,000	75,000	72,600	43,700	69,300	93,400
Top	46,700	87,900	131,800	46,700	88,300	132,200	42,300	62,800	86,200
Health status at age 65									
Excellent	45,100	101,300	295,600	47,000	90,600	118,600	43,000	72,000	96,900
Very good	47,600	82,100	122,700	47,000	84,600	110,900	44,000	70,500	93,900
Good	49,000	82,900	108,500	47,000	86,500	108,300	44,400	77,000	99,100
Fair	44,400	70,800	71,200	50,800	92,600	132,600	47,700	85,100	108,300
Poor	54,000	128,900	c	57,200	128,100	155,500	51,800	107,000	131,700
Marital status at age 65									
Married	44,100	80,300	117,000	44,600	86,600	114,700	43,200	71,500	93,200
Unmarried	52,000	94,900	116,200	51,400	96,500	124,600	48,400	88,800	114,300
Wealth quintile at age 65									
Bottom	c	c	c	51,900	110,000	138,600	48,000	94,200	116,600
Second	50,200	149,400	c	49,800	103,700	133,100	46,200	88,100	111,400
Third	44,500	56,200	c	47,100	73,500	102,100	45,100	77,000	100,000
Fourth	47,900	115,100	57,800	48,800	100,900	108,900	45,000	74,800	97,800
Top	47,300	77,700	126,800	47,500	79,500	118,100	43,600	66,600	90,900
Age at death									
Less than 65	.	.	.	.	.	.	.	.	.
65-74	36,300	35,000	c	41,700	35,200	51,500	45,800	37,500	54,600
75-84	52,600	59,600	86,200	53,600	77,000	107,200	50,300	65,700	89,500
85-89	44,100	67,800	106,600	48,400	78,300	108,200	45,300	64,900	85,300
90-94	53,000	102,800	131,300	49,700	88,000	109,600	45,200	72,200	96,600
95+	44,000	101,800	122,800	46,800	124,800	164,700	43,500	98,600	123,600

(continued)

Source: Authors' estimates from DYNASIM3.

Note: The table reports average total value of total LTSS expenditures from age 65 until death, discounted to age 65 using a real discount rate of 2.9 percent. Monetary values are converted to 2015 constant dollars using the projected change in the consumer price index. c=cell size too small to be reliable.

Table 15. Total Annual LTSS Spending by Payer under Baseline and Each New Insurance Program, 2030-2070 (billions of 2015 constant dollars)

		Voluntary						Mandatory		
		No Subsidies			With Subsidies					
	Base-line	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
2030										
Total	382.4	383.3	382.8	382.3	385.6	384.7	385.5	399.0	398.1	407.9
New program or private insurance	16.7	18.1	17.5	16.9	22.6	21.6	23.7	48.2	46.9	63.9
Medicaid	161.9	161.9	161.9	161.9	160.3	160.7	159.4	156.9	155.1	152.2
Out-of-pocket	203.8	203.3	203.4	203.5	202.8	202.5	202.4	193.9	196.1	191.9
2040										
Total	800.0	801.1	802.0	800.4	807.1	811.8	815.7	848.5	857.5	892.1
New program or private insurance	20.6	24.1	27.8	22.0	40.8	53.7	58.6	136.0	176.8	245.8
Medicaid	331.3	331.1	329.9	331.2	325.1	318.0	316.4	310.0	279.2	267.9
Out-of-pocket	448.2	445.9	444.3	447.2	441.2	440.1	440.7	402.6	401.5	378.4
2050										
Total	1,377.4	1,383.1	1,383.6	1,379.3	1,397.6	1,405.2	1,410.1	1,476.9	1,496.7	1,572.3
New program or private insurance	28.2	39.2	49.1	33.4	75.1	111.3	115.4	282.6	431.5	590.5
Medicaid	555.3	554.5	552.5	555.3	541.6	518.7	516.0	508.6	401.2	377.4
Out-of-pocket	794.0	789.4	782.0	790.6	780.9	775.2	778.7	685.7	664.0	604.4
2060										
Total	2,051.9	2,058.3	2,061.1	2,053.5	2,074.4	2,090.0	2,096.3	2,201.5	2,245.9	2,352.8
New program or private insurance	43.2	61.9	81.1	48.6	100.9	170.2	161.2	418.8	689.0	914.2
Medicaid	789.3	788.7	781.1	789.3	776.2	736.1	737.2	732.5	542.5	513.4
Out-of-pocket	1,219.5	1,207.7	1,198.9	1,215.6	1,197.4	1,183.7	1,197.9	1,050.2	1,014.4	925.2
2070										
Total	3,428.5	3,437.1	3,439.0	3,427.5	3,458.9	3,469.8	3,478.6	3,659.8	3,708.9	3,889.7
New program or private insurance	84.4	115.8	142.7	90.9	164.9	259.5	242.6	684.6	1,118.7	1,489.4
Medicaid	1,237.4	1,236.8	1,222.9	1,236.0	1,222.5	1,152.0	1,158.5	1,144.5	835.4	791.5
Out-of-pocket	2,106.7	2,084.5	2,073.4	2,100.6	2,071.5	2,058.2	2,077.5	1,830.7	1,754.8	1,608.9

Source: Authors' estimates from DYNASIM3.

Note: Monetary values are converted to 2015 constant dollars using the change in the consumer price index.

Table 16. Average Sum of LTSS Expenditures from Age 65 until Death by Payer under Baseline and Each New Insurance Programs, Selected Birth Cohorts (constant 2015 dollars)

		Voluntary						Mandatory		
		No Subsidies			With Subsidies					
	Base-line	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
1956-60										
Total	135,000	135,600	135,600	135,100	136,900	137,900	138,400	144,600	147,900	154,300
New program or private insurance	3,100	4,200	5,100	3,500	7,400	11,800	12,000	27,000	44,600	58,700
Medicaid	56,000	56,000	55,700	56,000	54,900	52,000	51,900	51,800	40,300	38,100
Out-of-pocket	75,900	75,400	74,800	75,600	74,600	74,100	74,500	65,800	63,000	57,500
1966-70										
Total	163,100	163,800	163,800	163,400	165,000	166,100	166,400	173,900	177,800	185,300
New program or private insurance	3,000	4,500	5,400	3,400	7,400	12,100	11,600	30,200	51,800	68,100
Medicaid	61,800	61,800	61,400	61,800	60,900	57,900	57,900	57,800	44,000	41,900
Out-of-pocket	98,300	97,500	97,000	98,200	96,700	96,100	96,900	85,900	82,000	75,300
1976-80										
Total	186,200	187,100	187,100	186,500	188,600	189,400	190,000	198,800	203,100	212,500
New program or private insurance	4,200	5,900	7,400	4,700	9,100	14,100	13,600	35,300	59,900	79,500
Medicaid	68,400	68,400	67,800	68,400	67,500	64,500	64,600	63,800	48,700	46,100
Out-of-pocket	113,600	112,800	111,900	113,400	112,000	110,800	111,800	99,700	94,500	86,900

Source: Authors' estimates from DYNASIM3.

Note: The table reports average LTSS expenditures, summed from age 65 until death, for adults who survive to age 65. Expenditures are not adjusted for time of receipt. Monetary values are converted to 2015 constant dollars using the projected change in the consumer price index.

Table 17. Average Present Discounted Value of LTSS Expenditures from Age 65 until Death by Payer under Baseline and Each New Insurance Program, Selected Birth Cohorts (2015 constant dollars)

		Voluntary						Mandatory		
		No Subsidies			With Subsidies					
	Base-line	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
1956-60										
Total	67,700	67,900	68,000	67,800	68,700	69,300	69,500	73,300	75,000	78,600
New program or private insurance	1,700	2,200	2,700	1,900	4,100	6,300	6,500	15,100	23,300	31,100
Medicaid	28,300	28,300	28,100	28,300	27,600	26,200	26,100	25,900	20,500	19,300
Out-of-pocket	37,700	37,400	37,200	37,600	37,000	36,800	36,900	32,300	31,200	28,200
1966-70										
Total	80,400	80,700	80,700	80,500	81,600	82,100	82,300	86,800	88,700	93,000
New program or private insurance	1,600	2,400	2,800	1,800	4,200	6,400	6,300	16,900	26,800	35,900
Medicaid	30,400	30,400	30,200	30,400	29,900	28,500	28,400	28,200	21,700	20,500
Out-of-pocket	48,400	47,900	47,700	48,300	47,500	47,200	47,600	41,700	40,200	36,600
1976-80										
Total	91,600	92,000	92,100	91,700	93,000	93,400	93,900	99,000	100,900	106,300
New program or private insurance	2,200	3,100	3,900	2,500	5,100	7,500	7,400	19,700	30,800	41,600
Medicaid	33,600	33,600	33,300	33,600	33,100	31,700	31,700	31,100	24,000	22,600
Out-of-pocket	55,800	55,300	54,900	55,600	54,800	54,200	54,800	48,200	46,100	42,100

Source: Authors' estimates from DYNASIM3.

Note: The table reports average total value of total LTSS expenditures from age 65 until death, discounted to age 65 using a real discount rate of 2.9 percent, for adults who survive to age 65. Monetary values are converted to 2015 constant dollars using the projected change in the consumer price index.

Table 18. Percentage of Program Spending that Offsets Other Financing Sources or Funds New Services, 2030-2070 (2015 constant dollars)

	Voluntary						Mandatory		
	No Subsidies			With Subsidies					
	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
2030									
Medicaid	0	0	0	26	23	33	14	21	19
Out-of-Pocket	9	11	0	12	19	14	29	23	24
Private Insurance	16	13	30	4	3	3	4	3	3
New Services	76	76	70	58	54	49	53	52	54
2040									
Medicaid	3	16	4	29	37	38	18	32	27
Out-of-Pocket	51	46	61	33	24	20	38	29	30
Private Insurance	24	12	17	6	3	1	3	3	3
New Services	21	26	19	33	35	41	41	36	40
2050									
Medicaid	5	11	0	27	41	43	18	37	31
Out-of-Pocket	36	49	59	26	22	17	42	32	33
Private Insurance	21	14	15	7	5	2	2	2	2
New Services	38	25	26	40	32	37	38	29	34
2060									
Medicaid	2	18	0	21	40	43	15	37	30
Out-of-Pocket	50	46	62	35	27	18	44	31	33
Private Insurance	21	15	12	8	5	1	3	2	3
New Services	27	21	26	36	29	38	39	30	34
2070									
Medicaid	1	20	15	17	45	48	15	38	31
Out-of-Pocket	53	44	55	38	25	17	44	33	34
Private Insurance	22	18	28	10	7	2	3	2	3
New Services	24	18	2	35	24	32	37	27	32

Source: Authors' estimates from DYNASIM3.

Table 19. Average Sum of Out-of-Pocket LTSS Expenditures from Age 65 until Death by Adults Born between 1976 and 1980 Who Ever Have Severe LTSS Needs after Age 65, by Personal Characteristics

		Voluntary						Mandatory		
		No Subsidies			With Subsidies					
	Base-line	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
All	113,600	112,800	111,900	113,400	112,000	110,800	111,800	99,700	94,500	86,900
Gender										
Men	87,600	87,000	86,300	87,400	86,300	85,400	86,100	75,700	72,300	66,300
Women	138,400	137,400	136,300	138,100	136,400	134,900	136,300	122,500	115,600	106,600
Income quintile at age 65										
Bottom	73,300	73,500	73,500	73,500	69,100	68,000	66,000	67,300	65,500	63,000
Second	97,400	97,200	97,100	97,500	96,100	95,500	95,200	85,200	81,000	74,900
Third	111,600	111,300	111,100	111,600	111,200	111,000	111,400	98,400	94,000	87,100
Fourth	122,700	121,400	120,400	122,600	121,400	120,400	122,500	105,400	99,600	89,800
Top	147,800	146,000	143,500	146,900	146,000	143,500	146,900	129,900	121,300	111,200
Health status at age 65										
Excellent	132,900	131,800	130,400	132,800	131,300	129,800	131,900	117,500	110,900	101,800
Very good	121,400	120,200	119,000	120,700	119,300	117,600	118,900	106,400	101,300	93,100
Good	106,500	105,800	105,100	106,500	105,100	104,200	105,200	92,800	88,200	80,700
Fair	108,200	107,700	107,200	108,000	106,800	106,000	106,400	95,100	89,300	82,900
Poor										
Marital status at age 65										
Married	114,200	113,400	112,500	114,000	113,100	112,100	113,500	100,100	95,100	87,700
Unmarried	115,700	114,800	113,900	115,400	113,000	111,500	112,100	101,600	95,900	88,100
Wealth quintile at age 65										
Bottom	84,400	84,400	84,100	84,500	83,300	81,800	81,600	77,400	73,400	70,100
Second	100,400	100,400	100,100	100,600	99,700	99,300	99,400	88,700	84,100	78,000
Third	108,400	108,200	108,100	108,400	107,300	107,000	106,900	94,800	90,800	83,700
Fourth	117,400	116,600	115,600	117,400	115,200	113,900	115,100	100,700	96,000	86,600
Top	151,400	148,600	146,300	150,200	148,400	146,100	149,700	132,600	123,900	113,400
Age at death										
Less than 65	0	0	0	0	0	0	0	0	0	0
65-74	4,700	4,600	4,700	4,700	4,500	4,600	4,600	3,500	3,800	3,300
75-84	26,800	26,500	26,200	26,800	25,900	25,600	25,900	21,000	21,700	18,500
85-89	68,600	67,600	66,800	68,500	66,700	65,900	66,900	56,800	55,600	49,500
90-94	132,100	130,900	129,800	131,600	129,700	128,500	129,800	113,700	109,100	99,300
95+	316,300	315,000	312,900	315,900	313,800	310,300	312,700	286,800	265,900	249,500

(continued)

Table 19. (continued)

		Voluntary						Mandatory		
		No Subsidies			With Subsidies					
	Base-line	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
Years with severe cognitive impairment after age 65l										
None	72,300	71,800	71,400	72,200	71,200	70,800	71,400	62,400	61,700	55,500
1	138,200	138,100	137,800	138,500	137,000	136,700	136,600	119,400	117,400	104,100
2 or more	245,600	243,600	240,600	244,700	241,700	237,500	240,800	220,000	197,600	188,000
Years with severe LTSS needs										
Less than 1	2,400	2,200	2,200	2,400	2,100	2,100	2,300	1,500	1,600	1,500
1	71,000	70,200	70,400	70,800	69,500	69,900	69,900	56,100	61,600	53,900
2 or more	325,900	324,000	320,900	325,300	321,900	317,500	320,800	292,100	269,400	250,400

Source: Authors' estimates from DYNASIM3.

Note: The table reports average out-of-pocket LTSS expenditures, summed from age 65 until death, for adults who survive to age 65. Expenditures are not adjusted for time of receipt. Monetary values are converted to 2015 constant dollars using the projected change in the consumer price index.

Table 20. Average Present Discounted Value of Out-of-Pocket LTSS Expenditures from Age 65 until Death by Adults Born between 1976 and 1980 Who Ever Have Severe LTSS Needs after Age 65, by Personal Characteristics

		Voluntary						Mandatory		
		No Subsidies			With Subsidies					
	Base-line	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
All	55,800	55,300	54,900	55,600	54,800	54,200	54,800	48,200	46,100	42,100
Gender										
Men	43,700	43,400	43,000	43,600	43,000	42,500	42,900	37,300	35,800	32,600
Women	67,200	66,600	66,100	67,000	66,100	65,400	66,100	58,700	55,900	51,200
Income quintile at age 65										
Bottom	38,300	38,400	38,400	38,400	35,700	35,200	34,100	34,700	33,900	32,400
Second	49,000	48,900	48,800	49,000	48,300	48,100	47,900	42,000	40,500	37,000
Third	54,600	54,400	54,300	54,600	54,400	54,300	54,500	47,400	45,700	41,900
Fourth	60,700	60,000	59,500	60,600	60,000	59,500	60,600	51,400	49,100	44,000
Top	69,900	68,900	67,700	69,400	68,900	67,700	69,400	60,700	57,100	52,000
Health status at age 65										
Excellent	62,100	61,500	60,900	62,100	61,200	60,600	61,600	54,200	51,600	47,000
Very good	59,200	58,500	57,900	58,800	58,000	57,200	57,900	51,200	49,100	44,800
Good	52,500	52,100	51,700	52,500	51,700	51,200	51,700	45,100	43,300	39,300
Fair	53,400	53,200	52,900	53,300	52,600	52,200	52,400	46,200	43,900	40,400
Poor	56,700	56,600	56,300	56,900	55,600	55,300	55,300	49,600	47,300	43,600
Marital status at age 65										
Married	54,600	54,200	53,800	54,500	54,100	53,600	54,300	47,300	45,300	41,500
Unmarried	59,000	58,400	58,000	58,800	57,400	56,700	57,000	51,000	48,700	44,300
Wealth quintile at age 65										
Bottom	41,900	41,900	41,800	42,000	41,300	40,600	40,500	38,100	36,300	34,500
Second	50,300	50,300	50,100	50,400	49,800	49,600	49,700	43,800	41,900	38,500
Third	53,000	52,900	52,800	53,000	52,300	52,200	52,100	45,600	44,100	40,300
Fourth	57,900	57,600	57,000	58,000	56,700	56,200	56,700	48,900	47,200	42,200
Top	73,000	71,400	70,200	72,300	71,300	70,100	72,000	63,100	59,500	54,000
Age at death										
Less than 65	0	0	0	0	0	0	0	0	0	0
65-74	4,000	4,000	4,000	4,000	3,900	4,000	3,900	3,000	3,300	2,800
75-84	18,400	18,100	18,000	18,400	17,700	17,600	17,800	14,200	14,800	12,600
85-89	40,000	39,400	38,900	39,900	38,800	38,400	39,000	32,900	32,400	28,700
90-94	68,700	68,000	67,500	68,400	67,400	66,800	67,500	58,800	56,600	51,400
95+	137,500	136,900	135,900	137,300	136,300	134,700	135,800	123,700	115,300	107,700

(continued)

Table 20. (continued)

	Voluntary							Mandatory		
		No Subsidies			With Subsidies					
	Base-line	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
Years with severe cognitive impairment after age 65l										
None	35,800	35,500	35,300	35,700	35,200	35,000	35,200	30,400	30,400	27,100
1	66,600	66,500	66,400	66,700	65,900	65,800	65,800	56,800	56,500	49,700
2 or more	120,000	118,900	117,300	119,500	117,800	115,700	117,400	106,000	96,000	90,700
Years with severe LTSS needs										
Less than 1	1,400	1,300	1,200	1,400	1,200	1,200	1,300	900	900	800
1	35,400	35,000	35,100	35,400	34,600	34,900	34,800	27,700	30,700	26,700
2 or more	159,100	158,000	156,500	158,700	156,800	154,600	156,300	140,700	130,900	120,700

Source: Authors' estimates from DYNASIM3.

Note: The table reports average out-of-pocket LTSS expenditures from age 65 until death, discounted to age 65 using a real discount rate of 2.9 percent, for adults who survive to age 65. Monetary values are converted to 2015 constant dollars using the projected change in the consumer price index.

Table 21. Receipt of LTSS Medicaid Benefits by Adults Ages 65 and Older under Baseline and Each Insurance Program, 2020-2070

		Voluntary						Mandatory		
		No Subsidies			With Subsidies					
	Base-line	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
Number receiving LTSS Medicaid benefits (thousands)										
2020	2,247	2,247	2,247	2,247	2,247	2,247	2,247	2,230	2,235	2,230
2030	2,749	2,749	2,749	2,749	2,717	2,720	2,717	2,641	2,619	2,595
2040	3,545	3,542	3,540	3,547	3,481	3,428	3,416	3,333	3,136	3,080
2050	4,102	4,102	4,100	4,102	4,004	3,959	3,930	3,784	3,540	3,449
2060	4,117	4,117	4,107	4,117	4,051	3,957	3,949	3,826	3,470	3,393
2070	4,348	4,348	4,341	4,345	4,285	4,213	4,197	4,022	3,700	3,604
Percentage of adults receiving LTSS Medicaid benefits										
2020	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
2030	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.5	3.5	3.4
2040	4.2	4.2	4.2	4.2	4.2	4.1	4.1	4.0	3.7	3.7
2050	4.7	4.7	4.7	4.7	4.6	4.5	4.5	4.3	4.0	3.9
2060	4.4	4.4	4.3	4.4	4.3	4.2	4.2	4.0	3.7	3.6
2070	4.3	4.3	4.3	4.3	4.2	4.1	4.1	3.9	3.6	3.5

Source: Authors' estimates from DYNASIM3.

Table 22. Percentage Change in Out-of-Pocket and Medicaid LTSS Expenditures under Each New Program Relative to Baseline, 2020-2070

	Voluntary						Mandatory		
	No Subsidies			With Subsidies					
	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive	Front-end	Back-end	Compre-hensive
Out-of-pocket									
2020	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-1.6	-0.9	-1.7
2030	-0.3	-0.2	-0.2	-0.5	-0.7	-0.7	-4.9	-3.8	-5.9
2040	-0.5	-0.9	-0.2	-1.5	-1.8	-1.7	-10.2	-10.4	-15.6
2050	-0.6	-1.5	-0.4	-1.6	-2.4	-1.9	-13.6	-16.4	-23.9
2060	-1.0	-1.7	-0.3	-1.8	-2.9	-1.8	-13.9	-16.8	-24.1
2070	-1.1	-1.6	-0.3	-1.7	-2.3	-1.4	-13.1	-16.7	-23.6
Medicaid									
2020	0.0	0.0	0.0	0.0	0.0	0.0	-0.7	-0.2	-0.7
2030	0.0	0.0	0.0	-1.0	-0.8	-1.6	-3.1	-4.2	-6.0
2040	0.0	-0.4	0.0	-1.9	-4.0	-4.5	-6.4	-15.7	-19.1
2050	-0.1	-0.5	0.0	-2.5	-6.6	-7.1	-8.4	-27.7	-32.0
2060	-0.1	-1.0	0.0	-1.7	-6.7	-6.6	-7.2	-31.3	-35.0
2070	-0.1	-1.0	0.0	-1.7	-6.7	-6.6	-7.2	-31.3	-35.0

Source: Authors' estimates from DYNASIM3.

Appendix Tables

Appendix Table 1. Specification Parameters in Microsimulation Analyses of the New Insurance Program Options

	Front-End Voluntary	Front-End Mandatory	Back-End Voluntary	Back-end Mandatory	Comprehensive Voluntary	Comprehensive Mandatory
Start of payroll taxes or premiums	2016	2016	2016	2016	2016	2016
Start of program benefits	2018	2018	2018	2018	2018	2018
Enrollment eligibility	Adults under age 70 in first benefit year or later (born>=1948)	Adults under age 70 in first benefit year or later (born>=1948)	Adults under age 70 in first benefit year or later (born>=1948)	Adults under age 70 in first benefit year or later (born>=1948)	Adults under age 70 in first benefit year or later (born>=1948)	Adults under age 70 in first benefit year or later (born>=1948)
Minimum and maximum premium ages	Minimum 51 (due to HRS limits, not policy choice), no max	None (all workers in affected cohorts regardless of age)	Minimum 51 (due to HRS limits, not policy choice), no max	None (all workers in affected cohorts regardless of age)	Minimum 51 (due to HRS limits, not policy choice), no max	None (all workers in affected cohorts regardless of age)
How is adverse selection handled?	5 year-vesting	By requiring all workers to enroll (no vesting)	5 year-vesting	By requiring all workers to enroll (no vesting)	5 year-vesting	By requiring all workers to enroll (no vesting)
Benefit eligibility criteria	HIPAA benefit trigger; premiums current	HIPAA benefit trigger; 40 OASDI covered quarters regardless of when accrued if in eligible cohort	HIPAA benefit trigger; premiums current	HIPAA benefit trigger; 40 OASDI covered quarters regardless of when accrued if in eligible cohort	HIPAA benefit trigger; premiums current	HIPAA benefit trigger; 40 OASDI covered quarters regardless of when accrued if in eligible cohort
Daily benefit amount	$100	$100	$100	$100	$100	$100
Benefit inflation level within a cohort	3%	3%	3%	3%	3%	3%
What is benefit inflation level for each new cohort at time of issue?	Mix 68% wage, 32% price inflation (~3.5%)	Mix 68% wage, 32% price inflation (~3.5%)	Mix 68% wage, 32% price inflation (~3.5%)	Mix 68% wage, 32% price inflation (~3.5%)	Mix 68% wage, 32% price inflation (~3.5%)	Mix 68% wage, 32% price inflation (~3.5%)

Percent of program costs that taxes / premiums cover?	100% for those over 200% of poverty; subsidy needs financing mechanism	100%	100% for those over 200% of poverty; subsidy needs financing mechanism	100%	100% for those over 200% of poverty; subsidy needs financing mechanism	100%
Inflation level for the premiums?	Level after issue; for new cohorts, mix 68% wage, 32% price inflation (~3.5%)	N/A (implicitly wage growth for base-- payroll tax estimated to be solvent over 75 years at flat rate)	Level after issue; for new cohorts, mix 68% wage, 32% price inflation (~3.5%)	N/A (implicitly wage growth for base -- payroll tax estimated to be solvent over 75 years at flat rate)	Level after issue; for new cohorts, mix 68% wage, 32% price inflation (~3.5%)	N/A (implicitly wage growth for base -- payroll tax estimated to be solvent over 75 years at flat rate)
Is there a low-income subsidy?	Age 65 income <150% poverty: 100% of premium; linearly declines with income 150-199.9% poverty; 200% of poverty: zero subsidy; must have 40 OASDI quarters to qualify	YES implicit through minimum for taxation and uncapped tax	Age 65 income <150% poverty: 100% of premium; linearly declines with income 150-199.9% poverty; 200% of poverty: zero subsidy; must have 40 OASDI quarters to qualify	YES implicit through minimum for taxation and uncapped tax	Age 65 income <150% poverty: 100% of premium; linearly declines with income 150-199.9% poverty; 200% of poverty: zero subsidy; must have 40 OASDI quarters to qualify	YES implicit through minimum for taxation and uncapped tax
Is the program funded through premiums or taxes?	Premiums	Payroll tax uncapped (HI); implicitly employee (i.e., there is no wage offset)	Premiums	Payroll tax uncapped (HI); implicitly employee (i.e., there is no wage offset)	Premiums	Payroll tax uncapped (HI); implicitly employee (i.e., there is no wage offset)
Any minimum earnings level for payroll mandate or premium?	Most without subsidy are in top 2 income/wealth quintiles	Yes, 4 OASDI covered quarters	Most without subsidy are in top 2 income/wealth quintiles	Yes, 4 OASDI covered quarters	Most without subsidy are in top 1 income/wealth quintiles	Yes, 4 OASDI covered quarters
Structure of the cat. deductible?	Time	Time	Time	Time	Time	Time
Elimination period length?	90 days	90 days	Default: 2 year; alt 4 years	Default: 2 year; alt 4 years	Default: 90 days	Default: 90 days
Benefit duration?	2 years	2 years	Lifetime	Lifetime	Lifetime	Lifetime
Spouses entitled (as in OASDI/HI)?	No	No	No	No	No	No

What is assumed to happen to private market (baseline integration)?	Ineligible cohorts maintain current law policies. Partially displaced for those in later cohorts. Partially new demand (some could not pass underwriting).	Ineligible cohorts maintain current law policies. Partially displaced for those in later cohorts. Partially new demand (some could not pass underwriting).	Ineligible cohorts maintain current law policies. Front end programs remain (no increase assumed due to greater awareness); partial displacement	Ineligible cohorts maintain current law policies. Front end programs remain (no increase assumed due to greater awareness), long benefit periods no longer sold for covered cohorts.	Ineligible cohorts maintain current law policies. Partially displaced for those in later cohorts. Partially new demand (some could not pass underwriting).	Ineligible cohorts maintain current law policies. Partially displaced for those in later cohorts. Partially new demand (some could not pass underwriting).
Administrative costs?	Zero commission; 150% of mandatory admin	2.5% on taxes; 3.75% on benefits (Note: DI=2%, so this allows some adverse experience)	Zero commission; 150% of mandatory admin	2.5% on taxes; 3.75% on benefits (Note: DI=2%, so this allows some adverse experience)	Zero commission; 150% of mandatory admin	2.5% on taxes; 3.75% on benefits (Note: DI=2%, so this allows some adverse experience)
Benefit tax	2.5%	N/A	2.5%	N/A	2.5%	N/A
Daily benefit design	Cash	Cash	Cash	Cash	Cash	Cash
Lapse?	Assumed to be very low (~1%/year after first year)	Not relevant (you qualify or do not)	Assumed to be very low (~1%/year after first year)	Not relevant (you qualify or do not)	Assumed to be very low (~1%/year after first year)	Not relevant (you qualify or do not)
Medicaid during deductible	Current law	Current law	Current law	Current law	Current law	Current law
Medicaid precedence?	New program pays first	New program pays first	New program pays first	New program pays first	New program pays first	New program pays first
Other public (VA/ OAA services) precedence?	Other public unaffected by new	Other public unaffected by new	Other public unaffected by new	Other public unaffected by new	Other public unaffected by new	Other public unaffected by new
Miscellaneous qualifications	Not unauthorized migrant	Not unauthorized migrant	Not unauthorized migrant	Not unauthorized migrant	Not unauthorized migrant	Not unauthorized migrant
Likely participants, income and wealth	Top 2 quintiles	N/A	Top 2 quintiles	N/A	Top 1 quintile	N/A

Other characteristics associated with participation	Adversely selected: Health, disability, cognitive status; also: gender, children, baseline insurance coverage	N/A	Adversely selected: Health, disability, cognitive status; also: gender, children, baseline insurance coverage	N/A	Adversely selected: Health, disability, cognitive status; also: gender, children, baseline insurance coverage	N/A

Appendix Table 2. Summary of Core Processes Modeled in Dynasim3: Disability and Health Status

Process	Data	Form and predictors
Disability and health status sector		
Disability (work limitations)	SIPP (1990–93)	Discrete-time logistic hazard model incorporates various socioeconomic differences (age, education, lifetime earnings, race/ethnicity, marital status and nativity).
Health status (5-category)	HRS (1992-2012) matched to earnings data	Projected at ages 51 and older. Ordered logit models (initial conditions for those not observed on the SIPP, and then lagged status-specific transition models) incorporate various socioeconomic differences (age, education, lifetime earnings, race/ethnicity, marital status and nativity).
Counts of Limitations in (instrumental) activities of daily living	HRS (1994-2012) matched to earnings data; relative age to imply time trend	Projected at ages 51 and older. Ordered logit models (initial conditions for those not observed on SIPP, and then lagged status-specific transition models) incorporate health status, socio-economic differences (relative age, education, lifetime earnings, race/ethnicity, marital status, and nativity), prior period lags, and age interactions. IADLs predict ADLs.
Chronic health conditions counts	HRS (1994-2010/2012) matched to earnings data	Projected at ages 51 and older. Ordered logit models (initial conditions at baseline, and then lagged status-specific transition models) incorporate health status, IADL limits, ADL limits, mortality, socio-economic differences (age, education, race/ethnicity, marital status and nativity).
Cognitive status (TICS)	HRS (1994-2010)	Projected at ages 65 and older. Probit for presence of a score and then count models (initial conditions at baseline, and then lagged status-specific transition models). Predictors include age, race/ethnicity, sex, education, health status, ADL limitations, IADL limitations, family income as a percent of poverty. Error term for subsequent status is redrawn once between age 67 and death.
Indicator of whether ADL limitations meet trigger status	MCBS (2007-2009), but calibrated to user targets	Predictors include age, education, health status, number of limitations in IADLs, service use (nursing home and home care), mortality, number of chronic conditions, race, Medicaid receipt.

For definitions of acronyms, please see page v.

Appendix Table 3. Summary of Core Processes Modeled in DYNASIM3: Demand and Prices for Long-Term Services and Supports

Process	Data	Form and predictors
Long-term services and support		
Use of home care, nursing home, and residential care	HRS (1994-2010)	Projected at ages 65 and older. Trivariate probit model incorporates various socioeconomic differences (age, education, race/ethnicity, family income, insurance status, marital status, nativity and number of children, wealth). Also includes chronic conditions, cognitive status, limitations in IADLs/ ADLs, health status, and mortality.
Intensity of LTSS use (home care hours and nursing home days)	HRS (2002-2010); NHATS (2011)	Separate zero-truncated negative binomial models for those projected to have either type of expense; incorporates various socioeconomic differences (age, education, race/ethnicity, family income, insurance status, marital status, nativity and number of children, wealth). Also includes chronic conditions, cognitive impairment, limitations in IADLs/ADLs, and health status. For home care, use NHATS table to translate monthly into annual.
LTSS prices, Medicaid	Various (e.g., Eljay 2014, 2012, 2009, Mollica 2009, Ng. et al. 2014)	Use state-specific Medicaid rates from various review articles when attributing costs for LTSS. Indexed to wage inflation after baseline.
LTSS prices, non-Medicaid	Genworth (2014, 2015)	State-specific. Use median, semi-private NH rooms, home health aide rates. Nursing home and residential care prices are indexed to wage inflation after baseline. Home care prices are indexed to the average of wage and price inflation after baseline. Assume that user provided share of individuals with family income of at least 5 times poverty pays above-market rates and a user provided share of individuals with family income of less than 3 times poverty pays below-market rates, with variation based on income level.

For definitions of acronyms, please see page v.

Appendix Table 4. Summary of Core Processes Modeled in DYNASIM3: Payer Allocation for Long-Term Services and Supports

Process	Data	Form and predictors
Long-term services and support		
Private long-term care insurance: purchase	HRS (2002-2010);	Project unlapsed coverage as of age 65 (using sample of 60-65 year olds). Predictors include education, life expectancy, health status, wealth, number of children, nativity, race/ethnicity, gender.
Private long-term care insurance: plan features	Parameters from AALTCI and private industry data (including Milliman Long-Term Care data base); Broker World Survey (July 2014)	Plans have varied daily/ lifetime maximum (5 and 6 groups, respectively), elimination periods (4 groups), inflation protection (yes/no). Lapse is projected from ages 66 onward. Premiums vary based on gender and marital status, projected issue age, and assigned plan features (benefit period and inflation protection).
Allocation of LTSS costs to payers	MCBS (2007-09), plus Medicaid and private plan rules	Use Medicaid, Medicare, and stylized private plan rules to determine eligibility for payment from different sources. Estimates from MCBS and historical aggregates provide targets.
Veterans Administra-tion nursing home	MCBS (2007-09)	Applied only to those in nursing homes. Predictors include gender, education, race, IADL limitations, health status, chronic conditions, Medicaid status.

For definitions of acronyms, please see page v.

Appendix Table 5. Summary of Core Processes Modeled in DYNASIM3: Health Care Coverage and Use (Excluding Long-Term Services and Supports)

Process	Data	Form and predictors
Medicare (including RHI)		
Medicare and total health spending	MCBS (2007-09)	Projected at ages 65 and older. Square root for baseline, includes first-order autoregressive error that varies based on prior spending. Baseline predictors include age, sex, education, mortality, marital status, insurance type, health status, chronic conditions, ADL/IADL limitations, ln(per capita income), region, nursing home status, household size. Growth function takes into account technological change and growth in costs shares (premiums and out-of-pocket).
Insurance status	MCBS (2007-09)	Seven stylized statuses (Medicaid, other public, employer fee-for-service, employer health maintenance organization (HMO), self-pay fee-for-service, self-pay HMO, no supplemental) projected at ages 65 and older. Multinomial logit for baseline. Baseline predictors include age, education, employment status, gender, health status, limitations in ADLs/IADLs, race/ethnicity, marital status, mortality, chronic conditions, household size. Transition model takes into account premiums and health status.
Premiums	Rule based	Take into account spending growth, changes in insurance status, load factors.
Out-of-pocket	MCBS (2007-09)	Varies by insurance type and decile of spending.
Medicaid		
Medicaid eligibility	Rule based, state-specific	Separate full-scope pathways for SSI receipt/eligibility, percent-of-poverty, Medically Needy, non-SSI in nursing home if income near SSI limits, HCBS; also QMB, SLMB, and QI. Accounts for cost shares, spousal impoverishment, partnership programs, and other details.
Medicaid take-up	Stochastic, with grounding in related literature	For Medically needy, varies by spending quintile and income quintile; lower for MSPs than for full-scope pathways, with QMB higher than SLMB and SLMB higher than QI. Because HCBS programs have waiting lists, take-up is assumed to be 100 percent. Similarly, nursing homes are assumed to require Medicaid application for those qualifying through that pathway (i.e., take up is also 100 percent).

For definitions of acronyms, please see page v.

Appendix: Data from Private Insurance Industry Experience

RESULTS

Appendix Tables 6.1 (Female) and 6.2 (Male) show an estimated distribution of future long-term care (LTC) expenditures incurred during an individual's years of needing services. The costs are shown by care setting across all individuals turning age 65 in 2014 (i.e., the cohort includes both individuals that need care during their lifetime and individuals that do not need care during their lifetime).

The estimates shown are representative of an insured population, and may not relate to other populations (e.g., due to the different patterns of care for individuals with funding support from government programs). In addition, these estimates reflect a LTC product design with a service reimbursement benefit and HIPAA benefit trigger. Different covered populations, eligibility requirements, benefit levels, etc. (e.g., cash benefits or less restrictive benefit triggers) may result in different patterns.

METHODS AND ASSUMPTIONS

Data Source: Continuance and incidence rates were developed from the 2014 *Milliman Long-Term Care Guidelines (Guidelines)*, which are based on approximately $25 billion of LTC private market insured claim experience from 450,000 claims. The *Guidelines* are developed from private LTC insurance experience and do not include public or private funding or the cost of informal caregiver services.

Average Length of Stay: Continuance tables from the *Guidelines* by gender and care setting (Skilled Nursing Facility (SNF), Assisted Living Facility (ALF) and Home Health Care (HHC)) without any benefit limitations applied were used to calculate the average length of stay for an individual. These tables were adjusted so that claim terminations reflect only disabled mortality rates, based upon Milliman claim termination research.

Lifetime Probability of LTC Need: The lifetime probability of need takes into account both the probability that an individual will need LTC services and the probability that they are still alive at that given age. Incidence rates by gender and care setting from the *Guidelines* were used to estimate the probability of an individual needing LTC services. These incidence rates were applied to a population projection of 65 year olds in 2014 developed using the 1994 GAM Static Table adjusted to reflect only mortality for a non-disabled population.

Cost of Care: Average LTC costs for all individuals were estimated assuming a current average SNF daily cost of $230, ALF daily cost of $200, and HHC daily cost of $160. Future costs of care were estimated using a 4% annual increase in costs for SNF and ALF and 3% annual increase for HHC. All future dollar amounts were then discounted back to 2014 using a 5.6% discount rate.

CAVEATS AND LIMITATIONS

This Appendix has been prepared for The Urban Institute (Urban). Milliman does not intend to benefit, or create a legal duty to, any third-party recipient of this work. This communication must be read in its entirety.

This Appendix summarizes estimates of future LTC expenditures incurred by year of need. Various assumptions were used to construct these estimates. Different assumptions may produce materially different results, such as the population covered, eligibility for benefits, cost subsidies, benefit levels, and future rates of inflation. Actual results will vary from these estimates. This information may not be appropriate, and should not be used, for other purposes.

Guidelines issued by the American Academy of Actuaries require actuaries to include their professional qualifications in all actuarial communications. Chris Giese and Al Schmitz are members of the American Academy of Actuaries and meet the qualification standards for performing the analyses in this Appendix.

Appendix Table 6.1
LTC Expenditures Incurred During Years of Need
Female Age 65 Cohort in 2014, 5.6% Discount Rate

	< 1 Year	1-2 Years	2-3 Years	3-4 Years	4-5 Years	5-6 Years	> 6 Years	Total
LTC Expenditures								
Total	$16,754	$67,109	$112,722	$157,771	$202,896	$248,334	$451,013	$69,868
Assisted Living Facility	$22,063	$81,729	$133,115	$184,919	$236,505	$287,740	$507,578	$25,631
Home Health	$10,196	$42,462	$72,568	$104,445	$137,462	$171,942	$356,843	$20,671
Skilled Nursing Facility	$24,597	$90,132	$145,662	$201,075	$255,620	$309,563	$525,415	$23,567
Probability of Expenditure Range								
Total	12.6%	7.2%	5.8%	4.5%	3.5%	2.6%	8.0%	44.0%
Assisted Living Facility	2.4%	1.8%	1.6%	1.4%	1.1%	0.9%	2.7%	11.9%
Home Health	6.4%	3.1%	2.3%	1.8%	1.4%	1.0%	3.2%	19.3%
Skilled Nursing Facility	3.7%	2.2%	1.8%	1.4%	1.0%	0.7%	2.0%	12.9%

Appendix Table 6.2
LTC Expenditures Incurred During Years of Need
Male Age 65 Cohort in 2014, 5.6% Discount Rate

	< 1 Year	1-2 Years	2-3 Years	3-4 Years	4-5 Years	5-6 Years	> 6 Years	Total
LTC Expenditures								
Total	$17,952	$65,309	$110,252	$155,813	$202,621	$250,818	$419,854	$37,077
Assisted Living Facility	$22,490	$81,020	$135,191	$189,506	$243,834	$298,151	$478,628	$9,459
Home Health	$11,648	$43,660	$76,542	$112,187	$150,286	$190,882	$348,302	$13,905
Skilled Nursing Facility	$25,639	$90,506	$149,206	$207,198	$264,537	$321,324	$501,217	$13,713
Probability of Expenditure Range								
Total	14.3%	6.7%	4.4%	3.0%	2.0%	1.4%	3.1%	34.9%
Assisted Living Facility	2.5%	1.3%	0.9%	0.6%	0.4%	0.3%	0.7%	6.9%
Home Health	7.3%	3.3%	2.2%	1.5%	1.0%	0.7%	1.6%	17.6%
Skilled Nursing Facility	4.5%	2.0%	1.3%	0.9%	0.6%	0.4%	0.8%	10.5%

About the Authors

Melissa M. Favreault is a senior fellow in the Income and Benefits Policy Center at the Urban Institute, where her work focuses on the economic well-being and health status of older Americans and individuals with disabilities. She also analyzes long-term care needs and the distributional effects of Medicare and Medicaid. Her work in this area has focused on how changes in family structure and work/earnings patterns affect economic well-being in retirement, with a special emphasis on effects for women and lower-wage workers. For this research, she has often relied on dynamic microsimulation models. She has helped develop these types of models for both Urban and the Social Security Administration. Favreault coedited *Social Security and the Family: Addressing Unmet Needs in an Underfunded System* with Frank Sammartino and C. Eugene Steuerle, and has written extensively about the distributional effects of proposed changes to Social Security. She served on the Social Security Advisory Board's 2011 Technical Panel on Assumptions and Methods.

Richard W. Johnson is a senior fellow in the Income and Benefits Policy Center at the Urban Institute, where he directs the Program on Retirement Policy. His current research focuses on older Americans' employment and retirement decisions, long-term services and supports for older adults with disabilities, and state and local pensions. His recent studies have examined job loss at older ages, occupational change after age 50, employment prospects for age 50+ African Americans and Hispanics, and the impact of the 2007–09 recession and its aftermath on older workers and future retirement incomes. He has also written extensively about retirement preparedness, including the financial and health risks people face as they approach retirement, economic hardship in the years before Social Security's early eligibility age, and the adequacy of the disability safety net.

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