Hawaii LTSS Feasibility Study

Guide to Actuarial Model Output Files

Overview

The files archived in this collection represent the final analysis runs on the actuarial model before closing the tables and figures of the LTSS Feasibility Report. These are the output files from running the program. They include all results calculated, the settings of the input parameters, and any specific population parameters that are developed during computation of the anticipated costs of benefits, the time path over which they would be paid, and similar tabular material that would be created on each program run. The following file versions are presented:

Rev 4_Pub_Premium Model_Working Population_$12.00	A flat premium-based program which covers the working population through their lifetimes. For an initial premium of $12 per adult working-age person per month.
Rev 4_Pub_Premium Model Whole Population $17.50	A flat premium-based program which covers the whole population for an initial premium of $17.50 per adult person (of any age) per month.
Rev 4_Pub_Income Tax 0.7%	A program based on a 0.7% addition to the state income tax for every person filing a tax return over a stipulated ceiling.
Rev 4_Pub_GET 0.4%	A program based on a 0.4% increment to the Hawaii General Excise Tax, which will cover everyone filing a Hawaii income tax return for their lifetimes.
Rev 4_Pub_GET 0.375%	A program like the one above, but based on a 0.375% increment to the Hawaii General Excise Tax.

Contents of Files

All of the five files listed above have the same format. All are Excel workbooks, and each contains the same basic tables. In some instances tables are not populated. In particular if a given collection mechanism is not used, no funds appear in the table of totals for that mechanism, and some summary tables are blank, as they do not apply to that form of fund

collection. All tables, however, are present in each workbook. The details in each of the worksheet tables are sketched in the sections to follow.

Out_Fund

The Funds Table is the main outcome report of the actuarial computation. It sets out the estimates of the monies that need to be paid out to beneficiaries each year, and the source and amount collected. Three modes of collection are given in the table: Premiums Payroll Taxes, or GET Taxes. In these analyses only one collection mechanism is used at a time; the other two columns will be filled with zeros. Interest is computed using the rates established in the table of economic parameters, and operating expenses are tallied as a fixed percentage of premiums and benefits and is planned to be slightly more than the required operating costs of the program. The total money outgo is subtracted from the total money inflow and reported as an increase in fund.

The fund balance at the end of the year is accumulated. As a measure of actuarial soundness, the fund ratio—the fund balance at end of the year divided by the anticipated payout the next year is reported. All of the discussions in the Report text test whether the fund ratio for all future years over a 75 year time horizon are acceptably positive. That is, does the fund ratio every year show that there are three or more times next year's payouts in the fund. An additional monitor on the funds ratio is whether it is positive and increasing in the last years of computation. (A fund ratio which is decreasing at the end of the planning period is an indicator of potential insolvency in the long run.)

To the right of the fund table, on the same page, is a plot of the money coming into the fund and the money expended by the fund over a wide range of years, generally 2017 through 2088. This is a quick illustration of the viability of the fund: We do not want to see the lines cross—we do not want to see the outgo line above the income line at any point in time.

Fund_Charts

Two fund charts are reported separately for convenience, the fund balance and the fund ratio. The fund balance is just that—the amount of money in the fund each year, scaled in millions of dollars. We are generally interested in the first few decades, to see that fund assets are sufficient for expenditures. The last decade or two typically shows rapid acceleration of fund balances. This is a kind of artifact of the compound interest rule applied to fund reserves—over many years the funds collected can grow substantially. This picture makes no adjustment for events such as changes in interest rates that might affect the fund in the out-years. The rule of thumb is "never downward sloping."

The fund ratio chart plots the measure of security in the fund ratio. Ideally it should be in the range of 300% to 500% or 600%. When the fund ratio is less than 300% this indicates a fragile fund which will withstand changes in the economic environment only with difficulty. When the

ratio is substantially over 600% or so, it suggests that balances may be too high. Adjustment of income or expenditures must be undertaken with great caution. The "windfall" this year may easily become a "cellar" next year. One notable feature of all the fund ratio plots is in fact an artifact. In the years from 1 to 5 of fund operation, in these analyses, no benefit payments are planned. This is not so much from a need to build the fund, but from the need to make sure the payment mechanisms are in fact working. The five year window may be in fact too large—it could be possible to begin benefit payments in three years, assuming the payment system development were well controlled. Management of this issue is a matter for the Fund Trustees. In any event, the fund ratio in years 1 through 5 is exceptionally high because very little is paid out. Conversely, in the first year of benefit payments, we should anticipate that persons who qualified for benefits in the pre-payout period would be active applicants and be paid benefits, drawing down fund balances. The situation becomes more regular a year or so after benefit payments begin.

OUT_CostRates

This is a technical actuarial table that is only written for premium and income tax scenarios. It develops a concept called the "actuarial balance." This represents the net present value of the fund at the end of the projection period (given in the top, bolded row). The transactions of each year are given in order, and then discounted to get the present values in the top row. These are important because the time paths of payments and income may vary, and it is critical that when the whole time has run that the present value of income is larger than that of costs, that there is an "actuarial balance" giving the net present value after subtracting costs from income.

We should note that the OUT_CostRate table is written differently for each collection source. For the premium based collections, all values are displayed as per capita money values. The income and outgo amounts for each year are divided by the premium payers in that year to produce per beneficiary amounts. The income tax rate based collection source is written in the percentage values of the tax base, so numbers are much smaller. All income and outgo amounts are divided by the working population tax base which leads to per beneficiary cost as a percentage of the base. In either case, the actuarial balance is long-run solvent as long as the present value number is positive.

The table also spells out the costs that are generated from the two underlying disability populations with appropriate recorded probabilities of meeting the program disability trigger (2 ADLs, or cognitive impairment). Since this is the first mention of Home Care or Nursing Home (Facility) Care in the tables, it is important to point out how these values are generated. The disability data for older Americans is derived from CMS (Center for Medicare and Medicaid Services) benefit payment data, and from broad national surveys, such as the National Nursing Home Survey and other assessments of elder disability that are administered by branches of the federal government.

In these studies we can compute the disability rates or likelihoods for populations of each age group—for those in nursing homes. For those receiving home care, we can compute the rates for each age group. As a point of fact, one cannot be both in a facility and receiving home care at the same time, so treating both of these sources of disability will provide an estimate of total disability. But the rates that apply to each age group are different across the facility and home care populations. So for consistency, we generate an expected cost for people of each age group who have the 2ADL trigger –from facility data. Then we do the same for people from the records of home care data. The total cost in each year is thus the sum of costs estimated from the facilities population and the home care population who met the trigger level for benefits of 2 ADLs or cognitive impairment.

Thus, we do not expect people to be frequently in facilities when the program is operation—we merely count the estimated numbers of beneficiaries from each data source to get probabilities for each age group. We then apply these to the population over time and compute the benefits that are expected for the population each year. Where the individual person is receiving care in any year is not material—we merely need good numbers to start, and therefor use two different streams of population data.

OUT_CostRatios

Cost Ratios are written only for income tax models (Described in the table heading as payroll tax, but administered as a rate adjustment to the overall income tax on the final tax return.). It picks up the number of taxpayers exceeding an income floor—that is, those who are in fact "working." Replacement ratio and dependency ratios[1] are technical factors relating to the ability of the fund to cover its costs from the tax income, and the fraction of the contributing population who depend on the fund for benefits in any given year.

In this context, the "replacement ratio" is the average benefit paid divided by the average income received per workforce contributor. This represents the rate at which benefit dollars are being paid relative to income dollars being received. This metric does not take into account interest or administrative payments. A ratio below 100% shows that income is being received at a faster rate than benefits are being paid out.

[1] In economics, geography and demography the **dependency ratio** is an age-population ratio of those typically not in the labor force (the *dependent* part) and those typically in the labor force (the *productive* part). It is used to measure the pressure on productive population. In published international statistics, the dependent part usually includes those under the age of 15 and over the age of 64.The productive part makes up the population in between, ages 15 – 64. It is normally expressed as a percentage:

$$(Total)\ Dependency\ ratio = \frac{(number\ of\ people\ aged\ 0-14\ and\ those\ aged\ 65\ and\ over)}{number\ of\ people\ aged\ 15-64} \times 100$$

As the ratio increases there may be an increased burden on the productive part of the population to maintain the upbringing and pensions of the economically dependent. This results in direct impacts on financial expenditures on things like social security, as well as many indirect consequences. http://en.wikipedia.org/wiki/Dependency_ratio, referenced on 18 December, 2014.

The “dependency ratio” is a measure of the number of beneficiaries per workforce contributor. This figure helps give a feel for the size of the population drawing benefits relative to the contributing population.

OUT_Income

This table separates out the sources of income, first from domestic payers and then from non-domestic payers (e.g., foreign persons paying tax in Hawaii). Then it separates the three source of possible payments, premiums, income tax surcharge, or GET surcharge. If a program were to be funded in part from one of these sources, and in part from another, this table would be the point at which those cash flows are consolidated. Another important feature of the table is the separation of the whole population into the part that is of premium paying age, and then the actual number of premium payers.

The table brings together in one place the relevant tax base for each of the programs, for example the taxable income for the income-tax surcharge and the GET base for the GET surcharge. The examples in the income tax-based programs account for those working enough hours to have a regular paycheck. (Most people under the age of 25 often have limited or spotty income, and so do not present a stable income stream for a long-term program. As young people get older, job and income stability generally increases.

OUT_NHBenefits – Nursing Home Benefits

This table shows the result of generating a benefit based on the trigger of 2 ADLs or cognitive deficit from the population now in nursing homes. The 2ADL disability level is projected forward for men and women separately. The number of days of service per year is estimated (These estimates are a bit small because they include fractional years—a person starting service on October 1 and continuing for 12 months without break would have 3 months in year 1 and 9 months in year two. The average days for each year would be lower because of this split, but all the days of service would have been accounted for. The final columns of the table sum the estimated expenses for men and women to get a population estimate for each year and display the nursing home maximum daily benefit for the corresponding year.

OUT_HCBenefits – Home Care Benefits

This table mimics the OUT_Nursing Home table. It estimates the number of men and women in each year, applies the expected payment, and sums the expenditure of men and women each year. Again, the designation of “Home Care” refers to the source of the estimate of disability. Total expenditures, of course must be summed over both sources of initial data. The final column in the table is a bookkeeping column tracking the value of the stipulated daily benefit in the corresponding year. This may differ from the average benefit paid because some beneficiaries will have had less than 10 years of vesting, and so will receive a smaller benefit. This implies that a person new to the state, with only 6 years of residence who then claims

benefits, will be claiming 60% of the then current face value. As a result the mean daily benefit reported in column D will be lower than the stipulated daily benefit.

OUT_Detailed Demographics

This table estimates the population and its relationship to the group of insured and those not insured for each program. There will be some differences across programs, but the general sense for the income-tax based program is as follows.

Each segment of the table begins with the population estimate by age for years 1 through 100. We generally do not plan benefits for those not yet in the labor force, as we cannot enroll them in an income tax program. As we move up in age, at age 25 (or thereabouts when people have more or less stable incomes), we begin collection of contributions. The contributors are initially about 2/3rds of the population in each age group. The percentage of insureds tracks the number of contributors and applies the vesting procedures—in the first year a contributor is eligible for 1/10 of the face value benefit, in the second year 2/10, and so forth. By the time the 25-year-old reaches the age of 35, 97% of the contributors will be fully insured.

In a similar fashion, the estimated claims are posted each year, starting with a small handful in the first year and growing only with age. If we look a few years forward, perhaps 2031, we see that the part of the population still contributing at ages 75 and over shrinks rapidly from mortality and beneficiaries ages 75 and above is a modest 15,000. Taken against those remaining alive in each age, the fraction of the age group in beneficiary status approaches 15% for each of the years of the last decade tabulated.

OUT_Population

This table generates the age distributions of the population by decades. It allows for tallies of men and women in each five year age group. The table computes the age dependency ratio, and adjust populations for net migration, births and deaths.

PolicyAssumptions - Parameter Table

This table sets the main parameters for every execution of the actuarial model. It is divided into five parts.

I. Sets the name of the run and embeds it in the individual worksheets as they are calculated.

II. Establishes who is covered, starting at what age, including spouses, when benefit start and all of the other major program options.

III. Establishes the benefit options—what level of disability is required, whether cognitive problems constitute a qualification, whether there is a medical

necessity requirement. (This latter option is a remnant of old private sector LTCI policy planning, in which benefits were restricted to those with a medical necessity. This option is not used in any of the analyses in this report.) Section III also establishes the rate at which benefits might be used at various levels of disability, with relatively few days of benefit required for low ADL counts and more for higher ADL counts or cognitive deficits.

IV. This option sets the expense budgets as a percentage of income or expenditures. The actual expenses are a responsibility of the Trustees, but it is essential to plan for an expense budget sufficient to operate the program.

V. Yearly parameters. There are three important parts to this segment of the worksheet. The first row sets the inflation rate for fixed premium programs and for benefits estimated from the HC and NH disability incidence data. (These are 5% inflation, and 3.1% each adjustments to the benefits attributed to the disabilities estimated from NH and from HC data.) The second part consists of three bold-faced numbers, either a one or a zero. A one in the first column is used to establish income tax computations, a one in the second column to do premium calculations, and a one in the third column to compute income based on the Hawaii GET. The first data column of the table below sets the addition to the income tax rate, which is generally left fixed, but could be adjusted over time. The second column sets the initial premium for a premium based program and inflates it year-by-year.[2] The third and fourth columns give the maximum daily benefit for estimates coming from the NH and HC populations. The fifth column sets any required fund ratio, should additional security be required. The sixth and final column give the general excise tax surcharge. It is also commonly set once and left fixed, but it could be altered at any future year and the funding pattern re-estimated.

EconomicAssumptions

The economic assumptions specifications set up the expected operating characteristics of the economy. These are generally set once over the life of a project. In this case, interest assumptions issued by the Social Security Actuary were changed, so the table was reformulated in November, 2014. It provides for estimates of average annual fund earnings, the CPI, a set of alternative real growth assumptions from Social Security and expectations of the annual increase in wages. The labor force participation rate for man and women is used to estimate

[2] The proposed indexing of 3.1% per year is established as a prerogative and responsibility of the Trust Fund Trustees. There are serious studies of the risk of tying the benefit amounts to legislative process, as the history of the Social Security System indicates: there may be few effective rules that binds lawmakers to collecting money before they pay it out. See http://www.socialsecurity.gov/history/notchfile1.html.

the workforce. The final column presents the expected increase in productivity with respect to a base level.

The column that draws most attention in the short run is the average annual interest rate, since it determines the expected yield on trust fund assets. Two alternatives come into play here. The first is to use the rates estimated by the Office of the Actuary of the Social Security Administration. That is the procedure used in this report. An alternative would be to pick some other sequence of interest rates. While we could easily say in 2014 that the current interest rate on high grade bonds is in the neighborhood of 2.8% and that we expect it to increase slowly, we have no well defended model of how this will happen—thus picking our favorite rate tends to be arbitrary. Using a rate established by a major national institution provides a more plausible bases for estimates long into the future. [3] Moreover in the event the SSA Actuary anticipates changes down the line, that office can issue (and has issued) a new set of long-term interest estimates.

DemographicAssumptions

This table sets out changes in the underlying demography of the state. It accounts for fertility, migration, mortality improvement and the like.

IN_Wages

This table establishes the long-run pattern of wages, income covered by Social Security taxes, and taxable income for each year in the planning horizon. The final column is a quick calculation of the annual growth in wages.

[3] A clear set of national rates for planning purposes is given by the Social Security Administration Report, http://www.ssa.gov/oact/tr/2012/2012_Long-Range_Economic_Assumptions.pdf.