Long-Term Services & Supports Feasibility Policy Note

Assessing the Costs and Benefits of a Long-Term Care Insurance Program in Hawai'i

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In the first policy note of this series, evidence was presented that an increase of Hawai'i's General Excise Tax of 0.5% would not have a significant impact on the economy. Some might be skeptical of such a rosy outlook, however. This policy note presents a more conservative estimate of how the state's economy would be affected by such a tax, using an input-output model to look at how a 0.5% surcharge on the GET will impact the state's Gross Domestic Product (GDP), earnings, state tax, output, and jobs. To complement this analysis, the boost to the economy when the tax revenue is distributed as benefits for Long-Term Care Services and Supports is also estimated. The costs are compared to the benefits to determine the overall impact SB 727 will have on the economy.

1. Modelling Hawai'i's Economy

To perform a cost-benefit analysis, a model of how individuals and firms interact in the economy must first be developed. This, along with some baseline assumptions on how individuals and firms react to a policy change, provide pieces to answer what costs and benefits a policy has for the economy. For this exercise, an input-output model of Hawai'i is used, while the following assumptions are made: (1) decisions made by locals (including local firms), such as consumption and investment, respond to this tax one-for-one; (2) visitors adjust their spending in response to this tax, but at a less elastic rate; and (3) nursing home benefit payments are all spent in the nursing and residential care facility industry, home care benefit payments are spent in the social assistance industry, and the administrative expenses are spent in the state and local government industry.

1.1. What is an Input-Output Model?

An input-output model is a representation of the economy's interactions, a model that captures the transactions among producers, consumers (including the government and exports to foreign

[1] We owe an enormous debt of gratitude to PingSun Leung, who helped with the income-output tables and editing the note

consumers), and resource owners for goods and services. An accounting of the sales and purchases of goods and services is summarized in an input-output table. A standard input-output table consists of three major components – inter-industry transactions, final demand, and value added. Inter-industry transactions are the intermediate transactions required to produce final goods, when one industry purchases another industry's goods or services during its production process, e.g. a car-maker buying steel. Final demand is the purchase of finished goods and services by consumers such as households, governments, visitors, and investors, e.g. your neighbor buying a new car. Note that a rental car agency purchasing a new car to add to its fleet falls under inter-industry transactions, since the rental car agency is not the final user of the car; the new car is an intermediate good used to "produce" rental cars. During the production of these final goods, there are transactions beyond the sale and purchase of intermediate goods and services; labor, land, and capital need to be compensated, while tax and interest payments need to be made. This falls under the value added component, and can be thought of as payments to the owners of factors production.

From these transactions among industries, final users (consumers), and owners of factors production, the input-output table can be mathematically manipulated to create multipliers that are used to determine how a change in (final) demand affects the rest of the economy, in terms of output, value added, income, taxes, and jobs. These multipliers take into account the direct and indirect effect of the changes in demand, such as the increased demand for goods from other industries due to inter-industry use of intermediate goods. More detail on how these multipliers are calculated, as well as how the input-output tables are created, can be found from a 2007 input-output study for the state, published by the Research and Economic Analysis Division of the State of Hawai'i's Department of Business Economic Development, and Tourism[2].

1.2. Assumptions on Spending Reactions and Benefit Allocations

Some assumptions need to be made when determining how demand will change after implementation of the tax and after benefits are distributed. In particular, assumptions on how producers and consumers react to the tax and what industries are affected by the distribution of benefits need to be made. The reason(s) for each of the three assumptions made in this analysis will be explained as best as possible in this subsection.

First, it is assumed that decisions made by locals (including local firms), such as consumption and investment, respond to this tax one-for-one; in other words, local consumption and investment have an elasticity of 1[3]. The first policy note found evidence that an elasticity of close to 0 is very likely for a

[2] "The Hawai'i State Input-Output Study: 2007 Benchmark Report", http://files.hawaii.gov/dbedt/economic/reports/IO/2007_state_io_study.pdf

[3] Mian, Rao, and Sufi (QJE 2013) use the variation in wealth losses during the 2006-9 housing collapse and find an elasticity of 0.6 to 0.8 with respect to household wealth; Andreyeva, Long, and Brownel (American Journal of Public Health 2010) find elasticities between 0.27 to 0.81 for foods and nonalcoholic beverages; Anderson, McLellan, Overton, and Wolfram (1997) compile elasticities from various publications, and find elasticities of restaurant meals, foreign and airline travel, automobiles, and fresh fruits and vegetables to have elasticities significantly greater than 1. If we consider the surcharge as analogous to an income shock, both Steindel (Current Issues in Economics and Finance 2001) and Watanabe, Watanabe, and Watanabe (Journal of International Economics 2001) find income tax changes are have less than a one-to-one effect on income.

surcharge of 0.5% (that spending did not change), but some might find this unrealistic. The logic behind using an elasticity of 1 is as follows: almost all purchases made by final consumers will be taxed an additional 0.5% either explicitly from the seller, or indirectly via adjustments made by sellers to pay for the surcharge on their gross income and gross proceeds), and since income will not increase, individuals will have to decrease their consumption by 0.5% to offset this increase in prices. One important note is that this adjustment is made only for consumers; it is assumed that inter-industry demand itself is not affected by an increase in prices. This intermediate assumption is made because there is no surcharge on the gross income and gross proceeds from manufacturing, producing, wholesaling, and intermediate services transactions. Thus, changes in demand are focused on changes in consumers' demand of final goods.

Second, it is assumed visitors also adjust their spending in response to this tax, but at a less elastic rate. Is this a reasonable assumption? It makes sense that visitors' purchasing power is minimally affected by an increase of 0.5% in prices: very little of their yearly purchases are affected by this increase, and they will probably not change their purchasing decisions when they are visiting Hawai‘i. With this in mind, the elasticity is set at above 0 for two reasons: first, this is an attempt to come up with conservative estimates, so it would be best to be less optimistic about visitors' spending decisions; second, some visitors might see marginal changes in the cost of visiting Hawai‘i (e.g., in hotel room costs or airfare costs), and choose to not vacation in Hawai‘i with the slight increase in prices. The initial assumption on visitor expenditure elasticity is 0.1, but analyses with higher elasticities, even up to an elasticity of 1, still show benefits being modestly higher than costs.

The third assumption is an assumption as to how benefits are distributed: nursing home benefit payments are all spent in the nursing and residential care facility industry, home care benefit payments are spent in the social assistance industry, and the administrative expenses are spent in the state and local government industry. The first part of this assumption (nursing home benefit payments) is rather straightforward. The second and third parts of this assumption (home care benefit payments and administrative expenses) are a little more contentious. Home care benefits could go towards the nursing and residential care industry, but this is against the philosophy of this portion of the benefits. The other two industries that are closely related to home care are "social assistance" and "personal and laundry service". Multipliers for the latter are generally higher than for the former, so in the vein of being more conservative estimates, "social assistance" is used. Administrative costs could fall into two different industry definitions: "administrative and support services" or "state and local government". As the administrators will be state and local workers, and since the "state and local government" category will result in more conservative estimates (the multipliers are significantly lower than for the "administrative and support services" category), administrative expenses are considered to increase demand for "state and local government" outputs.

1.3. Data Sources

The regional input-output table comes from the State of Hawai‘i's Department of Business, Economic Development, and Tourism. The estimates on taxes received, and the estimates on the distribution of benefits come from Nitz, Tian, and Leung's *Long Term Care Financing Economic Impact Calculator* (2015).

2. The Cost-Benefit Analysis of SB 727

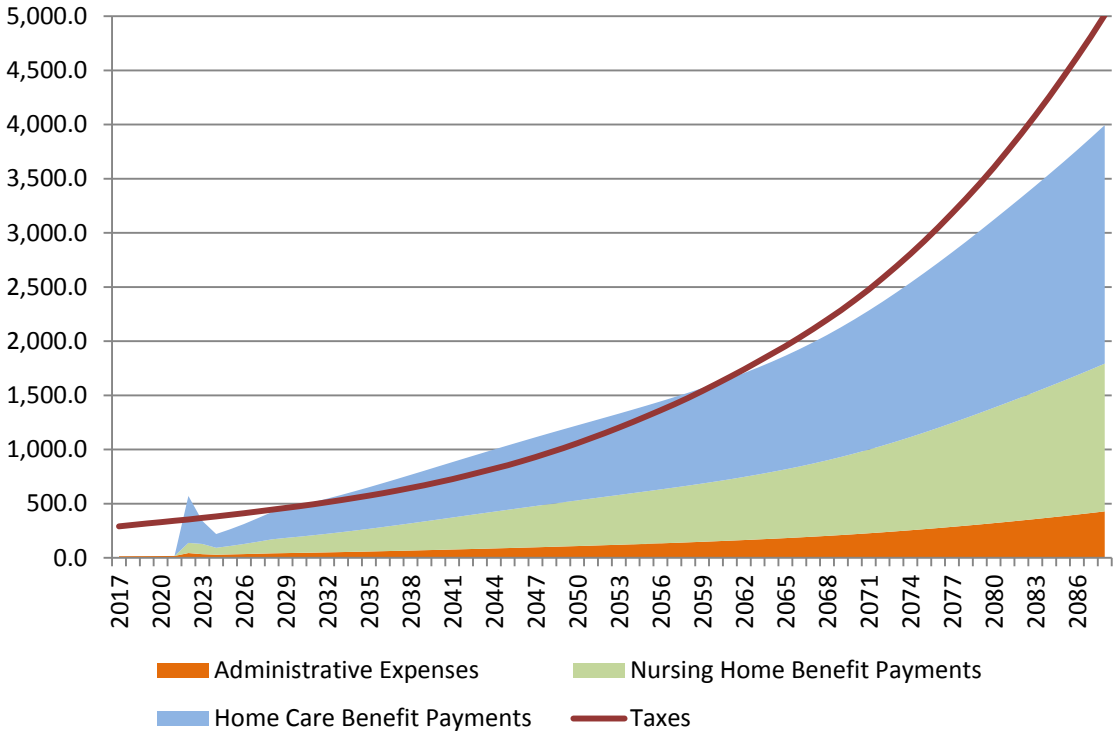
There are a couple of important factors when accounting for these estimates. First, there are two types of input-output multipliers. One multiplier (Type I) looks solely at the direct and indirect impacts of a change in demand. The second multiplier (Type II) takes into consideration how employees within the industries might change their demand for goods as consumers; this additional "induced" impact results in a larger multiplier, and larger impacts on both costs and benefits. Both are provided for the sake of completeness. Second, any forecasting becomes less and less reliable the further into the future one forecasts; the interaction between industries will change, so the multipliers will be different. Cost-benefit estimates far into the future should be taken with a grain of salt.

Figure 1 shows the projections for taxes collected and benefits distributed, respectively. The actuarial model that made these projections estimates the benefit distributions based on expected disability levels and expected length of care, with some assumptions on demography (fertility rates, migration, mortality rates, etc.) and inflation. It then takes some assumptions about the interest rate and growth of the state GDP and tests for solvency over the next 75 years, according to the projections of benefit distributions. In a particular year, the ratio of fund balances to expected payout must meet the actuary's rule of thumb for solvency. The trust fund is carried forward, and the model allows for there to be a surplus or a deficit in a particular year, as long as the (carried forward) fund-to-payout ratio meets the rule of thumb for solvency (notice in figure 1 that the tax line falls below the total benefits in some years, but only after the fund has had time to accumulate). For more details on how these projections are made, refer to the Hawai'i Long-Term Services and Supports Feasibility Study: Guide to Actuarial Model Output Files[4].

These projections do not really reflect the impact of either taxes or benefits on the economy; the taxes collected and the benefits distributed need to go through the input-output model to capture how different economic variables are affected, especially since the tax is across the entire economy while the benefits are focused on a narrow segment. For this policy note, value added, earnings, state tax, output, and the number of jobs lost/created are examined. Value added is the difference between a sector's total output and the costs of its intermediate inputs, while output considers the value of the final products. Value added is analogous to GDP, and is generally considered a better estimate of impact on the economy than output.

[4] https://www.hawaiiadrc.org/Portals/_AgencySite/LTSS/Workbook_t.pdf

Figure 1. Tax and Benefit Payment Forecasts



In figure 2, the costs of the surcharge and the benefits to the distribution of services are presented for value added, earnings, state tax, and output using the Type I multiplier (direct and indirect impacts). Benefits for the first few years are rather low, as there are no major benefits in the form of nursing home benefit payouts or home care benefit payments. Any boosts to the economy pre-2022 are in the form of hiring administrators to maintain the program. Administrative costs never exceed $20 million in the first few years, compared to the $300-350 million in tax receipts. Note that these administrative costs are coming from the surcharge, and do not count as additional costs to the economy – of the $300-350 million collected in taxes, most of that is going towards funding for the benefit payments, while less than $20 million is going back into the economy right away, via hiring people to administer the program. There is an initial spike of benefits in 2022 as the program comes online, before returning to a more typical distribution of benefit payments. Figure 3 shows the same cost/benefit comparison for value added, earnings, state tax, and output, but using the Type II multiplier (direct, indirect, and induced impacts). For the Type II multiplier, the induced impacts results in both higher costs and higher benefits.

Figure 2. Type I Cost-Benefit Comparison

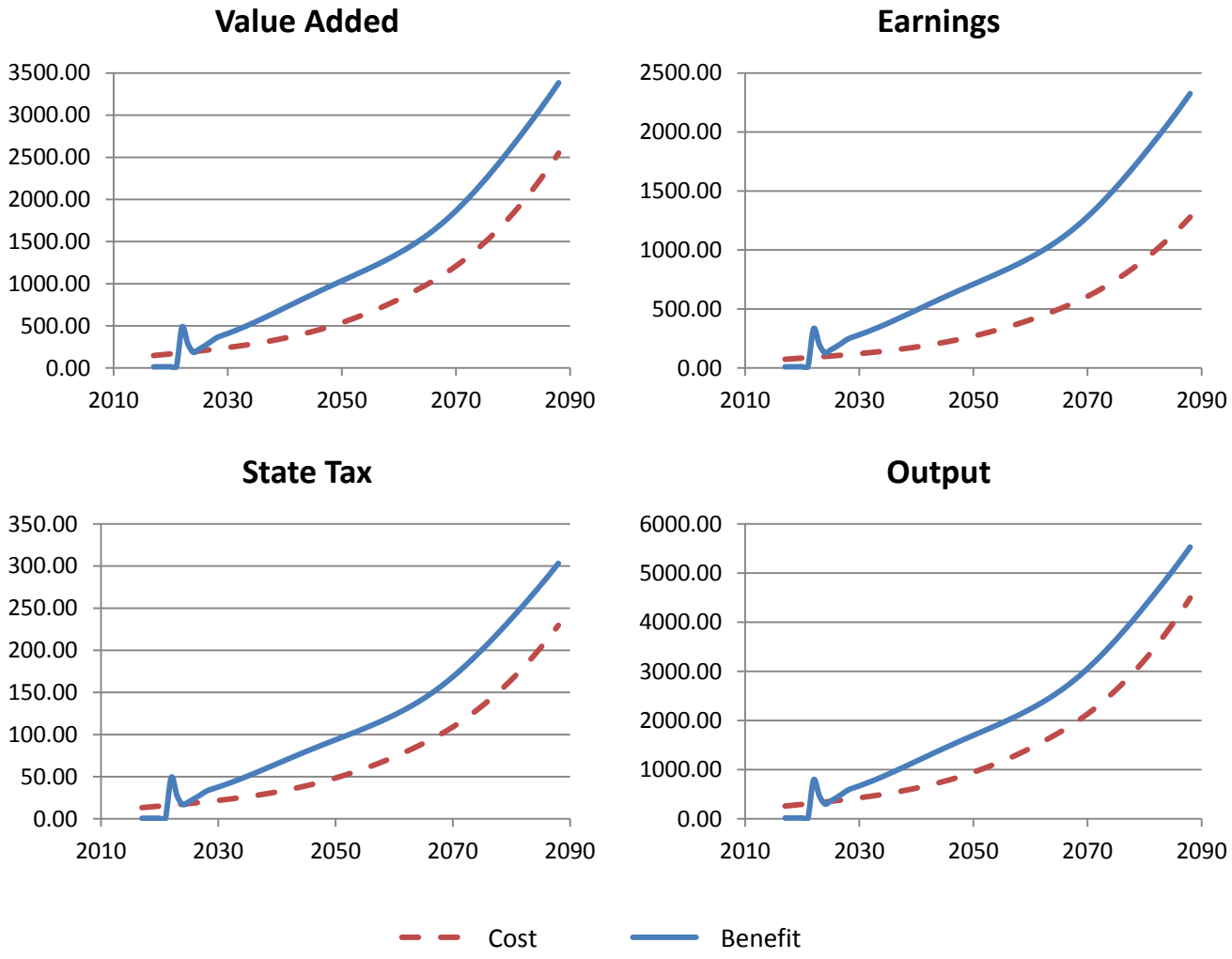


Figure 3. Type II Cost-Benefit Comparison

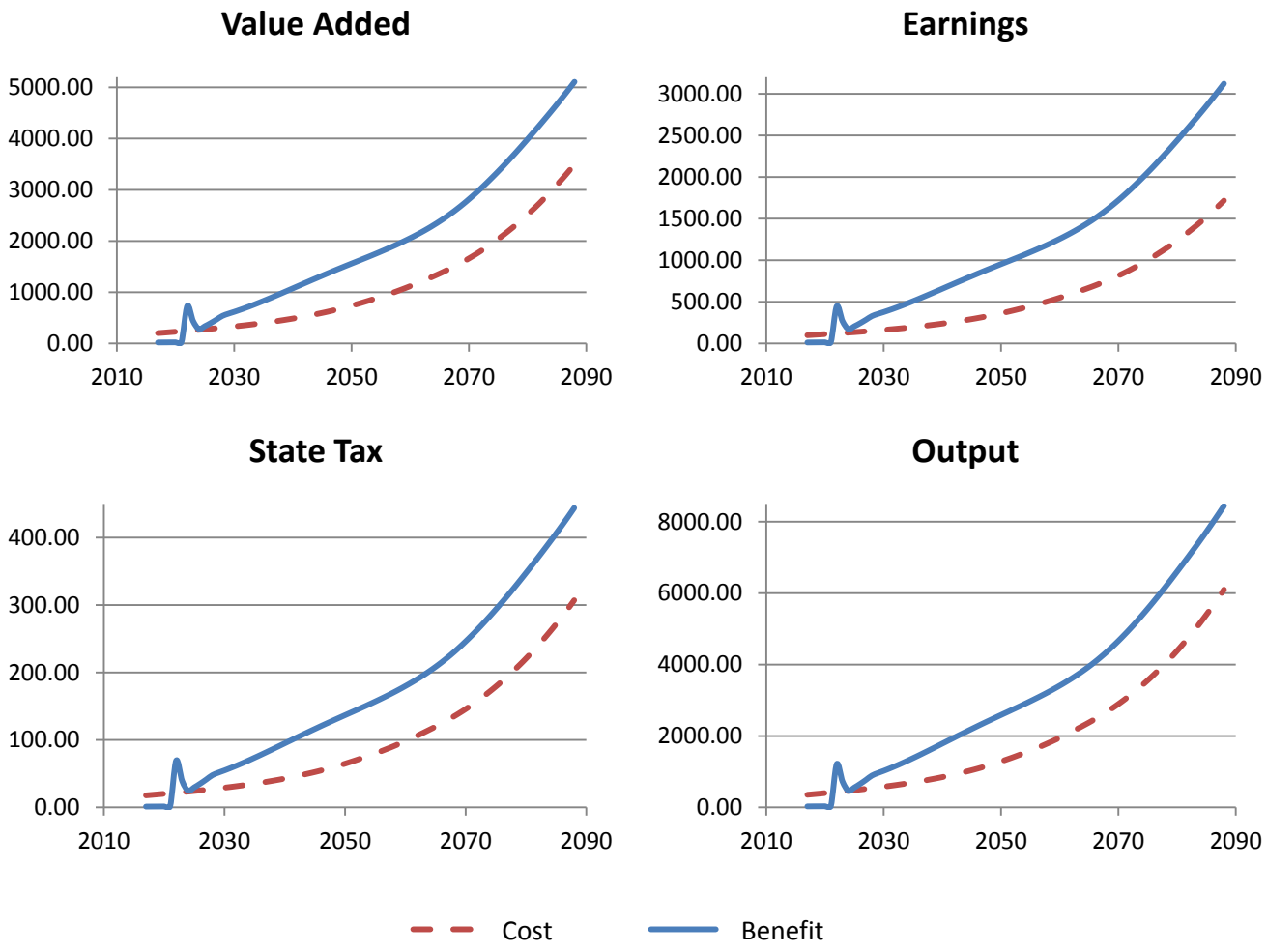


Figure 4 and 5 present the net cost/benefits from the tax surcharge and benefit payments. After 2025, the net benefit grows quite comfortably. To put these net benefits into context:

- GDP[5] was $77,389 million in 2014,
- total personal disposable income[6] was $65,861 million 2014,
- state tax[7] was $6,033 million in 2013, and
- output[8] was $105,851 million in 2007.

[5] 2014 State of Hawai'i Data Book, Table 13.05, http://files.hawaii.gov/dbedt/economic/databook/db2014/section13.pdf
[6] 2014 State of Hawai'i Data Book, Table 13.07, http://files.hawaii.gov/dbedt/economic/databook/db2014/section13.pdf
[7] 2014 State of Hawai'i Data Book, Table 9.01, http://files.hawaii.gov/dbedt/economic/databook/db2014/section09.pdf
[8] The Hawai'i State Input-Output Study: 2007 Benchmark Report. Research and Economic Analysis Division of the Department of Business, Economic Development, and Tourism.
http://files.hawaii.gov/dbedt/economic/reports/IO/2007_state_io_study.pdf

With Type I multipliers, the initial net benefits from the program distributing nursing home and home care benefit payments in 2022 represent a boost in GDP of 0.4%, in earnings of 0.35%, in state tax of 0.5%, and in output of 0.45%. With Type II multipliers, GDP is boosted by 0.6%, earnings by 0.5%, state tax by 0.8%, and output by 0.7%. These four economic indicators grow by no less than 7% a year for the first ten years of benefit payments after the initial spike in benefits. Since 2000, the U.S.'s real GDP annual growth rate[9] has not exceeded 4.1%; the growth rate for GDP, earnings, state tax, and output do not drop below this growth rate until around 2045.

Figure 4. Type I Net Benefits

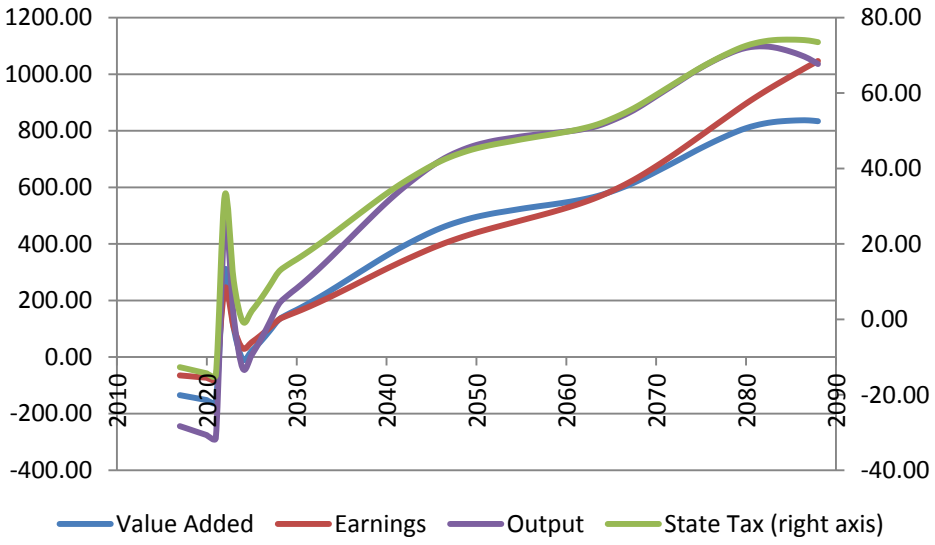
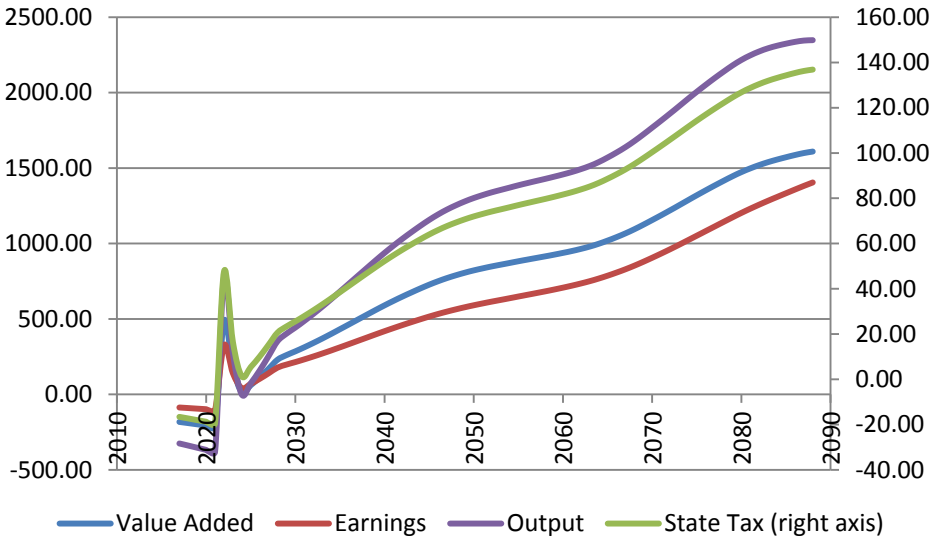


Figure 5. Type II Net Benefits

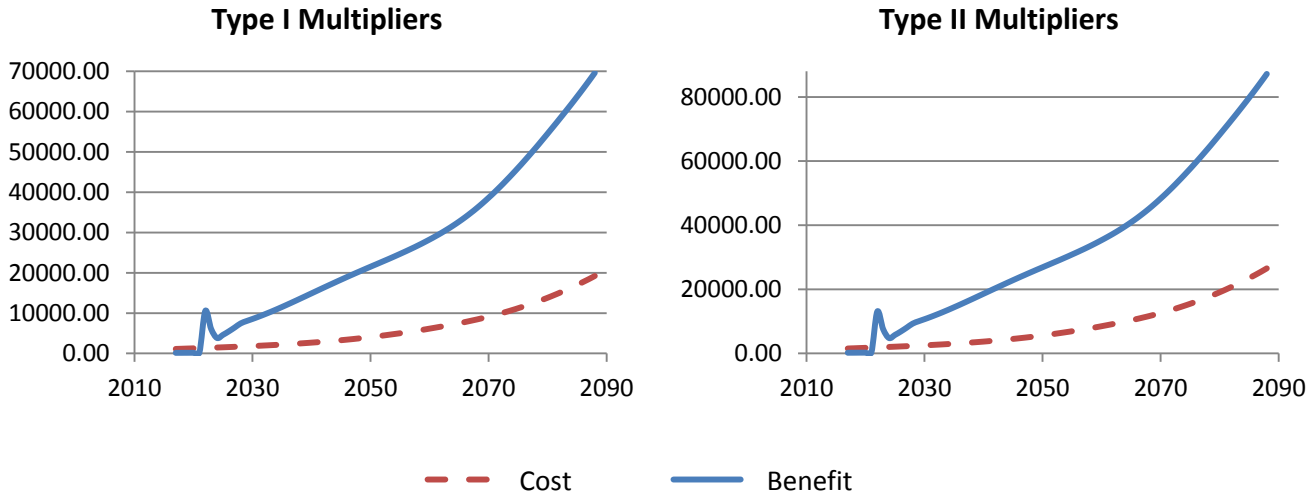


[9] Data from the World Bank: http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG

Thus far, jobs lost from the tax surcharge and jobs created from the benefit payments haven't been looked at. This is due to the number of jobs created from the benefit payments likely being very optimistic. Input-output models are limited in that they do not account for changes in price. Unchanging prices are not a significant issue when changes are small or when changes are spread over the entire economy. Injecting billions of dollars into one narrow industry, however, and prices for that industry, particularly wages, will probably change. An increase in wages does little to affect value added, earnings, state taxes, and output. When there is $20 to spend on hiring people, $10 to two people will affect certain aspects of the economy similarly to $20 for one person – there is still $20 being earned and taxed, and $20 will find its way into the economy through consumption. However, instead of two jobs created, only one job is being provided when wage doubles. The amount of benefit payments going into nursing homes and home care will probably affect the wages paid to workers in these industries.

Figure 6 contains the number of jobs lost from the surcharge to fund the program and the number of jobs created by the program from distribution of benefits using both Type I and Type II multipliers. Though optimistic, even if wages triple and the number of jobs created is a third of what is projected, the number of jobs created exceeds the number of jobs lost from higher taxes. To put these projections into context, there were 1,120,000 people over 16 years of age in 2012, with 698,000 people working civilian jobs and 37,500 in the armed force[10].

Figure 6. Cost-Benefit Comparison: Jobs



[10] 2013 State of Hawai'i Data Book, Table 12.01: http://files.hawaii.gov/dbedt/economic/databook/2013-individual/12/120113.pdf

3. Conclusion

This policy paper has provided evidence that a Long-Term Care Insurance Program is beneficial to the state's economy. Using a regional input-output model and the projected taxes collected and benefits distributed, this paper has shown that the GDP, earnings, state tax, output, and job loss from a surcharge to fund the program is very small compared to the benefits from nursing home and home care benefit payments. Even the most conservative estimates of the net benefits to a Long-Term Care Insurance Program demonstrate an increase of no less than 0.35% to GDP, earnings, state tax, and output. Further, with net benefits growing at a high rate for the first 30 years or so of the program, expectations are that the program will continue to make significant contributions to GDP, earnings, state tax, and output over the next few decades. The amount of jobs created via the input-output model look to be overly optimistic, yet even imposing very pessimistic adjustments to the results lead to a net increase to jobs. Though there are normative arguments that can be made about a Long-Term Care Insurance Program, the positive analysis is clear: such a program will have a significant, positive impact on Hawai‘i's economy.

Truncated Table for Figure 1

YEAR	Taxes collected (millions)	NH Benefit Payments (millions)	HC Benefit Payments (millions)	Admin Expenses (millions)
2017	291.00	0.0	0.0	14.5
2022	354.68	93.6	433.2	44.1
2027	427.62	110.6	217.6	37.8
2032	513.10	171.6	324.4	50.5
2037	619.95	236.9	426.0	64.1
2042	757.29	309.8	532.3	80.0
2047	930.07	381.1	634.5	97.3
2052	1,152.12	447.0	731.1	116.5
2057	1,417.78	510.7	834.5	138.1
2062	1,737.86	582.4	958.3	163.9
2067	2,112.46	675.1	1,118.8	195.3
2072	2,581.60	800.1	1,328.9	235.5
2077	3,179.42	959.1	1,574.9	285.7
2082	3,916.81	1,137.0	1,846.0	345.0
2087	4,810.67	1,324.6	2,138.9	413.7

Truncated Table for Figure 6

	Type I		Type II	
YEAR	**Lost**	**Created**	**Lost**	**Created**
2017	1540.70	217.85	1540.697	217.8503
2022	1877.87	13043.99	1877.868	13043.99
2027	2264.05	8060.43	2264.054	8060.429
2032	2716.62	12065.37	2716.618	12065.37
2037	3282.32	16043.75	3282.318	16043.75
2042	4009.47	20320.83	4009.466	20320.83
2047	4924.26	24489.89	4924.263	24489.89
2052	6099.93	28441.97	6099.925	28441.97
2057	7506.47	32550.72	7506.466	32550.72
2062	9201.14	37379.13	9201.137	37379.13
2067	11184.48	43602.49	11184.48	43602.49
2072	13668.32	51805.97	13668.32	51805.97
2077	16833.52	61713.90	16833.52	61713.9
2082	20737.62	72745.79	20737.62	72745.79
2087	25470.18	84641.22	25470.18	84641.22

Truncated Table for Figure 2 & 4

	TYPE 1 Cost				TYPE 1 Benefit				TYPE 1 NET			
YEAR	**VA (GDP)**	**Earnings**	**State Tax**	**Output**	**VA (GDP)**	**Earnings**	**State Tax**	**Output**	**VA (GDP)**	**Earnings**	**State Tax**	**Output**
2017	203.16	99.70	17.83	354.08	20.54	12.74	1.24	28.66	-182.62	-86.96	-16.60	-325.42
2022	247.62	121.52	21.74	431.57	732.66	446.77	69.30	1209.88	485.04	325.24	47.57	778.32
2027	298.55	146.51	26.21	520.32	468.47	286.16	41.46	773.98	169.92	139.65	15.25	253.66
2032	358.22	175.80	31.44	624.32	698.51	426.62	61.88	1156.81	340.29	250.82	30.44	532.48
2037	432.82	212.41	37.99	754.33	928.51	567.10	82.05	1539.51	495.69	354.69	44.06	785.18
2042	528.70	259.47	46.41	921.44	1176.96	718.88	103.66	1952.71	648.25	459.42	57.25	1031.27
2047	649.33	318.66	57.00	1131.68	1420.34	867.60	124.72	2356.78	771.01	548.93	67.73	1225.11
2052	804.36	394.75	70.60	1401.87	1652.51	1009.49	144.74	2741.05	848.15	614.75	74.14	1339.18
2057	989.83	485.77	86.88	1725.11	1894.06	1157.12	165.69	3139.82	904.22	671.36	78.80	1414.71
2067	1474.83	723.78	129.46	2570.38	2541.95	1553.05	222.21	4209.28	1067.12	829.26	92.75	1638.90
2072	1802.36	884.52	158.21	3141.21	3021.99	1846.37	264.08	5002.72	1219.63	961.85	105.87	1861.51
2077	2219.74	1089.35	194.84	3868.63	3604.17	2202.19	314.44	5965.06	1384.43	1112.84	119.59	2096.43
2082	2734.55	1342.00	240.03	4765.85	4254.69	2599.83	370.50	7039.13	1520.14	1257.83	130.47	2273.28
2087	3358.60	1648.26	294.81	5853.47	4958.35	3030.01	431.07	8198.84	1599.75	1381.75	136.26	2345.36

Truncated Table for Figure 3 & 5

	TYPE II Cost				TYPE II Benefit				TYPE II NET			
YEAR	**VA (GDP)**	**Earnings**	**State Tax**	**Output**	**VA (GDP)**	**Earnings**	**State Tax**	**Output**	**VA (GDP)**	**Earnings**	**State Tax**	**Output**
2017	203.16	99.70	17.83	354.08	20.54	12.74	1.24	28.66	-182.62	-86.96	-16.60	-325.42
2022	247.62	121.52	21.74	431.57	732.66	446.77	69.30	1209.88	485.04	325.24	47.57	778.32
2027	298.55	146.51	26.21	520.32	468.47	286.16	41.46	773.98	169.92	139.65	15.25	253.66
2032	358.22	175.80	31.44	624.32	698.51	426.62	61.88	1156.81	340.29	250.82	30.44	532.48
2037	432.82	212.41	37.99	754.33	928.51	567.10	82.05	1539.51	495.69	354.69	44.06	785.18
2042	528.70	259.47	46.41	921.44	1176.96	718.88	103.66	1952.71	648.25	459.42	57.25	1031.27
2047	649.33	318.66	57.00	1131.68	1420.34	867.60	124.72	2356.78	771.01	548.93	67.73	1225.11
2052	804.36	394.75	70.60	1401.87	1652.51	1009.49	144.74	2741.05	848.15	614.75	74.14	1339.18
2057	989.83	485.77	86.88	1725.11	1894.06	1157.12	165.69	3139.82	904.22	671.36	78.80	1414.71
2062	1213.30	595.43	106.50	2114.58	2177.59	1330.40	190.39	3607.53	964.29	734.96	83.89	1492.95
2067	1474.83	723.78	129.46	2570.38	2541.95	1553.05	222.21	4209.28	1067.12	829.26	92.75	1638.90
2072	1802.36	884.52	158.21	3141.21	3021.99	1846.37	264.08	5002.72	1219.63	961.85	105.87	1861.51
2077	2219.74	1089.35	194.84	3868.63	3604.17	2202.19	314.44	5965.06	1384.43	1112.84	119.59	2096.43
2082	2734.55	1342.00	240.03	4765.85	4254.69	2599.83	370.50	7039.13	1520.14	1257.83	130.47	2273.28
2087	3358.60	1648.26	294.81	5853.47	4958.35	3030.01	431.07	8198.84	1599.75	1381.75	136.26	2345.36