Hawaii's Generational Economy

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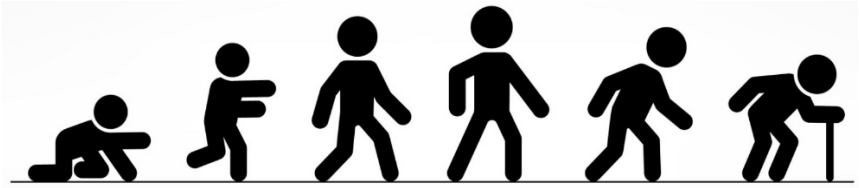
October 2020



Prepared for
Department of Business, Economic Development, and Tourism
State of Hawaii

Acknowledgements

The study of Hawaii's Generational Economy was conducted with the support of the East-West Center. We wish to acknowledge very useful comments provided by Yang-Seon Kim, Sang-Hyop Lee, Bahram Sanginabadi, Ronald Lee, Gretchen Donehower, Cullen Hayashida, and Barbara Yamashita.

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Overview

The goal of this study is to establish a framework for quantifying the generational economy at the state level, documenting how people at every age acquire and use resources to meet their own needs, to support others, and to provide for the future. A generational perspective is central to understanding our lives during childhood, prime adult ages and old age. High quality data is essential to assess whether our citizens are satisfying their own needs, meeting the needs of others, and preparing for the future.

The first years of life are foundational. The future of every generation depends critically on the resources available when young. Are resources sufficient to provide food, clothing, housing, health and education? Children are costly, as we shall see, but the burden of providing for them is shared. Children depend heavily on their parents, but also on their grandparents. Children also rely on resources provided by governments. State and local governments play a particularly critical role ensuring a basic education is available for all.

With the end of childhood and onset of adulthood, early economic roles end and new ones begin. Young people complete their schooling and begin to contribute in many ways. They enter the workforce and start earning a living. They have children and take on the financial responsibilities that come with being parents. Even if they do not choose to have children, they support the children of others by paying taxes that support public schools and other programs that benefit children.

Working age adults also play a critical role by providing resources needed to support old age. Some provide support, time and money, to their aging parents. As taxpayers, they provide the resources needed to fund important programs, such as Social Security and Medicare, which support current seniors. And working age adults save for the future allowing them to fund their own retirement when the time comes. They do this through employer sponsored retirements plans, through 401(k)s, by investing in a small business or a farm, and sometimes by buying and paying off the mortgage on a home.

The economic role of older adults is probably more poorly understood and documented than any other phase of life. The role of seniors as dependents is often emphasized in public discourse. However, the conventional notion that people retire at age 62 or age 65 ignores the fact that many seniors are more likely to work now than they did ten or twenty years ago. The importance of seniors in caring for their grandchildren is acknowledged but not truly understood. The same can be said of the importance of seniors in Civil Society, such as their contributions as volunteers. The role of seniors in supplying the wealth that funds investment and fuels economic growth is often overlooked. The results presented here begin to address these issues, and we hope to learn more in the future. This should provide a stronger basis for understanding how important changes in our society, whether COVID-19, climate change, or population aging, will influence Hawaii's residents at all stages of the life cycle.

In section II we will provide a comprehensive treatment of Hawaii's Generational Economy by explaining concepts and methods and defining key variables. Data sources are available from the authors. We present baseline estimates for Hawaii and combine these estimates with population data to project key

economic series. Drawing on these detailed estimates, we highlight some of the most important trends in Hawaii and critical issues that must be addressed with urgency as reported in Part I.

This study builds on National Transfer Accounts that have been applied to more than 70 countries world-wide but rarely at the sub-national level. A full description of the accounts can be found on the NTA website (www.ntaccounts.org) and Lee and Mason (2011) and United Nations Population Division (2013). The accounts for Hawaii make extensive use of the US National Transfer Accounts (Lee, Donehower and Miller 2011).

Part I. Population Aging and Hawaii's Economy

Both Hawaii and the United States will experience substantial population aging over the coming decades. Hawaii's elderly may face substantial challenges in meeting their needs. Federal programs, like Medicare and Social Security, will be difficult to sustain. State and County governments may find it increasingly difficult to help. The impact of seniors may rebound on younger generations who depend on seniors and provide care and support as family members and taxpayers. As the working-age population grows more slowly, economic growth may slow.

Although the situation may appear to be bleak, we need to understand the severity of coming changes and the steps that can be taken in response. Are there important ways the adverse impact of aging can be mitigated? And are there positive aspects of aging that will compensate for some of the challenges that lay ahead?

Demographic trends

Hawaii is experiencing two important demographic trends. The first is that our population, particularly our working-age population, is growing more slowly than in the past. The second is our population is aging. These changes are outcomes of the demographic transition. People are living longer and opting for smaller families than in the past. This has been occurring for many decades, although it was interrupted by the baby boom that lasted from 1946 to 1964. Because fertility has reached low levels and death rates have been declining, population growth has slowed and our population has aged.

Demographic changes for the US and for Hawaii have been more moderate than in many other high-income countries including many in East and Southeast Asia. This can be traced to three factors. The first is that gains in life expectancy have been smaller in the US than in other high-income countries. In the last few years, even before the impact of COVID-19, US life expectancy did not improve at all. The second factor is fertility. US fertility has declined in recent years and it is below replacement level, the level necessary to avoid population decline unless offset by migration., but US fertility is much higher than in East Asia and many European countries. The third factor is immigration. In recent decades, the US has experienced substantial migration. Immigration has resulted in somewhat higher population growth and a somewhat younger population. The immigration rates have declined in recent years, however, and the future course is difficult to judge.

Demographic trends in Hawaii and the US are similar, but there are differences. Life expectancy at birth in Hawaii ranked first among all states in 2018 at 82.3 years as compared with 78.7 years for the US.[1] Hawaii is less like the rest of the US and more like Japan, which has the highest life expectancy in the world at 84 years.

The total fertility rate in 2018 for Hawaii was estimated at 1.85 births per woman fractionally more than the 1.73 for the US as a whole (Mathews and Hamilton 2019). Fertility was substantially lower in Japan (1.3 - 1.4 births per woman) and especially South Korea (below 1 birth per woman).

Historically, net immigration to Hawaii, people arriving less people departing, was an important source of population growth. Net migration, foreign and domestic combined, was 55,646 between 2000 and 2010 contributing about one-third of Hawaii net change during that decade. Migration has become less important recently, however. Between 2010 and 2018, net migration to Hawaii was close to zero with 55,050 net foreign immigrants offset by -55,599 net immigrants between Hawaii and the mainland. [2]

Population size

Populations for Hawaii and the United States from 1980 to 2060 are reported in Table 1 along with the corresponding growth rates. Hawaii's population reached 1,000,000 residents in the 1980s and has continued to increase since then. The population for 2020 is estimated at almost 1.5 million increasing to 1.7 million in 2060. Values for 1980 through 2010 are based on the decennial census but results from the 2020 population census will not be available for some time.

Table 1. Population of Hawaii and the United States, 1980-2060

Year	Population (thousands)		Period	Annual growth rates (%)	
	Hawaii	US		Hawaii	US
1980	969	229,476			
1990	1,113	252,120	**1980-1990**	1.4	0.9
2000	1,214	281,711	**1990-2000**	0.9	1.1
2010	1,364	309,011	**2000-2010**	1.2	0.9
2020	1,467	331,003	**2010-2020**	0.7	0.7
2025	1,515	340,400	**2000-2025**	0.6	0.6
2030	1,557	349,642	**2025-2030**	0.5	0.5
2035	1,593	358,691	**2030-2035**	0.5	0.5
2040	1,622	366,572	**2035-2040**	0.4	0.4
2045	1,649	373,343	**2040-2045**	0.3	0.4
2050	1,673	379,419	**2045-2050**	0.3	0.3
2055	1,697	385,335	**2050-2055**	0.3	0.3
2060	1,722	391,495	**2055-2060**	0.3	0.3

Source: Hawaii- (DBEDT 2019) and calculations by authors; US-UN Population Division 2019

[1] https://www.rwjf.org/en/library/interactives/whereyouliveaffectshowlongyoulive.html
[2] DBEDT Databook Table 1.58. https://files.hawaii.gov/dbedt/economic/databook/2014update/015815.pdf

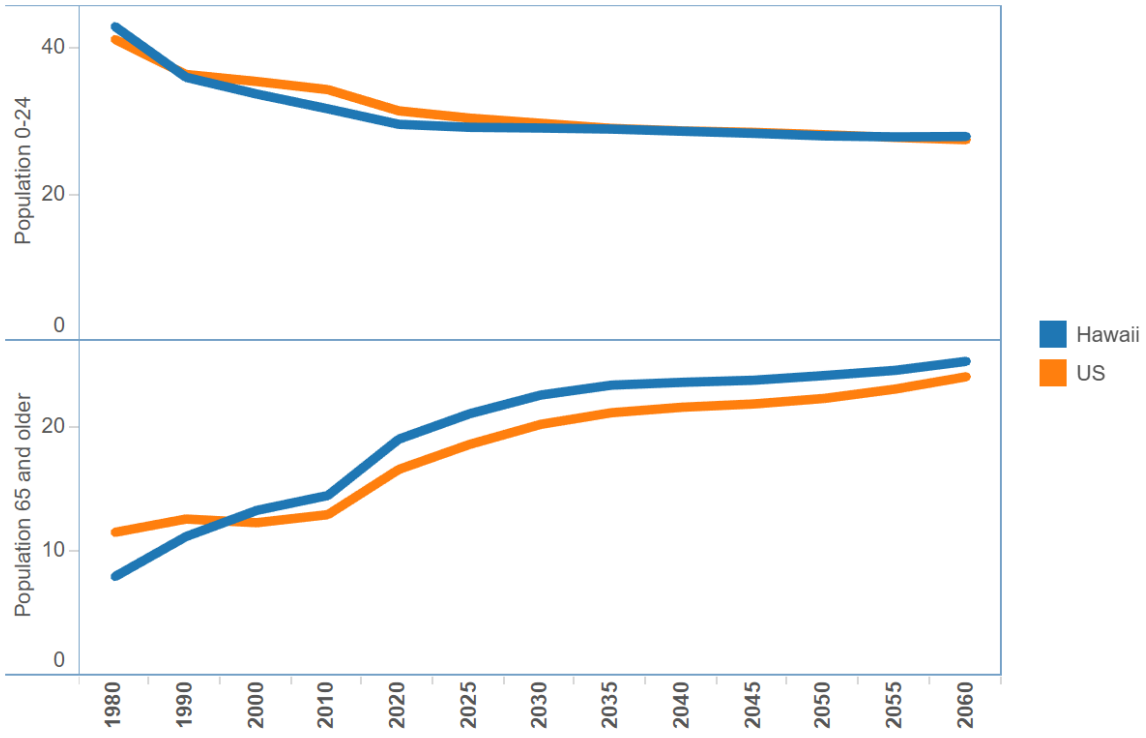
Population projections for Hawaii are available from DBEDT to 2045. These have been extended to 2060 by the authors. See Part II for details. Annual growth rates refer to the preceding interval – 10 years for historical data and five years for the projected values. Population estimates and projections for the United States are from United Nations World Population Prospects for 2019 (United Nations Population Division 2019).

In the 1980s and again between 2000 and 2010 the population of Hawaii grew more rapidly in percentage terms than the US population. For both the US and Hawaii slower growth is projected for the future with smaller differences between the two. Population growth is projected to be less than 1 percent per year after 2010.

Population age-structure

In 1980 Hawaii's population was younger than the US population. The percentage in the 0-24 age range was over 40 percent in both, but a little bit higher in Hawaii than for the US as a whole. The percentage 65 and older was only 8 percent in Hawaii as compared with 12 percent for the US as a whole. Since that time populations have aged in both Hawaii and in the United States but more so in Hawaii. It is anticipated that for 2020 the population in the 0-24 age group will have dropped to about 30 percent of the total population in both places. The population 65 and older will have increased to 17 percent of the total for the US and 19 percent in Hawaii.

Figure 1. Population age structure in Hawaii and the United States, 1980-2060



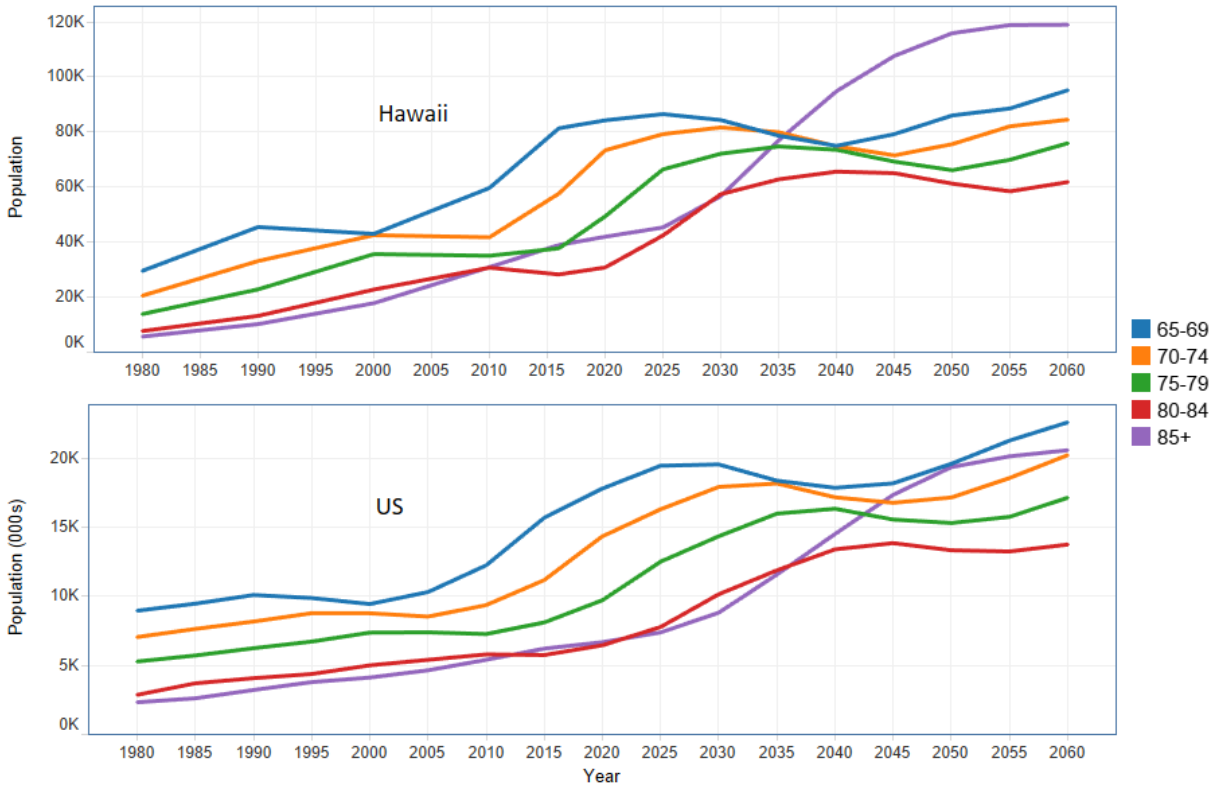
Sources: DBEDT 2018, UN Population Division 2019, and calculations by authors.

If the population projections prove accurate, the percentage of population in the young age group will essentially stabilize for the foreseeable future in both Hawaii and the United State with a little more than one-quarter (28%) falling in the young age group. Of course, this value could be lower than projected if fertility rates drop to lower levels than assumed in the projections. This possibility should certainly not be ruled out.

The percentage 65 and older has not stabilized, however, with increases projected into the coming decades. By 2060 one-quarter of Hawaii's population (25.3%) and about one-quarter of the US population (24.1%) are projected to be 65 and older.

A broad and reasonably accurate expectation for the distant future for either the US or Hawaii is that about one-quarter of the population will be under the age of 25, one-half in the 25-64 age group, and one-quarter will be 65 or older.

Figure 2. Populations in five-year age groups, 65-69 to 85+, Hawaii and the US, 1980 to 2060



Sources: See Figure 1.

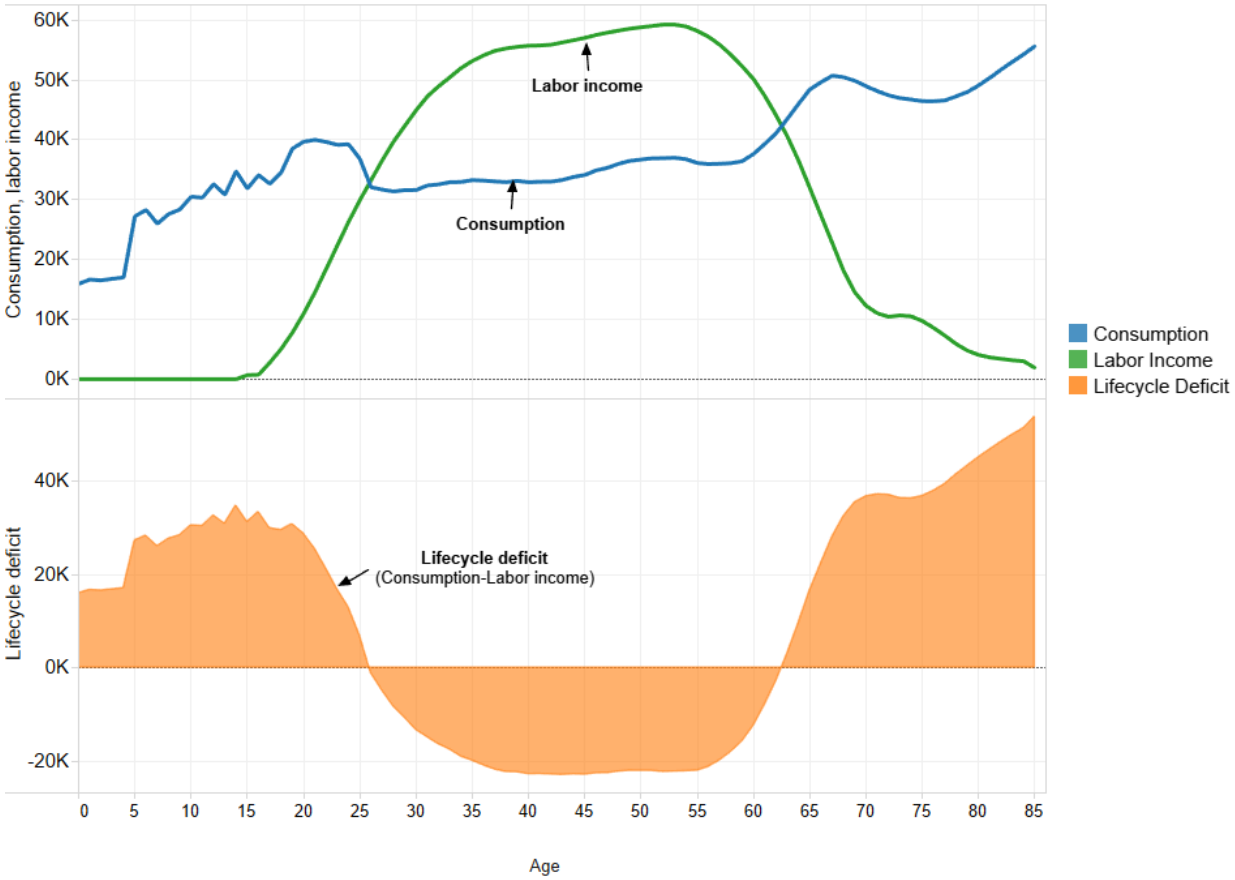
One important feature distinguishes Hawaii's age structure from the United States'. Hawaii is expected to experience a very sharp increase in the 85 and older population as compared with the US (Figure 2). The differences are entirely consistent with the longer life expectancy of people living in Hawaii. The large numbers of the oldest-old in Hawaii could have very important implications for health care needs, retirement income, and social services.

Hawaii's lifecycle

The effects of population age structure depend on how economic behavior varies over the lifecycle. How much do people earn through their labor? How much do they consume? How do the young and the old generate resources to bridge the gap between consumption and labor income? The basic lifecycle in per capita terms, shown in Figure 3, is a starting point for understanding the lifecycle. In Hawaii per capita labor income increased sharply until adults reached their mid-thirties. It was relatively flat between age 35 and 55 peaking at around $60,000. By age 60, however, labor income had declined to around $50,000 and by age 70 to only $10,000. Per capita consumption was quite low for children who had not yet reached school age, but increased to $40,000 for those in their early 20s. For those between ages 25 and 60, per capita consumption varied between $30,000 and $40,000. Consumption was higher for seniors, however, reflecting the cost of health care and long-term care.

The lifecycle deficit or the gap between consumption and labor income is an important way of summarizing the economic lifecycle. The large economic gaps for children and seniors are both very apparent in Figure 3.

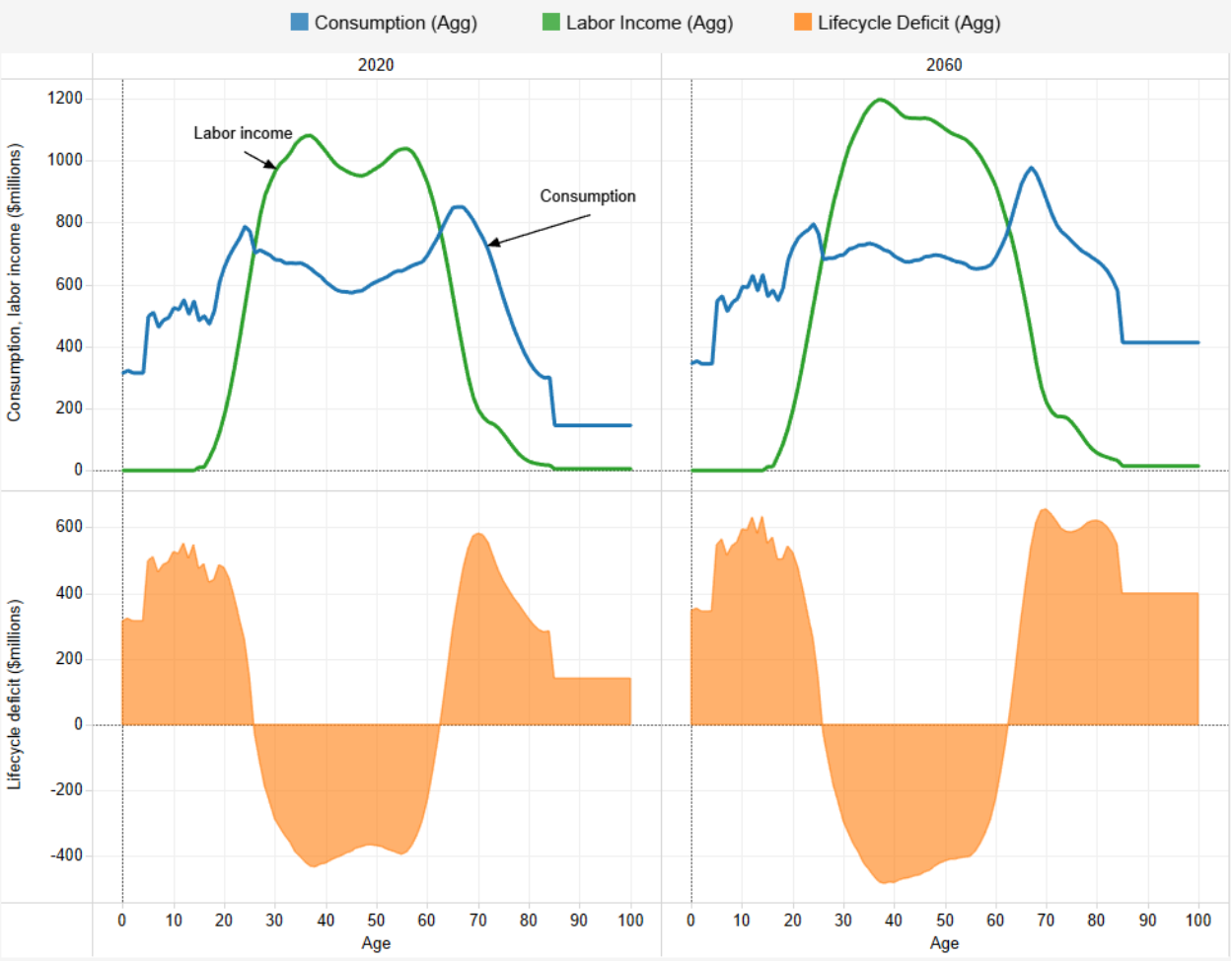
Figure 3. Hawaii's lifecycle (2012 $). Per capita consumption, labor income, and lifecycle deficit



The interaction between the per capita values and population age structure can be seen in the aggregate lifecycle values for Hawaii for 2020 and 2060 presented in Figure 4. Aggregate consumption and labor income are reported in the upper panel and the lifecycle deficit in the lower panel. These are

aggregate figure expressed in millions of dollars (2012 prices). Those 25 and younger and 63 and older had a lifecycle deficit while those between the ages of 26 and 62, inclusive, had a lifecycle surplus – their labor income exceeded their consumption. The projected values are based on projected population for 2020 and 2060 and the per capita labor income and consumption profiles fixed at the baseline values as shown in Figure 3.

Figure 4. Consumption, labor income, and lifecycle deficit/surplus by age for Hawaii in 2020 and 2060 (Aggregate*, $million in 2012 price)



Source: Calculated by authors.
** Values are based on population projections and the baseline per capita age profiles (2012).*

The projected lifecycle deficit at young ages and the lifecycle surplus as the working ages are projected to remain relatively stable because the number of people in either of those age groups is not projected to grow. However, the lifecycle deficits at older ages, shown in the lower panel, are projected to be much greater in 2060 than in 2020. The increases are concentrated among those who are 70 and older. At age 80, for example, the lifecycle deficit is projected to increase from 322 million dollars in 2020 to 622 million dollars in 2060.

The lifecycle deficit for the young has been relatively stable for some time reflecting the relative stability of the population under age 25 noted above. In 1980, the deficit for those under 25 was $10.5 billion as compared with $10.9 billion in 2020. Aging and the increase in the old-age deficit have been occurring for some time. Between 1980 and 2010, the deficit for those 65 and older increased by $5 billion dollars from $2.8 to $7.8 billion dollars (Figure 5).

Hawaii reached an important turning point starting in 2010. Over the last ten years, 2010 to 2020, the lifecycle deficit for seniors increased by $3 billion dollars. During the next decade, the lifecycle deficit for seniors is projected to increase by $3.3 billion dollars. The growth in the deficit will begin to moderate after 2030 but the old-age deficit will increase by more than $1 billion between 2030 and 2035. The deficit while projected to grow more slowly after 2030 is still expected to reach $18 billion in 2060.

Figure 5. Lifecycle deficit for those under age 25, 65 and older, and all ages combined, 1980 to 2060* ($million in 2012 price)

	Under 25	65 and older	Total
1980	10,544	2,839	5,970
1990	10,072	4,625	5,135
2000	10,522	6,278	5,561
2010	10,984	7,809	6,540
2020	10,908	10,840	9,547
2025	11,149	12,533	11,317
2030	11,490	14,133	13,045
2035	11,731	15,361	14,288
2040	11,825	16,119	14,978
2045	11,840	16,616	15,396
2050	11,847	17,096	15,788
2055	11,965	17,584	16,347
2060	12,176	18,258	17,104

Source: Calculated by authors.
** Note that data are at ten year intervals until 2020 and at five year intervals thereafter*

Between 1980 and 2010 the increase in the lifecycle deficits for children and seniors were offset by increases in the lifecycle surplus at the working ages. This happened because of the impact of the baby boomers who only began to reach retirement age in 2010. Thus, the total deficit was relatively stable between 1980 and 2010. After 2010, however, the baby boomers began to reach retirement age and they no longer generated a growing lifecycle surplus to offset the growing old-age deficit.

Figure 5 illustrates one of the most important findings of this study, combining the last decade with the next 15 years, aging will produce a $7.7 billion hole in our economy. The deficit is not a one-time event. In the absence of major reform, large deficits would persist for the indefinite future. Seniors will experience the impact directly but so too will children and prime-age adults due to the deep and pervasive linkages across all generations.

The End of Hawaii's demographic dividend

During the 1980s and earlier Hawaii experienced a demographic dividend because its working age population was growing more rapidly than the non-working age population. This is no longer the case, however, based on estimates of the growth effects of demographic change based on Hawaii Transfer Accounts. The analysis relies on a simple way of calculating consumption per capita:

$$\frac{C}{N} = (1-s)\frac{Y}{L}\frac{L}{N} \tag{1}$$

where C is consumption, Y is income, L is the number of workers, N is the number of consumers, and s is the aggregate saving rate. (See Appendix 1 for more details.) The term L/N is called the support ratio. Letting gr[] represent the growth rates of these terms, it is easy to show that:

$$gr\left[\frac{C}{N}\right] = gr\left[(1-s)\frac{Y}{L}\right] + gr\left[\frac{L}{N}\right] \tag{2}$$

The left-hand-side of equation 2 is the rate of growth of consumption per capita a measure of per capita economic growth. On the right-hand-side two factors account for economic growth. The first term captures factors like productivity growth and the impact of recessions including COVID-19. Demographic factors may have indirect effects on this term but these are not explored here. The second term is the pure demographic effect of changes in population growth and age structure.

Estimates of per capita consumption and labor income allow an important enhancement to the support ratio. In some analyses, all of those in the "working ages" are counted as making an equal contribution to labor income. The reality, however, is that the contribution at each age depends on labor force participation, hours worked, unemployment rates, and wages. L, which we call effective labor, is adjusted to allow for all of these factors. Workers aged 30-49 are counted as 1 effective worker each, on average. Those at other ages are counted as more than or less than one depending on how their labor income compares to the labor income of those 30-49. We make a similar adjustment to account for the fact that consumption varies considerably with age. The effective number of consumers, N, counts each person 30-49 as one effective consumer on average and those at other ages more or less than one depending on how their consumption, on average, compares with consumption of those 30-49.

Between 1980 and 1990 the support ratio was rising in Hawaii which contributed more than one-half a percentage point to economic growth (Table 2). This essentially marked the end of the demographic dividend phase that many countries and states have experienced. The support ratio remained at a high level between 1990 and 2010, but it was no longer increasing. A major turning point came in 2010 as the support ratio began to decline. Between 2010 and 2030 the support ratio has decline annually at between 0.54 and 0.63 percentage points. For the last decade and for the decade to come this represents a significant drag on economic growth in Hawaii. Between 2010 and 2035 aging would depress consumption per equivalent adult in total by 12.5 percent and by 15.1 percent between 2010 and 2060.

Table 2. Demographic change and economic growth in Hawaii, 1980-2060

Year	Number of effective consumers (N)	Number of effective workers (L)	Support ratio (L/N)	Period	Annual growth rates (%)		
					(N)	(L)	(L/N)
1980	983,098	497,226	0.506				
1990	1,144,614	612,339	0.535	**1980-1990**	1.52	2.08	0.56
2000	1,270,138	682,016	0.537	**1990-2000**	1.04	1.08	0.04
2010	1,451,359	775,910	0.535	**2000-2010**	1.33	1.29	-0.04
2020	1,584,861	802,998	0.507	**2010-2020**	0.88	0.34	-0.54
2025	1,646,748	808,627	0.491	**2000-2025**	0.77	0.14	-0.63
2030	1,706,564	813,760	0.477	**2025-2030**	0.71	0.13	-0.59
2035	1,758,059	822,676	0.468	**2030-2035**	0.59	0.22	-0.38
2040	1,799,909	835,808	0.464	**2035-2040**	0.47	0.32	-0.15
2045	1,835,123	849,858	0.463	**2040-2045**	0.39	0.33	-0.05
2050	1,865,144	861,190	0.462	**2045-2050**	0.32	0.26	-0.06
2055	1,893,985	868,707	0.459	**2050-2055**	0.31	0.17	-0.13
2060	1,923,903	873,248	0.454	**2055-2060**	0.31	0.10	-0.21

Source: Calculated by authors

The impact of aging on the support ratio and, hence, on per capita consumption, equations 1 and 2, is not a forecast of per capita consumption because it does not incorporate the role of other factors. COVID-19 will in the short-run lead to slower economic growth and reduced consumption. Once our economy recovers income per effective worker should increase as part of the recovery process. Productivity could increase for other reasons, as well, offsetting the effects of a declining support ratio. We will return to some possible strategies for responding to population aging below. A useful way to explore possible reforms is to focus on funding the rising lifecycle deficit. If the increased deficit can be funded, then consumption can increase more rapidly than in the simple projections presented in Table 2. Before we explore the possibilities for reform, however, we will document how our economy is currently funding the lifecycle deficit.

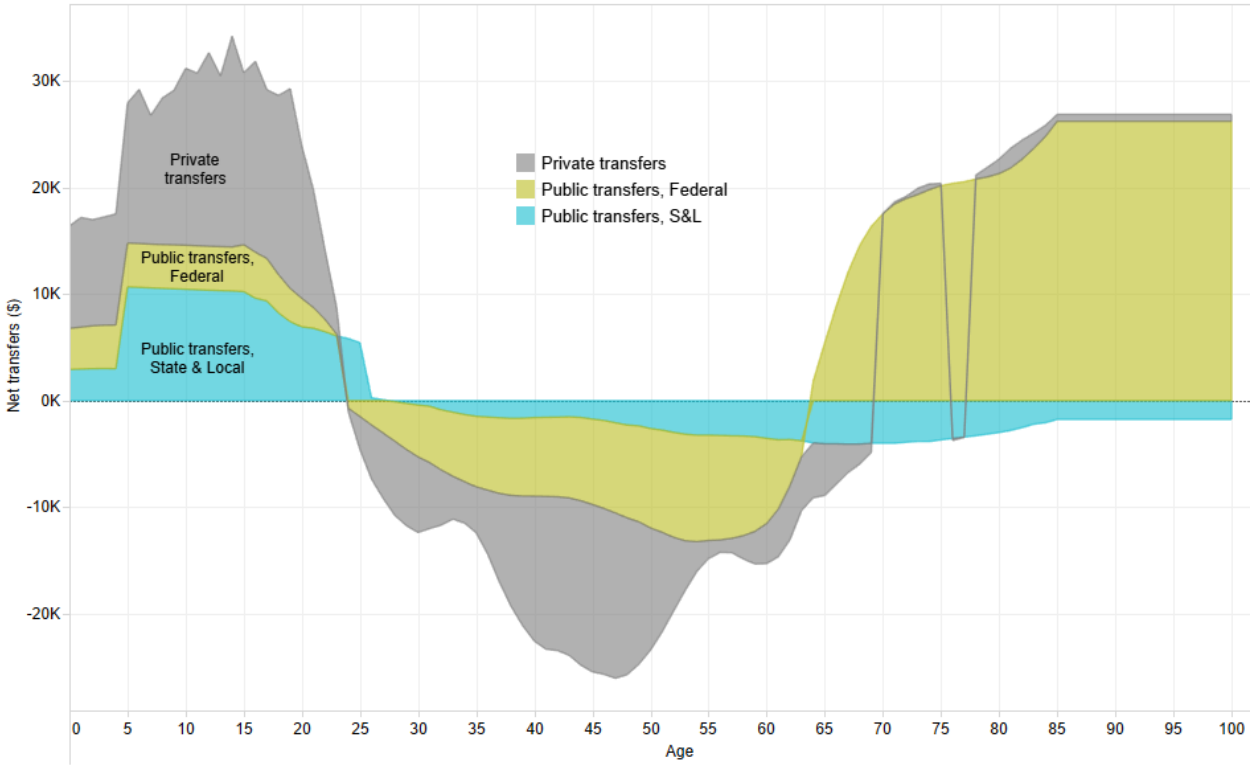
Funding the lifecycle deficit

One way or another our economy must respond to the growing lifecycle deficit. At the current time, the economy is funding the lifecycle deficit relying on a particular combination of resources. It is unlikely that the resources available to fund the current deficit will increase to match a substantial increase in that deficit. If they do not, a decline in consumption will be the only way to bring the deficit in line with the resources available to fund it. To explore these possibilities, we will document how Hawaii has funded the lifecycle deficit based on the most recently available data. For any economy, there are only two possibilities: intergenerational transfers and asset-based reallocations.

Intergenerational transfers

Both seniors and children rely heavily on intergenerational transfers to meet their material needs. Consider first the situation with children. They rely heavily on private transfers, mostly family transfers, consisting of food, clothing, health care, private education, and housing. For the baseline year of 2012, the net inflow was highest for teens ranging from $17,000-20,000 a year (Figure 6). Children also rely heavily on public transfers with the highest per child cost occurring at school ages due to the cost of public schooling. For State and Local governments the cost peaked at about $10,000 per child. Federal programs were a less important source of funding for children but provided about $4000 per child in cash and in-kind transfers. Combining private and public transfers, net transfers in 2012 ranged from a low of about $18,000 for very young children to a high of around $32,000 for teenagers. Note that this does not include the considerable cost of time devoted to childrearing particularly on the part of mothers.

*Figure 6. Net transfers (private and public) by age, per capita, 2012 baseline estimates**



Source: Calculations by authors.
**Net transfers are transfer inflows less transfer outflows*

In one respect transfers to seniors are similar to transfers to children. Total net transfers to 70-year-olds and young children were very similar, while total net transfers to seniors 85 and older were almost as much as net transfers to teenagers. The composition of transfers to children and seniors are very different, however. Public transfers from Federal programs dominate transfers to seniors. For those 85 and older, net public transfers from Federal programs averaged $26,000 per capita. Private transfers were much smaller reaching a maximum of about $1800 for seniors in their early eighties. Seniors in

their sixties provided substantially more in private transfers than they received. At around age 65 net private transfer outflows reached about $5000 per capita. Private transfers from younger seniors were subsidizing the costs of grandchildren or helping adult children in need (with housing for example). Some young seniors were providing support to their surviving parents.

Not only are net private transfers to younger seniors negative, net public transfers from State and Local programs are negative for both young seniors and old seniors (Figure 6)! Seniors are paying more in taxes than they are receiving in benefits. The State does provide support to seniors by partially funding Medicaid, but most programs designed to benefit seniors are Federal programs. State and Local taxes are lower than they might otherwise be because of preferential treatment but seniors do pay property tax, excise tax, and income tax.

Average transfers, shown in Figure 6, do not capture the considerable diversity in intergenerational support. Many seniors receive support from specialized programs that may target those who are particularly in need. A more complete assessment of transfers would incorporate the time transfers that seniors provide and receive from their family members. Unfortunately, time use data for Hawaii are not sufficient to examine this form of support, although estimates of time transfers for the United States as a whole are available.

If Hawaii were entirely self-sufficient from a transfer perspective, total transfers received would equal total transfers provided. Total aggregate net transfers would be zero. (Note that this does not appear to be the case at all in Figure 6, but the figure is for per capita values not aggregate values.) Hawaii is not entirely self-sufficient, however. Public transfers at the Federal level need not balance. The Federal government has in recent years run a deficit that can fund benefits in excess of taxes. Even if the Federal government balanced its budget the benefits received by residents of Hawaii would not necessarily equal the taxes paid. Non-residents who visit Hawaii also receive benefits from State and Local governments and pay taxes. Private transfers to Hawaii residents also include transfers from family members living abroad and on the mainland. And private transfers from Hawaii residents include transfers to those living abroad or on the mainland.

We estimate that in the base year of 2012, residents received $300 million more in Federal benefits that they paid in taxes. State and Local governments received taxes in excess of benefits provided by $923 million. Combining the two, net public transfers to Hawaii from the rest of the world totaled about $1.2 billion. This was sufficient to fund about 5 percent of the combined lifecycle deficit of seniors and children. These values should be viewed with healthy skepticism. In particular, the value of in-kind benefits provided to visitors by State and Local governments is difficult to assess.

Asset-based reallocations

Seniors rely heavily on accumulated assets to fund their old-age deficit. Before reaching retirement they accumulate assets on which they can rely later in life. These assets may be in the form of funded pension programs, such as, the Employee Retirement System for public workers or 401(k) pensions often sponsored by private employers. But seniors may also rely on a small business, a farm, rental property or an owner-occupied home to help fund their lifecycle deficit. Accumulated assets fund the

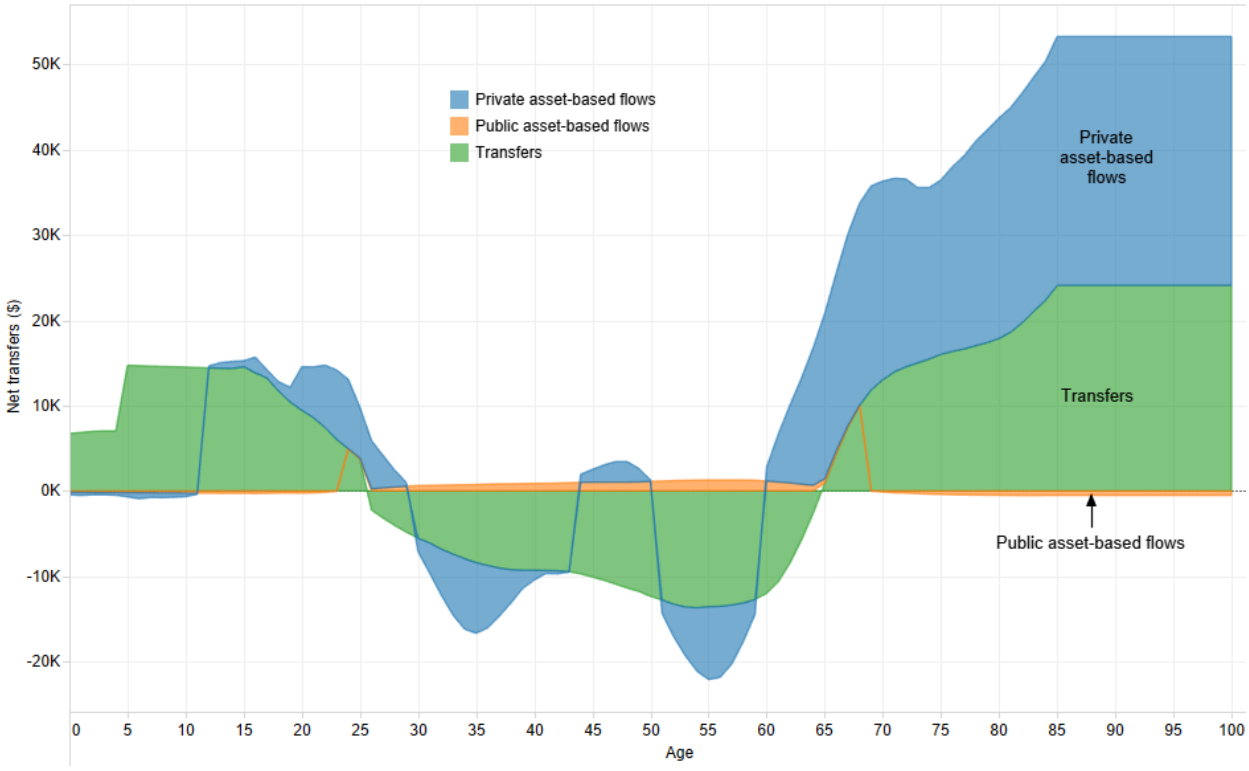
lifecycle deficit by generating asset income (dividends, interest income, etc.) or seniors can dis-save, disposing of assets to fund retirement.

Assets (or debt) provide a limited opportunity for young adults to fund their lifecycle deficit. They can borrow relying on student loans or credit card debt to fund lifecycle deficits. This occurs to some extent in Hawaii as it does in the United States, as a whole.

Almost all asset-based reallocations are private but the public sector can also play a role. State and Local governments face heavy constraints on the extent to which they might borrow to fund public programs, but the Federal government has more latitude.

Baseline estimates of asset-based flows for Hawaii are presented in Figure 7 and compared to combined public and private transfers to supply context. The most important takeaway point about asset-based flows is the importance of private flows to funding the lifecycle deficit of seniors. Private asset-based flows turn positive at age 60 and increase sharply reaching more than $20,000 by age 66. They continue to increase with age reaching $29,000 per year for those 85 and older. As important as public transfers are, $24,000 per year for those 85 and older, they are less important than asset-based reallocations. This is true for the US as well as for Hawaii. It is very important to keep in mind, however, that these figures are averages and the situation is very different for lower income seniors who depend much more on transfers than asset-based reallocations.

Figure 7. Asset-based flows and transfers by age, per capita, 2012 baseline estimates



Source: Estimated by authors.

Responding to aging in Hawaii

Our simple projections show that aging will lead to an increase in the lifecycle deficit of all ages combined from $6.5 billion in 2010 to $14.3 billion in 2035 - an increase in $7.7 billion over that 25-year period (Figure 5). If resources cannot be generated to offset the increase in the deficit, then consumption will necessarily decline. The decline in consumption would not necessarily fall on all age groups equally, however. Almost all of the additional deficit will be at older ages. Consequently, public policy will have to address two important issues: first, how to generate resources to reduce the overall deficit; and, second, how to insure that any reduction in consumption is shared across generations in a way that is acceptable to all.

Working longer

Working longer is often proposed as a sound response to aging. In many countries around the world, public policies discourage work at older ages, but in Hawaii and the United States many policies support working longer. Mandatory retirement and other forms of age discrimination are prohibited except in a few circumstances. Social Security is designed to neither discourage nor encourage retirement at a particular age, although the State retirement system is not designed to follow this principal. Of course, some employers do discriminate on the basis of age and protections for older workers can be ineffective. Moreover, our education system emphasizes the young rather than lifelong learning that could help to maintain productivity and employment at older ages. More flexible approaches to employment, e.g., part-time work and job sharing, could help seniors. The good news is that people are healthier at older ages and, hence, capable of working longer and contributing more at older ages. Recent studies of the US and other countries have shown that there is an untapped labor potential among seniors (Coile, Milligan and Wise 2017). National Transfer Accounts estimates of labor income for the US are also encouraging in this regard.

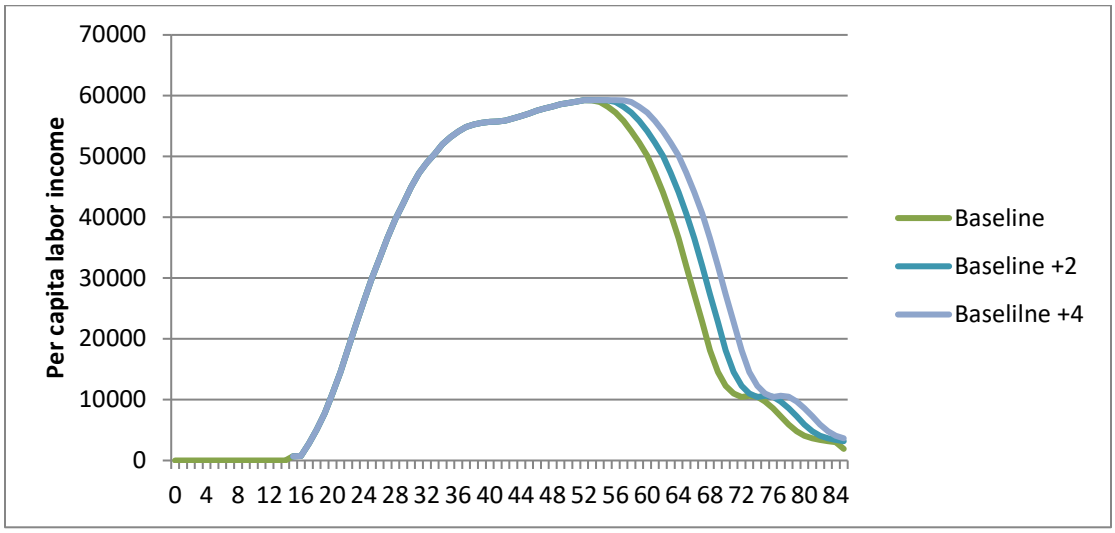
If people in Hawaii understand the economic challenges associated with aging, they may choose to delay retirement and work longer. To what extent might people offset the projected increase in the deficit by working longer? A simple approach is to tie increases in years worked to increases in life expectancy. Using the projections from Medina, Sabo and Vespa (2020), life expectancy at age 65 is projected to shift by 2 years between 2010 and 2035 and by 4 years between 2010 and 2060. So we will consider the impact of people working an additional two years between 2010 and 2035 and an additional four years between 2010 and 2060. The suggested pace of reform is similar to the increase in the normal retirement age by two years between those born in 1937 and 1960, a 23 year period, implemented under reform of the US Social Security system.

The proposed reform is implemented in the analysis through shifts in the per capita labor income profile starting from the peak of almost $60,000 at age 52. Labor income is assumed to shift at every age over 52 so that income now earned at age 63 will be earned at age 65 and the income earned at age 72 today will be earned at age 74 in 2035 (Figure 8).

The increase in aggregate labor income given the reform scenarios will reflect the shift in per capita labor income and the change in population at each age. Total labor income would increase by $1.8

billion in 2035 and $4.2 billion in 2060. The reform would fund 24 percent of the increase in the lifecycle deficit between 2010 and 2035 and 40 percent of the increase between 2010 and 2060.

Figure 8. Per capita labor income by age, baseline values and two scenarios with labor income shifted by 2 and 4 years



Source: Calculated by authors.

Working longer and consuming less

If working longer offsets only part of the increase in the lifecycle deficit due to aging, the other lifecycle option, reducing consumption, could make up the rest. How much would consumption decline? Total consumption would have to decline by $5.9 billion instead of $7.7 billion in 2035 and by $6.35 billion rather than $10.5 billion in 2060. How this sacrifice would be shared becomes a critical issue.

Table 3. Decline in per capita consumption required to balance increase in the lifecycle deficit given increase in years worked (2 years by 2035 and 4 years by 2060)

	2035	2060
Cost is shared by all	10.0%	9.8%
Cost is born by seniors only	29.3%	26.7%
Cost is born by prime-age adults and children	15.2%	15.6%
Cost is born by adults (25 and older)	13.0%	12.6%

Source: Calculations by authors

If the percentage decline at every age were equal, the first option in Table 3, then per capita consumption at every age would decline by 10.0 percent in 2035 and 9.8 percent in 2060 as compared with 2010. There are three other possibilities reported in the Table. Suppose that the cost was born entirely by seniors. In 2035 their consumption would have to be lower by 29.3 percent while that of children and prime-age adults would be protected remaining at 2010 levels. If consumption by seniors were protected, consumption by children and prime-age adults would decline by 15.2 percent. Finally, if

consumption by children were protected then consumption would be lower by 13.0 percent for all adults. The values in 2060 are very similar to those for 2035. If per capita consumption declines only among seniors their consumption would be lower by 29 percent in 2035 and 27 percent in 2060.

Intergenerational Transfers

The US as a whole can look to intergenerational transfers as a powerful tool for shifting resources across age or generations. Tax reform can be used to provide more or less support to seniors or children. Families can choose to spend more or less on their children. However, total public or private net transfers to the US are unlikely to change dramatically in the coming decades. Remittances from immigrants to family members living abroad are no doubt important to the families receiving them. The US government provides foreign aid. Transfers are unlikely to provide a means for generating the resources needed to maintain consumption. Net transfers from the US to the rest of the world are relatively small as compared with the increase in the lifecycle deficit that is coming as the US population ages.

To some extent intergenerational transfers in Hawaii are governed by the same principles as transfers at the national level. Hawaii has some capacity to shift resources across generations or age. Parents determine how much private resources are committed to the needs of children. State and local governments determine taxes and spending that may, for example, place important emphasis on education and child health.

Decisions at the Federal level, however, have very important implications for the age distribution of resources. As shown above, Federal programs like Social Security and Medicare increase resources available to seniors by taxing workers. Hence, resources available to seniors will be influenced by forces at the national level rather than the state and local level.

Table 4. Net transfers to children (under age 25), 2010-2060

	Aggregate ($million, 2012 prices)		Share of total labor income	
	Private	Public	Private	Public
2010	5,533	4,782	0.131	0.113
2020	5,498	4,785	0.126	0.110
2025	5,651	4,907	0.129	0.112
2030	5,829	5,061	0.132	0.115
2035	5,942	5,154	0.133	0.115
2040	5,982	5,181	0.132	0.114
2045	5,975	5,179	0.129	0.112
2050	5,982	5,192	0.128	0.111
2055	6,053	5,253	0.128	0.111
2060	6,169	5,349	0.130	0.113

Source: Calculations by authors

Resources available to children would come under direct demographic pressure if people were having more children, but the projected number of children and the number of children per working-age adult are expected to be relatively stable. If families and governments maintain their current total spending on children, spending per child would be relatively stable.

The projections reported in Table 4 show what would happen to aggregate net transfers to children if per capita spending per child remains at the baseline level for 2012. Net private and public transfers would grow very modestly between 2010 and 2060 and at about the same rate as total labor income. Net private transfers to children would remain close to 13 percent of total labor income while net public transfers would remain close to 11 percent of total labor income. In short, rising economic costs of children should not be burdensome for either families or State and Local government.

The problem, however, is that resources available for children will be squeezed by the increased needs of seniors. That is likely for several reasons. Taxes increases may be needed to support Social Security, Medicare, and other programs for seniors reducing the disposable income of parents. If taxes do not increase, then benefits will decline. Working-age adults will come under pressure to provide more support for their parents and to save more for their own retirement. With gains in life expectancy we can anticipate longer retirement providing additional pressure to save for retirement and spend less on children.

Seniors rely heavily on net public transfers to support their old-age needs. Because benefits accrue to seniors with funding provided by those in the working ages, aging will lead to an increase in benefits promised relative to revenues expected. It is aging in the United States as whole, not Hawaii alone, that determines the fiscal outlook for Social Security and Medicare. According to the latest report of the Social Security and Medicare Trustees, the Social Security (OASDI) trust fund will be depleted in 2034. At that time, Social Security benefits (OASI) would decline to 76 percent of scheduled benefits in 2035 declining to 71 percent in 2094. "Under current law, premium income would be sufficient to pay 90 percent of estimate Hospital Insurance (Medicare, Part A) beginning in 2026 declining to 78 percent by 2044." Note that the assessment in the Trustees report does not reflect the impact of COVID-19 on Social Security finances, which could be substantial (Office of the Chief Actuary 2020).

It is difficult to predict the course of Social Security and Medicare in future years. It seems unlikely that the current provisions in the law would be left untouched as they mandate major cuts in Social Security benefits once trust funds are depleted. The Biden plan may be instructive. His proposal would raise taxes for those earning more than $400,000 per year and increase benefits for lower income individuals. It would close about one-quarter of the projected shortfall. For now, political leaders at the national level do not seem prepared to reconcile the effects of aging on Social Security, Medicare, and other programs on which the elderly depend (Smith, Johnson and Favreault 2020).

Using data from Hawaii Transfer Accounts allows us to project the impact of aging on flows to and from residents of Hawaii for all federal programs combined. The projection holds per capita transfer inflows, cash and in-kind benefits, received by residents including Social Security, Medicare, the federal portion of Medicaid, and other Federal programs, constant. The projection also holds per capita transfer

outflows to the Federal government. All Federal taxes are included plus our share of deficits incurred to support Federal programs.

Given population trends in Hawaii and holding the per capita profiles constants provides an estimate of the impact of population aging on total public transfer inflows and outflows and projected net public transfers to Hawaii from the Federal government (Table 5). The results for 2010 are instructive because it is near the baseline year of 2012 and because population aging accelerated beginning in 2010. Net public transfers from the Federal government were essentially in balance. Net transfers to those 65 and older and those under 25 totaled 5.1 billion dollars, but outflows from those 25 to 64 were nearly identical. The difference was only 79 million dollars.

Table 5. Net federal public transfers to Hawaii, aggregate ($million, 2012 prices), projected values

	Under 25	65 and older	Under 25 plus 65 and older	25 to 64	All age groups
2010	1,455	3,675	5,130	(5,051)	79
2020	1,471	5,150	6,621	(5,016)	1,605
2025	1,519	5,991	7,510	(5,021)	2,489
2030	1,561	6,781	8,342	(5,072)	3,270
2035	1,581	7,394	8,975	(5,175)	3,800
2040	1,586	7,758	9,344	(5,287)	4,057
2045	1,585	7,974	9,559	(5,359)	4,200
2050	1,593	8,197	9,791	(5,403)	4,387
2055	1,617	8,435	10,052	(5,400)	4,652
2060	1,650	8,764	10,414	(5,413)	5,000

Source: Calculations by authors

Net public transfers to Hawaii are projected to increase $3.8 billion per year in 2035 and $5.0 billion per year in 2060. This cannot happen. For a few years, Social Security and Medicare trust funds may be used to fund transfers to residents in Hawaii and throughout the United States. As noted above, however, the trust fund for Medicare is expected to be depleted in 2026 and for Social Security in 2035. Those resources will no longer be available to fund large net transfers. Moreover, the COVID-19 recession will likely bring the depletion dates closer. In the absence of reform, the annual shortfall in net public transfers to Hawaii for all age groups combined will be $3.8 billion and rising from 2035 onward (Table 5).

Under these circumstances should reform emphasize cutting benefits or raising taxes? Suppose we do not raise taxes and rely on benefit reductions to bring net public transfers into balance. This will have a devastating effect on seniors who would bear a major portion of the shortfall in funding the lifecycle deficit. If we rely entirely on raising taxes then the burden would fall heavily on working-age adults and the children that they support. An intermediate approach relies on sharing the costs across all ages through a combination of higher taxes and reduced benefits.

This analysis can only quantify the effects of alternative choices but policy makers and the electorate must choose among these competing alternatives.

Key points and conclusions

This study identifies a number of important points including the following:

- Rapid population aging began in Hawaii in 2010 and will continue until 2035. After 2035 the percentage at older ages will grow more slowly.
- As compared with the rest of the United States, the population aged 85 and older will grow very rapidly.
- Aging will lead to slower economic growth. All other things equal growth of per capita consumption will be lower by about 0.5 percent per year due to population aging between 2010 and 2030. An effect of that magnitude is substantial when it persists for twenty years.
- The shortfall in resources, the lifecycle deficit, will be severe for seniors. Hence, their economic status will depend most heavily on steps taken over the coming decades.
- Because seniors are living longer they can work longer. Working an additional two years by 2035 and an additional four years by 2060 is a realistic goal.
- Working longer is an important, but only a partial solution for seniors. The additional labor income of working two additional years would provide seniors with about 20 percent of the additional resources to fund old-age needs in 2035.
- Federal programs like Social Security and Medicare are a very important source of support for seniors today and will be even more important in the future. Reform of these programs to insure their sustainability and their continued support for seniors is essential.
- Demographic change should have no direct effect, favorable or unfavorable, on resources for children. Aging could have adverse consequences for children by squeezing resources available for them.

In summary, population aging will lead to slower economic growth. The effects are significant in part because they are lasting. This distinguishes them from recessions, for example, that may have more significant effects for a year or two but much smaller effects over longer periods of time. If the costs of aging are shared across all generations they will be substantial but tolerable.

There are important benefits of aging that should not be overlooked. Moderately low fertility in Hawaii is responsible, in part, for aging but it also creates opportunities for greater investment in education and child health. Devoting resource to children will help to raise their productivity later in life and increase their capacity to support older generations. A balanced assessment of aging must also include the benefits of better health and longer life. People in Hawaii are especially fortunate to be so healthy and to live so long. Our population will be older but our future will be brighter.

The challenges for public policy are to insure that people at every age, including seniors, can realize their full potential and that the benefits and costs of an aging society are as broadly shared as possible.

Part II. Hawaii Transfer Account: Detailed Methods and Results

Fundamentals

Hawaii Transfer Accounts (HTA) are based on an established economic framework applied at the national level called National Transfer Accounts (NTA). NTA was developed and co-founded by SH Lee and Mason at the East-West Center and researchers at the Center for the Economics and Demography of Aging at University of California - Berkeley. The methodology has been thoroughly reviewed and adopted by the United Nations Department of Social and Economic Affairs (United Nations Department of Economic and Social Affairs: Population Division 2013). Research teams from more than seventy countries have implemented and applied NTA to analyze the economic impact of population aging in their own countries. An overview of NTA is provided in Lee and Mason (2011), a finalist for the Paul A. Samuelson Award and selected as an outstanding scholarly publication by Choice Magazine. Sang-Hyop Lee, Mason, and their colleagues have presented their work and collaborated with Asian Development Bank, the International Monetary Fund, the World Bank, the United Nations Department of Social and Economic Affairs, the Board of Governors of the Federal Reserve System, and the Ministries of Finance of India and Japan.

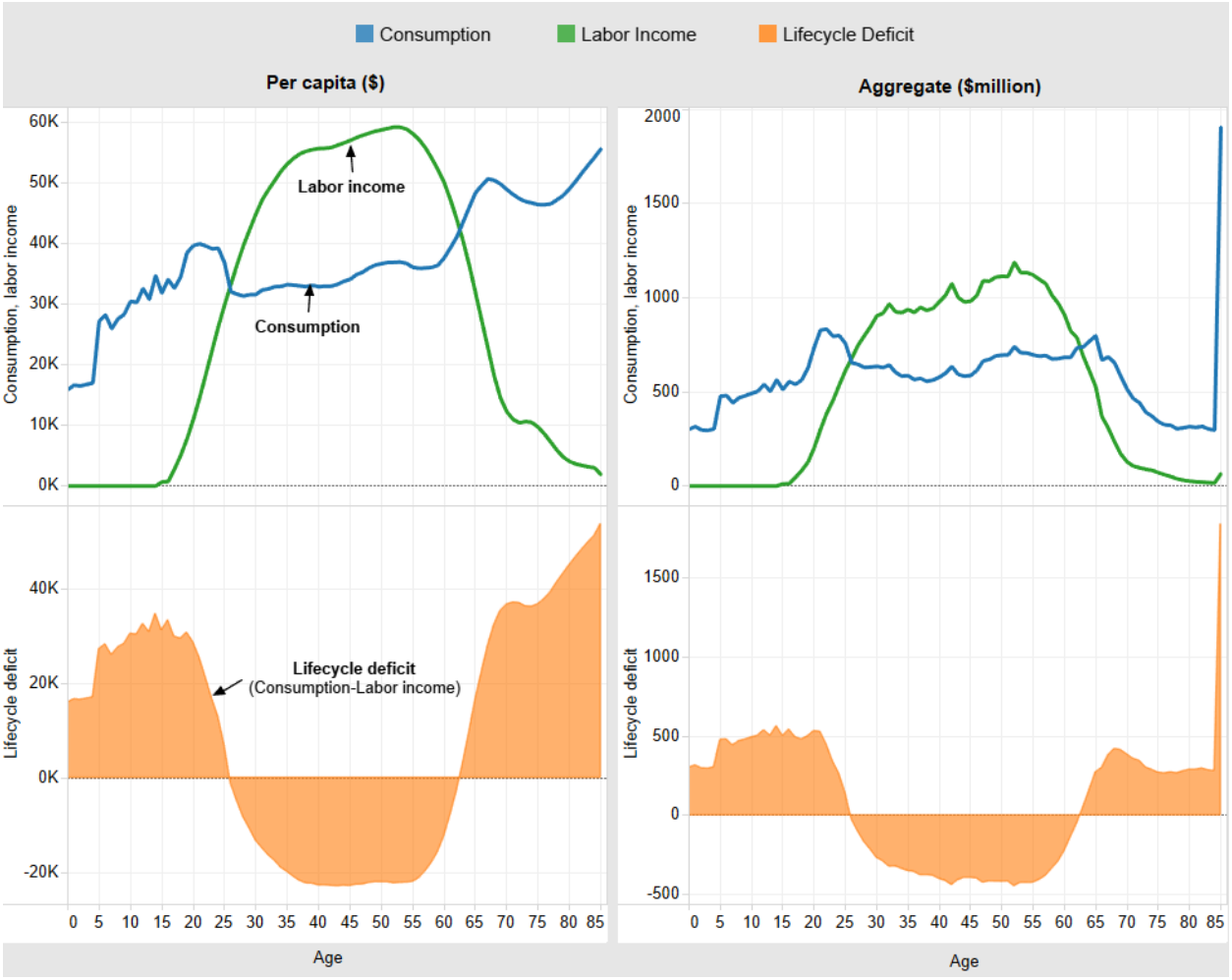
HTA provides estimates of how Hawaii residents at every age acquire and use economic resources to meet their material needs, to support others, and to provide for the future. The emphasis on the age of individuals distinguishes HTA from other economic data. All economic flows, income, consumption, saving, and so forth, are assigned to the ages of individuals, with firms, households, governments, and non-profits confined to a background role. In most respects, the accounts are constructed to complement and to be consistent with standard economic accounts, e.g., the System of National Accounts or standard economic accounts for Hawaii.

Baseline accounts for Hawaii have been constructed for 2012 as dictated by the availability of the most comprehensive data for that year. Data for 2020, when it is available, will provide an important opportunity to update the accounts. All estimates are constructed for single years of age with an upper age intervals of 85 and older. Population projections have been combined to project selected NTA data as will be discussed below.

The NTA framework

The NTA framework is motivated by the economic lifecycle as quantified by consumption and labor income at each age. Consumption by the young and the old exceeds their labor income. The gap between the two is referred to as the lifecycle deficit. During the middle ages of life, labor income exceeds consumption and we refer to that gap as the lifecycle surplus. Per capita and aggregate values of consumption, labor income, and the lifecycle deficit by age for the 2012 baseline are shown in Figure II.1.

Figure II.1. Consumption, labor income, and lifecycle deficit for Hawaii, 2012 baseline estimates



Consumption includes both private and public consumption. Private consumption refers to all goods and services with education, health, and other goods and services distinguished and available in the detailed accounts. The estimates are based on household surveys of consumer expenditure. Public consumption includes publicly-funded consumption of education, health, and other goods and services based on a combination of survey data and administrative data available from government agencies.

Labor income consists of earnings by those who are employed, self-employment labor income, and an estimate of the value of labor by unpaid family workers. The lifecycle deficit is calculated as the difference between consumption and labor income.

All data have been adjusted to match values available from aggregate economic accounts with details noted below. Some aggregate flows, such as labor income, can be assigned to age groups directly using survey data. Other aggregate flows, such as some components of consumption, are assigned to individuals using rules described in the NTA manual.

An important flow identity governs NTA or HTA.

Consumption – labor income = Transfers + Asset income – Saving.

The final two terms are usually groups together to measure the net flows associated with assets. Defining asset-based reallocations as Asset income – Saving:

Consumption – labor income = Transfers + Asset-based Reallocations.

Age reallocations are the means by which resources at surplus ages are reallocated to deficits for children and seniors. There are many important examples of reallocation systems operating in Hawaii, a few of which are illustrated in Table II.1. Both the public and private sectors are heavily involved in reallocations. Private transfers are dominated by family support that often occurs within households. Parents and grandparents support their children. Transfers flow between adult offspring and seniors. There are many forms of private asset-based reallocations. Students may take out loans. Home owners obtain the benefits of living in their own residence. Individuals or families may own a farm or a business. Individuals may rely on pension funds that are employment-based or independent.

Table II.1. Types of age reallocations

	Transfers	Asset-based reallocations
Private	Family support Charitable organizations	Student loans Owner-occupied housing Family farms and businesses Pensions (funded)
Public, Federal	Medicare, Medicaid Social Security National defense	Public debt
Public, State and Local	Education Medicaid Public safety	

In the Hawaii Transfer Accounts, flows to and from Federal programs are distinguished from flows involving State and Local programs. The Federal government is responsible for three particularly important public transfer programs: Old-age and Survivors Disability Insurance (OASDI), Medicare, and Medicaid in cooperation with the State. The State government is also heavily involved in transfer programs. Through public education the State directs support to children and young adults, for example. Both the Federal and State and Local governments provide many goods and services that accrue to everyone and these are allocated on a per capita basis. Examples would be National defense at the Federal level and public safety at the State and Local level. The final example shown in Table II.1 is public debt. The Federal government borrows resources and uses those resources to fund a variety of programs. State and Local governments in general cannot accumulate public debt to any significant degree to fund current spending.

All public reallocations programs are funded through taxes and, hence, involve transfers from those who pay taxes to those who receive benefits. Transfers refer to the difference between transfer inflows and transfer outflows.

Asset-based reallocations are defined as asset income less saving (or asset income plus dis-saving). Examples of asset income are interest, dividends, rental income, royalties, the rental value of owner-occupied housing, and so forth. Asset income can be negative, e.g., interest expense. Saving and dis-saving are the other forms of asset-based reallocations. Any asset income that is not saved is used to fund the lifecycle deficit.

Hawaii Transfer Accounts for 2012 are summarized for broad age groups in Table II.2 for per capita values and in Table II.3 for aggregate values. Many features of HTA are of interest.

Table II.2. Summary of Hawaii Transfer Accounts by age groups, 2012, per capita values ($)

	Age groups						
	All	0-14	15-29	30-44	45-59	60-74	75+
Consumption	35,792	24,999	35,617	32,914	36,139	45,691	51,386
Labor income	30,675	0	20,585	52,976	57,509	29,518	4,272
Life-cycle Deficit	5,117	24,999	15,033	-20,062	-21,370	16,173	47,113
Public transfers	881	11,842	5,486	-8,319	-12,479	1,998	20,212
Private transfers	-189	13,539	5,253	-9,285	-7,848	-2,971	773
Public asset-based reallocations	676	-167	174	1,130	1,605	927	-91
Private asset-based reallocations	3,749	-216	4,119	-3,588	-2,648	16,220	26,219
Reallocations	5,117	24,999	15,033	-20,062	-21,370	16,173	47,113

Table II.3. Summary of Hawaii Transfer Accounts by age groups, 2012, aggregate values ($million)

	Age groups						
	All	0-14	15-29	30-44	45-59	60-74	75+
Consumption	49,927	6,463	10,105	8,923	10,202	9,182	5,052
Labor income	42,788	0	5,840	14,362	16,235	5,932	420
Life-cycle Deficit	7,138	6,463	4,265	-5,439	-6,033	3,250	4,632
Public transfers	1,228	3,062	1,557	-2,255	-3,523	401	1,987
Private transfers	-263	3,500	1,490	-2,517	-2,215	-597	76
Public asset-based reallocations	943	-43	49	306	453	186	-9
Private asset-based reallocations	5,230	-56	1,169	-973	-747	3,259	2,578
Reallocations	7,138	6,463	4,265	-5,439	-6,033	3,250	4,632

Lifecycle details

Detailed components of per capita lifecycle measures are reported in Table II.4. Values by single year of age and aggregate values are available in the HTA database. Labor income is comprised of earnings and self-employment labor income. Both public and private consumption are comprised of education, health, and other.

Table II.4. Lifecycle and components by age groups, 2012, per capita values ($)

	Age groups						
	All	0-14	15-29	30-44	45-59	60-74	75+
Lifecycle deficit	5,117	24,999	15,033	-20,062	-21,370	16,173	47,113
Labor income	30,675	0	20,585	52,976	57,509	29,518	4,272
Earning	28,572	0	20,056	50,717	52,379	26,207	3,681
Self-employment income	2,103	0	529	2,259	5,130	3,310	592
Consumption	35,792	24,999	35,617	32,914	36,139	45,691	51,386
Private consumption	26,205	13,233	25,074	26,470	29,423	35,108	35,417
- Education	1,042	1,224	3,428	411	152	35	35
- Health	4,226	1,708	2,197	3,302	6,189	7,024	7,890
- Other	20,937	10,300	19,450	22,756	23,082	28,048	27,491
Public consumption	9,587	11,766	10,543	6,444	6,716	10,584	15,969
- Education	1,742	4,983	4,005	8	9	0	0
- Health	2,949	1,887	1,642	1,540	1,811	5,687	11,072
- Other	4,896	4,896	4,896	4,896	4,896	4,896	4,896

Consumption as measured in HTA is different than consumption measured in NIPA. HTA consumption is measured net of excise taxes and other taxes on consumption. Health care spending funded by the public sector is classified as public health consumption.

Reallocations

Two economic mechanisms can be used to reallocate resources across age: transfers and asset-based reallocations. These are discussed in turn.

Transfers

Transfers in HTA consist of cash and in-kind flows between one age group and another. Cash and in-kind flows received by an age group are referred to as inflows while flows provided by an age group are referred to as outflows. Transfers refer to the difference between the two or transfer inflows less outflows. Public and private transfers are distinguished in HTA.

In HTA public transfers distinguish Federal from State and Local transfers. A similar breakdown is not available for national accounts (NTA). In some instances, State and Local government may serve as the implementing agency for Federally funded-programs. In these cases, based on the source of funding, transfer programs are counted as Federal transfers.

The per capita public transfer inflows and outflows for Federal programs are shown for broad age groups in Table II.5. Public transfer inflows are comprised of education, health, and other in-kind transfer inflows along with pensions, e.g., Social Security, and other cash inflows. Outflows consist of federal taxes paid by residents with four types of taxes distinguished: consumption taxes; taxes on income profits and capital gains; taxes on property; and taxes on payroll and workforce. The age profiles vary depending on the type of tax. If taxes are insufficient to fund public transfer inflows, often the case in the United States, a public transfer deficit is incurred by US taxpayers including taxpayers in Hawaii. Hawaii's share of the national public transfer deficit is allocated in proportion to the share of national taxes paid by Hawaii residents.

Table II.5. Public Transfers: federal, by age groups, 2012, per capita values ($)

	Age groups						
	All	0-14	15-29	30-44	45-59	60-74	75+
Public transfers, federal	219	4,071	418	-6,684	-9,260	6,368	23,197
Public transfer inflows, federal	8,205	4,138	4,563	4,821	5,625	17,309	27,543
Education	1	4	2	0	0	0	0
Health	1,912	608	626	607	830	4,745	9,970
Other in-kind	2,831	2,831	2,831	2,831	2,831	2,831	2,831
Pensions	2,386	0	170	340	679	8,290	13,533
Other Cash	1,075	696	934	1,044	1,285	1,443	1,210
Public transfer outflows, federal	7,986	67	4,145	11,505	14,885	10,941	4,346
Taxes, federal	6,295	44	3,375	9,261	11,80	8,318	3,036
Goods and services (consumption)	84	44	85	97	90	103	98
Income, profits and capital gains	3,161	0	1,362	4,189	5,871	4,954	2,380
Property	63	0	58	103	74	73	83
Payroll and workforce	2,987	0	1,871	4,873	5,765	3,188	475
Public transfer deficit	1,691	23	769	2,243	3,085	2,623	1,310

Per capita public transfer inflows and outflows for all age groups combined are nearly equal, as shown in Table II.5, because the benefits from Federal programs received by residents of Hawaii exceed by a small margin the taxes and obligations (transfer deficit) incurred to fund federal programs. Values for single years of age and aggregate values are available in the HTA database.

The per capita public cash and in-kind transfer inflows due to State & Local programs are reported for broad age groups in Table II.6 with values by single-year-of-age and aggregate available in the database.

Table II.6. Public Transfers: state and local, by age groups, 2012, per capita values ($)

	Age groups						
	All	0-14	15-29	30-44	45-59	60-74	75+
Public transfers, state & local	662	7,771	5,068	-1,635	-3,219	-4,370	-2,985
Public transfer inflows, state & local	5,518	8,635	8,041	3,816	3,876	3,561	3,445
Education	1,740	4,980	4,003	8	9	0	0
Health	1,037	1,278	1,016	933	981	943	1,103
Other in-kind	2,066	2,066	2,066	2,066	2,066	2,066	2,066
Pensions	0	0	0	0	0	0	0
Other Cash	675	311	957	810	821	553	276
Public transfer outflows, state & local	4,856	864	2,973	5,452	7,095	7,931	6,430
Taxes, state & local	5,871	1,053	3,568	6,566	8,575	9,627	7,830
Goods and services (consumption)	2,089	1,053	2,099	2,412	2,260	2,573	2,416
Income, profits and capital gains	2,615	0	1,013	2,873	4,375	5,002	3,474
Property	946	0	201	914	1,604	1,864	1,905
Payroll and workforce	221	0	255	367	337	188	35
Public transfer deficit	-1,015	-189	-595	-1,114	-1,480	-1,696	-1,400

*Income, profits and capital gains include taxes and non-tax fees on ownership of assets used in production.
*Taxes include only those paid by Hawaii residents. TAT and excise taxes paid by tourists, in particular, are excluded.

Per capita private transfers and components are presented in Table II.7. Private transfers are defined as private transfer inflows less private transfer outflows. The inflows are substantial at all ages. For children the inflows are from adults to children, but for adults most transfers are between spouses or other adult partners. Private inter-household transfers are transfers between households with inflows and outflows assigned to the age of the household head or between household heads and non-residents. Net inter-household transfers are negative with outflows exceeding inflows. Net transfer outflows exceed inflows by a substantial amount for older adults in Hawaii.

Intra-household transfers are calculated indirectly by comparing estimated consumption to the disposable income of each household member. Those with more disposable income than consumption transfer their surplus to household members who have insufficient disposable income. If disposable income exceeds consumption for the household as a whole, the surplus is transferred to the household head and saved. If disposable income falls short of consumption for the household as a whole, the shortfall is funded through dis-saving assigned to the age of the household head. Private transfers include rent for those who live in rental property. For those who live in owner-occupied housing, private transfers include the rental value of owner-occupied households allocated to household members as transfers from the household head.

Based on data for broad age groups intra-household private transfers are negative for those in the 30-74 age range and positive for those under 30 and 75 or older. Data by single year of age, in the database,

provide more refined estimates showing that net private transfers are positive for those 23 and younger or 69 and older while they are negative for those between the ages of 24 and 68, inclusive.

Table II.7. Private Transfers by age groups, 2012, per capita values ($)

	Age groups						
	All	0-14	15-29	30-44	45-59	60-74	75+
Private transfers	-189	13,53	5,253	-9,285	-7,848	-2,971	773
Private transfer inflows	15,52	13,80	15,13	15,62	18,26	16,86	10,39
Private transfer outflows	15,71	261	9,878	24,90	26,11	19,83	9,624
Inter-household transfers	-470	0	323	-506	-828	-1,252	-1,266
Inter-household transfer inflows	128	0	486	82	34	27	28
Inter-household transfer outflows	597	0	163	587	862	1,279	1,294
Intra-household transfers	281	13,53	4,930	-8,779	-7,020	-1,720	2,038
Education	142	1,260	1,680	-632	-1,277	-315	-91
Health	11	1,787	461	-930	-1,066	-275	317
Housing	192	1,760	1,640	-169	-1,339	-1,015	-247
Other consumption	233	8,889	3,211	-4,815	-4,852	-1,367	671
Saving	-298	-157	-2,062	-2,233	1,513	1,251	1,389
Intra-household transfer inflows	15,40	13,80	14,64	15,53	18,23	16,83	10,36
Education inflows	677	1,278	1,979	144	46	4	5
Health inflows	1,582	1,806	1,196	1,081	1,850	2,066	1,733
Housing inflow	2,353	1,760	2,566	2,167	2,395	2,921	2,526
Other consumption inflows	6,137	8,957	7,255	4,973	4,964	5,468	3,432
Saving inflows	4,653	0	1,649	7,173	8,975	6,376	2,671
Intra-household transfer outflows	15,12	261	9,715	24,31	25,25	18,55	8,330
Education outflows	535	17	299	777	1,322	318	97
Health outflows	1,571	19	735	2,011	2,916	2,341	1,416
Housing outflows	2,160	0	926	2,336	3,734	3,936	2,774
Other consumption outflows	5,903	68	4,044	9,789	9,816	6,835	2,761
Saving outflows	4,950	157	3,710	9,405	7,462	5,125	1,282

*Only estimates of intra-household transfers by purpose are available

Asset-based reallocations

Accumulating assets during the working ages provides an important means of funding consumption in old-age. Those who have assets can fund consumption by relying on asset income of by selling or dissaving assets. Combining these two flows, asset income less saving, quantifies the lifecycle reallocation achieved through asset-based reallocations. Asset-based reallocations can be private or public. A classic example of private asset-based reallocations is a funded pension plan. In some countries public assets, such as natural resources, can be relied on to support retirement needs. But the more common case in the United States is when government relies on deficit spending to fund old-age needs.

To a smaller extent assets or debt are used to fund consumption at young ages. Young people may take out student loans or rely on credit cards to fund their retirement needs.

Asset-based reallocations will be negative if saving exceeds asset income. This is most likely to occur during the working years when individuals are accumulating resources to fund retirement needs in the future. Per capita private asset-based reallocations for broad age groups are reported in Table II.8. Aggregate values for broad age groups and both aggregate and per capita values for single-year-of-age are available in the database.

Table II.8. Private asset-based reallocation by age groups, 2012, per capita values ($)

	Age groups						
	All	0-14	15-29	30-44	45-59	60-74	75+
Private asset-based reallocations	3,749	-216	4,119	-3,588	-2,648	16,220	26,219
Private asset income	12,378	0	2,981	8,816	18,851	30,397	26,450
Private capital income	9,516	0	2,372	6,971	14,614	22,951	20,073
Private property income	2,862	0	609	1,846	4,237	7,445	6,377
Private property income, inflows	19,344	0	4,115	12,475	28,638	50,321	43,100
Private property income, outflows	16,482	0	3,506	10,629	24,401	42,875	36,723
Private saving	8,629	216	-1,139	12,404	21,499	14,177	231

Per capita public asset-based reallocations are reported in Table II.9.

Table II.9. Public asset-based reallocation by age groups, 2012, per capita values ($)

	Age groups						
	All	0-14	15-29	30-44	45-59	60-74	75+
Public asset-based reallocations	676	-167	174	1,130	1,605	927	-91
Public asset income	-714	-30	-340	-921	-1,260	-1,122	-624
Public saving	-1,390	137	-514	-2,050	-2,865	-2,048	-533
Public asset-based allocations, federal	1,691	23	769	2,243	3,085	2,623	1,310
Public asset income, federal	-597	-8	-272	-792	-1,090	-926	-462
Public saving, federal	-2,288	-31	-1,041	-3,036	-4,175	-3,549	-1,772
Public asset-based allocations, S&L	-1,015	-189	-595	-1,114	-1,480	-1,696	-1,400
Public asset income, S&L	-117	-22	-69	-128	-171	-195	-161
Public saving, S&L	898	167	527	985	1,310	1,501	1,239

Combined public asset-based reallocations are positive for almost all adult age groups because of the Federal government's use of deficit spending to fund public programs. This is not the case for State and Local governments for which public saving is positive.

Comparison with the U.S. account

Aggregate and per capita controls consist of HTA data for all age groups combined compiled from economic accounts and administrative data that are published by government agencies such as the DBEDT, the Bureau of Economic Analysis, the Centers for Medicare and Medicaid Services, and so forth.

The macro controls are combined with age profiles of consumption, income, and other economic series to finalize HTA. The shapes are constructed and then adjusted to match the aggregate controls. The macro controls also provide an overview of the structure of HTA and its components. Results for Hawaii are compared with results for the US in Table II.10.

Table II.10. Transfer Accounts: Hawaii and US, 2012

	Aggregate ($Million)		Per capita ($)	
	Hawaii	USA	Hawaii	USA
Lifecycle Deficit	7,138	3,364,433	5,117	10,721
Consumption	49,927	13,054,800	35,792	41,598
Private Consumption	36,554	9,519,100	26,205	30,332
Education	1,454	249,979	1,042	797
Health	5,894	1,274,600	4,226	4,061
Others NEC	29,206	7,994,521	20,937	25,474
Public Consumption	13,373	3,535,700	9,587	11,266
Education	2,429	735,626	1,742	2,344
Health	4,114	1,146,387	2,949	3,653
Others NEC	6,830	1,653,686	4,896	5,269
Less: Labor Income	42,788	9,690,367	30,675	30,878
Earnings	39,855	8,609,900	28,572	27,435
Self-employment labor income	2,934	1,080,467	2,103	3,443
Public Reallocations	2,172	839,900	1,557	2,676
Public transfers	1,228	-44,000	881	-140
Public transfer inflows	19,142	4,872,400	13,723	15,526
- In-kind	13,373	3,535,700	9,587	11,266
- Cash, pensions	3,328	768,700	2,386	2,449
- Cash, other NEC	2,441	568,000	1,750	1,810
Public transfer outflows	17,914	4,916,200	12,842	15,665
-Taxes and other revenues	16,971	4,033,200	12,166	12,852
-Transfer deficit (surplus)	943	883,000	676	2,814
Public asset-based reallocations	943	883,900	676	2,816
Asset income	-996	-421,600	-714	-1,343
Less: Saving	-1,939	-1,305,500	-1,390	-4,160
Private Reallocations	4,967	2,524,433	3,561	8,044
Private transfers	-655	-96,100	-470	-306
Private transfers, intra-household	0	0	0	0
Private transfers, inter-household	-655	-96,100	-470	-306
- Inflows	178	…	128	…
- outflows	833	…	597	…
Private asset-based reallocations	5,622	2,620,533	4,030	8,350
Asset income	17,266	4,253,033	12,378	13,552
Less: Saving	11,644	1,632,500	8,348	5,202
Memorandum item				
Population	1,394,905	313,830,990		

The US-Hawaii comparison of per capita values is interesting. Both private and public per capita consumption is lower in Hawaii than in the US. Private spending on education is higher in Hawaii than for the US as a whole, but public spending (and total spending) on education is lower in Hawaii. Private health spending in Hawaii and the US are similar, but public spending on health is a bit lower in Hawaii than the US.

In many respects public transfer systems in Hawaii are similar to those for the US as a whole. However, per capita in-kind public transfer inflows received by Hawaii residents are somewhat lower than inflows for US residents. Public transfer outflows are also lower in Hawaii than for the US as a whole. Per capita taxes are similar, but the per capita deficit is much higher for the US as a whole than for Hawaii residents.

The most important difference for private asset-based reallocations are that per capita saving is higher for Hawaii than for the US as a whole.

Appendix 1. Summary Measures

Effective number of workers

The effective number of workers is the population weighted by the labor income at each age relative to the average of those in the 30-49 age group. Thus, persons at the working ages of 30-49 count, on average, as one effective worker while those at other ages count as more than or less than one effective worker depending on the average labor income of persons of that age as compared with the average of the 30-49 age group. Effective workers of age x in year *t, L(x,t),* is defined as:

$$\begin{aligned} L(x,t) &= \tilde{y}_l(x)P(x,t) \\ \tilde{y}_l(x) &= y_l(x,b)/y_l(30-49,b) \end{aligned} \tag{2}$$

where $\tilde{y}_l(x)$ is the normalized age profile of labor income equal to the per capita labor income of persons age *x* relative to the average per capita income of persons aged 30-49 years calculated in the base year b. $P(x,t)$ is the population age *x* in year *t*. The total effective number of workers in year t, L(t), is:

$$L(t) = \sum_{x=0}^{\omega} L(x,t) \tag{2}$$

where the maximum years lived is ω.

Effective number of consumers

The effective number of consumers is defined in a fashion similar to the effective number of workers with *N(x,t)*, the effective number of consumers age x in year t, equal to:

$$\begin{aligned} N(x,t) &= \tilde{c}(x)P(x,t) \\ \tilde{c}(x) &= c(x,b)/c(30-49,b) \end{aligned} \tag{2}$$

where $\tilde{c}(x)$ is the normalized consumption age profile that measures how consumption at each age compares with consumption by those of age 30-49 years. The total effective consumer in year t is:

$$N(t) = \sum_{x=0}^{\omega} N(x,t). \tag{3}$$

Support ratio

The support ratio is a measure of population age structure that emphasizes the balance between the number of workers and the number of consumers in any population. The support ratio incorporates differences unique to a state or a country in the age patterns of labor income and consumption at each age. The support ratio rises when the population becomes concentrated at the age in which people have high labor income or low consumption relative to those at other ages. The support ratio $SR(t)$ is equal to:

$$SR(t) = \frac{L(t)}{N(t)} \tag{4}$$

the ratio of the effective number of workers to the effective number of consumers. The channels through which population influence economic aggregates are framed in the following fashion. By definition total income, $Y(t)$, is equal to:

$$Y(t) = \frac{Y(t)}{L(t)} \times L(t). \tag{5}$$

Income per effective consumer is equal to the product of output per effective worker and the support ratio:

$$\frac{Y(t)}{N(t)} = \frac{Y(t)}{L(t)} \times SR(t). \tag{6}$$

In growth terms

$$gr\left[\frac{Y(t)}{N(t)}\right] = gr\left[\frac{Y(t)}{L(t)}\right] + gr\left[SR(t)\right] \tag{7}$$

where gr[x] denoted the growth rate of the argument x. Holding output per worker constant, an increase in growth in the support ratio leads to a one-for-one increase in the growth of output per effective consumer. Growth in the support ratio over the demographic transition is called the first demographic dividend. Any effects of demographic change on output per effective worker are not considered here.

Child Gap Ratio

The child gap ratio is the gap between consumption and labor income for children, those under age 25, relative to total labor income.

$$\text{Child Gap Ratio} = \sum_{x=0}^{24} C(x,t) - Yl(x,t) \Big/ Yl(t) \tag{7}$$

where $C(x,t)$ is consumption of those age x in year t, $Yl(x,t)$ is labor income of those age x in year t, and $Yl(t)$ is total labor income in year t. The aggregate components are calculated using the base year age profiles of consumption and labor income and the projected population at each age.

Old-age Gap Ratio

The old-age gap ratio is the gap between consumption and labor income for seniors, those aged 65 and older, relative to total labor income.

$$\text{Old-Age Gap Ratio} = \sum_{x=65}^{\omega} C(x,t) - Yl(x,t) \Big/ Yl(t) \tag{7}$$

Gap Ratio

The gap ratio is the gap between consumption and labor income for children and seniors relative to total labor income. The gap ratio is defined as:

$$Gap\ Ratio = Child\ Gap\ Ratio + Old\text{-}age\ Gap\ Ratio \tag{8}$$

Appendix 2. Population projections for Hawaii

Population projections for Hawaii are extended from 2045 to 2060 using the following approach. After 2045 the population 0-4 is projected to grow at the same rate as for the 2040-2045 period. "Net survival" for those five and older is held constant at the values for the 2040-2045 period where net survival is calculated as

$$
\begin{aligned}
s(x) &= N(x, 2045) / N(x-5, 2040) \\
s(85+) &= N(85+, 2045) / \left(N(85+, 2040) + N(80-84, 2040) \right) \\
N(x,t) &= N(x-5, t-5) s(x) \text{ for } t > 2045
\end{aligned}
\tag{9}
$$

The key assumption underlying this approach is that survival rates do not change after 2045. To the extent that life expectancy increases after 2045, the population at old ages will be modestly larger than the projected value.

Interpolation of single year of age population data from five-year age groups rely on Sprague interpolation.

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