

THE IMPACT OF INSUFFICIENT RETIREMENT SAVINGS ON THE COMMONWEALTH OF PENNSYLVANIA

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TABLE OF CONTENTS

Table of Contents	2
Executive Summary	3
1.0 Introduction and Methodology.....	5
1.1 Report Purpose	5
1.2 Pennsylvania’s Elderly and Near-Retiree Population	6
1.3 Defining Insufficient Retiree Savings	8
1.4 Current and Future Net Impacts	10
1.5 Organization of Report	12
1.6 Glossary of Terms	12
2.0 State Assistance Costs	14
2.1 Aggregate State Assistance Costs for Elderly Residents.....	14
2.2 State Assistance Costs by Income Level.....	17
2.3 Quantifying Insufficient Retiree Savings	20
2.4 The Impact of Insufficient Savings on State Assistance Costs.....	22
3.0 Economic Impacts of Reduced Household Spending	23
3.1 Aggregate Elderly Household Spending	23
3.2 Impact of Insufficient Retiree Savings on Household Spending	25
3.3 Economic and Tax Revenue Impact of Reduced Household Spending.....	26
4.0 Future Assistance Costs and Economic Impacts	28
4.1 Population Growth.....	28
4.2 Excess Medical Inflation	30
4.3 Income Scenarios.....	31
4.4 Projected Assistance Costs from Insufficient Retiree Savings	32
4.5 Projected Economic Impact from Reduced Household Spending.....	33
5.0 Summary of Results.....	36
5.1 Cumulative Costs and Impacts, 2015-2030	36
Appendix A – Modeling Household Incomes.....	40
Appendix B – Modeling State Assistance Costs	53
Appendix C – Modeling Household Spending.....	72
Appendix D – About Econsult Solutions, Inc. (ESI)	91



EXECUTIVE SUMMARY

The financial capacity of elderly households to maintain their living standards during their retirement years has significant quality of life implications for a large (and growing) proportion of Pennsylvanians. While considerable research has focused on the implications for individuals, the issue also has significant implications for the state's economy and fiscal health. These fiscal and economic challenges will grow over time. This report quantifies two categories of public impacts from insufficient savings for elderly Pennsylvanians:

- **Current and future costs to the state for public assistance programs for elderly residents.** State funding supports programs for elderly residents like medical services and long-term care that are frequently means-tested for eligibility and/or benefit levels. This means that the level of income available to the state's elderly population has significant impacts on state assistance costs.
- **Current and future loss of economic activity due to reduced household spending by elderly households.** The income level of elderly households also impacts their level of spending on a variety of goods and services each year. Household spending losses ripple through the economy, resulting in lower levels of activity and employment within the state economy, and ultimately less tax revenue accruing to the state government.

Importantly, state assistance costs and economic activity losses due to insufficient savings take on even greater salience with the aging of the baby boom generation. Assuming continuity of policy, program eligibility and economic factors, this report projects significant growth in both state assistance costs and lost economic activity through 2030 based on broad structural factors like growth in the elderly population and anticipated growth in medical costs.

KEY FINDINGS

- State assistance costs for elderly residents are estimated at \$4.2 billion in 2015.
 - 54 percent of this cost is accounted for by the 21 percent of the elderly population with \$20,000 or less in annual household income.
- State assistance costs would have been an estimated \$3.5 billion in 2015 if elderly households had sufficient savings, a net difference of \$700 million from the \$4.2 billion spent by the state.
 - The net difference in state assistance costs due to insufficient savings is projected to grow from \$700 million in 2015 to \$1.1 billion in 2030, totaling a cumulative \$14.3 billion over the 2015-2030 period (see Figure ES.1).
- Pennsylvania's elderly households had an estimated \$49.8 billion in household spending in 2015. Given sufficient savings levels, these households would have spent an estimated \$51.8 billion, for a net expenditure loss of \$2.0 billion.
 - This net expenditure loss due to insufficient savings is projected to grow to \$3.1 billion by 2030, totaling a cumulative \$40.0 billion over the 2015-2030 period (see Figure ES. 2).
- Including spillover effects, this reduced spending resulted in an estimated \$2.8 billion in lost economic output in the state economy in 2015. Lost output is projected to grow to \$4.3 billion in 2030, totaling a cumulative \$55.8 billion over the 2015-2030 period (see Table ES.1).
 - This loss of economic activity also represents a loss of employment and associated earnings. Further, it shrinks the state's tax base, reducing state revenue collections by an estimated \$70 million in 2015 and \$106 million in 2030, and a cumulative total of \$1.4 billion for the 2015-2030 period.



FIGURE ES.1 – NET STATE ASSISTANCE COSTS DUE TO INSUFFICIENT SAVINGS, 2015-2030 (IN \$2015)

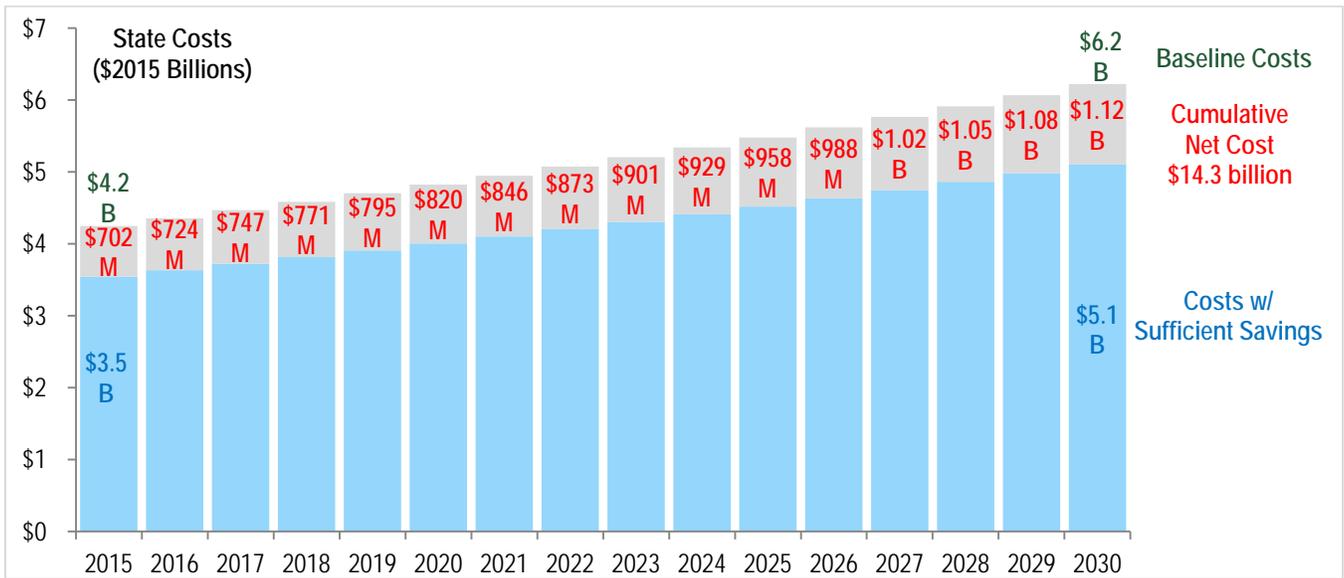


FIGURE ES.2 – REDUCED HOUSEHOLD SPENDING DUE TO INSUFFICIENT SAVINGS, 2015-2030 (IN \$2015)

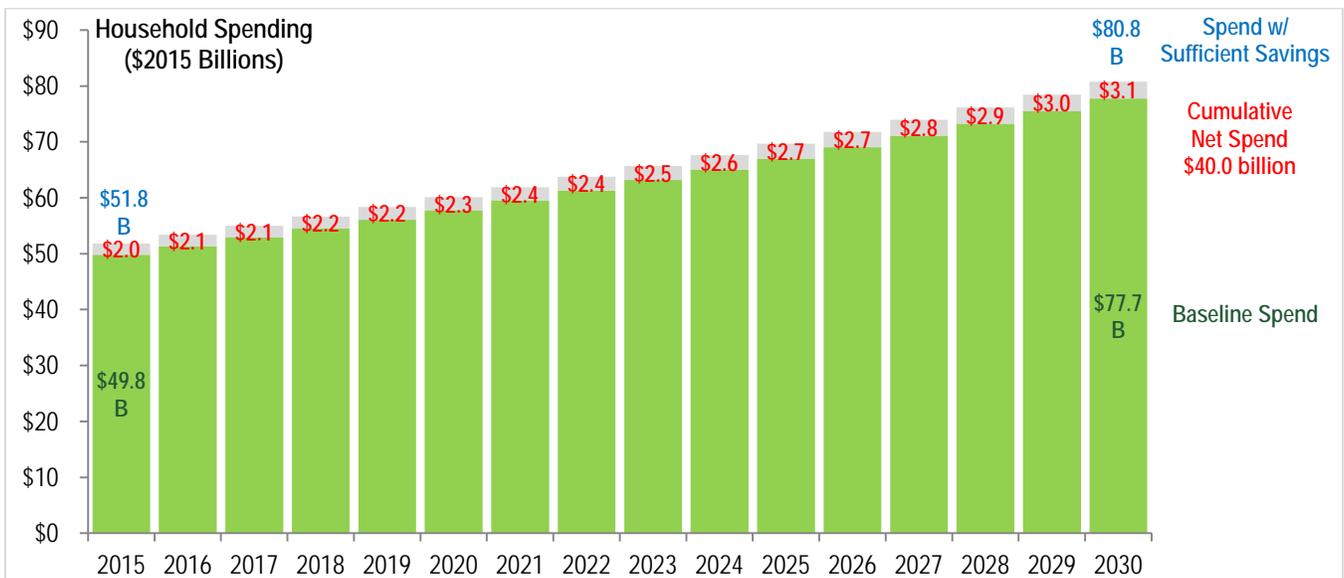


TABLE ES.1 – NET ECONOMIC AND TAX REVENUE IMPACTS OF REDUCED HOUSEHOLD SPENDING, 2015-2030 (\$ IN 2015)

	2015	2030	Cumulative 2015-2030
Economic Output	\$2.8 billion	\$4.3 billion	\$55.8 billion
Employment (FTE)	20,680 jobs	31,830 jobs	25,880 jobs per year
Earnings	\$857 million	\$1.3 billion	\$17.2 billion
State Tax Revenue	\$70 million	\$106 million	\$1.4 billion



1.0 INTRODUCTION AND METHODOLOGY

1.1 REPORT PURPOSE

The financial capacity of elderly households to maintain their living standards during their retirement years has significant quality of life implications for a large (and growing) proportion of Pennsylvanians. While considerable research has focused on the implications for individuals, the issue also has significant implications for the state's economic conditions and for its fiscal situation. These fiscal and economic challenges are anticipated to magnify over time as the state's elderly population grows.

Recent studies have estimated the cost to state governments of inadequate retirement savings in Utah¹ and Maine,² as measured in terms of anticipated public assistance costs for new retirees over the next fifteen years. This report, commissioned by the Pennsylvania State Treasurer and undertaken by Econsult Solutions, Inc. (ESI), estimates the magnitude of this issue within Pennsylvania, building upon these analytical frameworks. In addition, it extends the analysis in two important ways:

- First, we isolate the portion of state assistance costs and lost economic activity that is attributable to insufficient retirement savings by comparing baseline cost and spending projections to a scenario in which elderly residents are able to achieve adequate savings levels. This approach isolates the impacts of insufficient savings from the broader implications of an aging population on the state's budget and its economy.
- Second, we focus not only on direct state assistance costs through public programs, but also on lost private sector activity in the form of reduced household spending and its ripple effects. These losses have consequences across the state's economy (including on the level of employment and earnings among the working-age population) and ultimately its tax base.

The results of this analysis demonstrate the collective public impact of the private retirement savings of just one generation of Pennsylvanians.

¹ Notalys, LLC (2015). "The Cost of Retiring Poor: Cost to Taxpayers of Utahns Retiring Poor." <<https://www.aarp.org/content/dam/aarp/ppi/2016-03/cost-to-taxpayers-of-utahns-retiring-poor.pdf>>

² Philip Trostel (2017). "The Fiscal Implications of Inadequate Retirement Savings in Maine." *University of Maine*. <<https://mcspolicycenter.umaine.edu/wp-content/uploads/sites/122/2017/03/final-aarp-report.pdf>>



1.2 PENNSYLVANIA'S ELDERLY AND NEAR-RETIREE POPULATION

Broad demographic trends have increased the importance of retirement incomes on the fiscal and economic health of the state economy. The baby boomer generation born between 1946 and 1964 represents a disproportionate share of the population across the US, and will collectively reach the traditional retirement age of 65 between 2011 and 2029. The aging of this generation (with 10,000 boomers estimated to turn 65 each day nationally for nearly two decades)³ will dramatically change the composition of the nation's population.

These demographic changes will be especially pronounced in Pennsylvania, which is currently the seventh oldest state in the nation.⁴ Figure 1.1 below shows Pennsylvania's population by five-year age bands as of 2015. Of the state's 12.8 million residents, 2.2 million (or 17 percent) were age 65 or older. The near-retiree age groups from 50-64 (those born between 1951 and 1965, represented by the total of the three blue columns in the charts below) collectively represent 2.7 million residents (21 percent of the state's population).

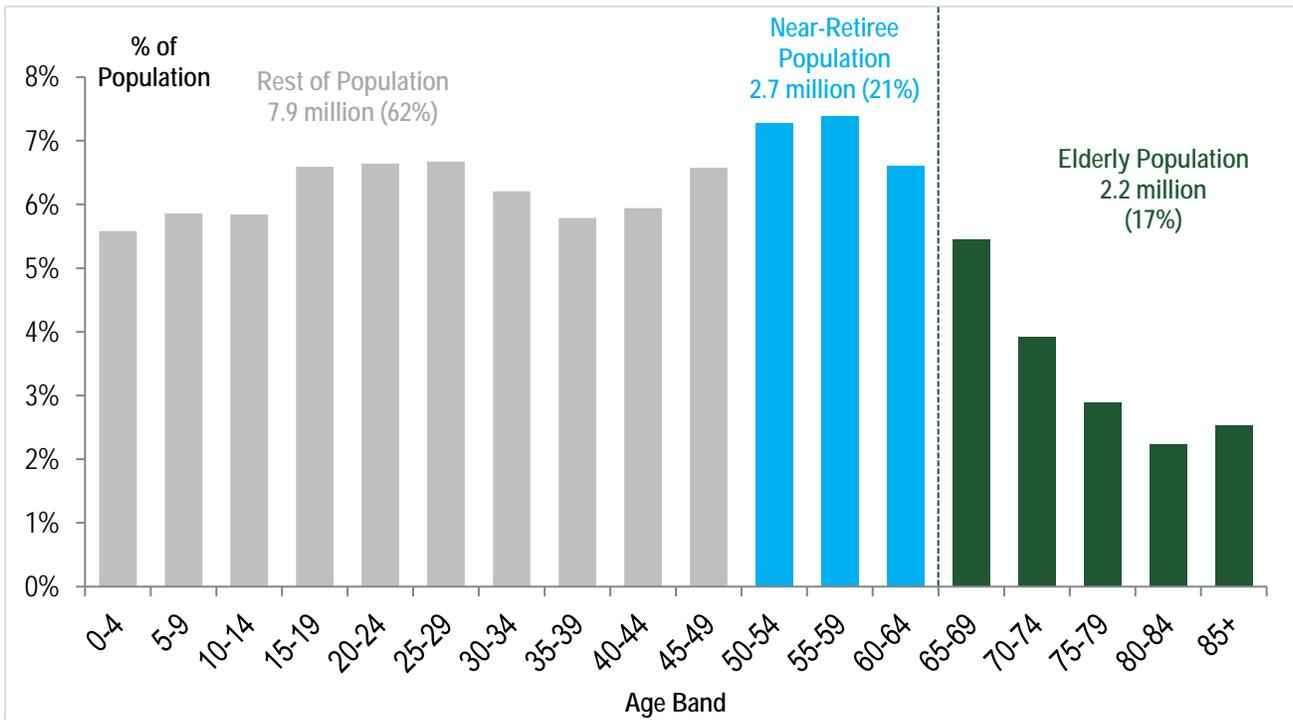
Projections from the Pennsylvania Independent Fiscal Office (IFO) estimate that the population of residents age 65 and older will increase to 3.1 million by 2030, representing 23 percent of the state's population (see Figure 1.2). This growth is driven primarily by the aging of this baby boomer cohort, which will cross into the elderly age range (demarcated by the dotted line in the figures below) over this time period.

³ Pew Research Center (2010). "Baby Boomers Retire" <<http://www.pewresearch.org/fact-tank/2010/12/29/baby-boomers-retire/>>

⁴ David Johnson. "These are the Youngest States in America." *Time Magazine*, November 6, 2017. <<http://time.com/5000792/youngest-oldest-us-states/>>

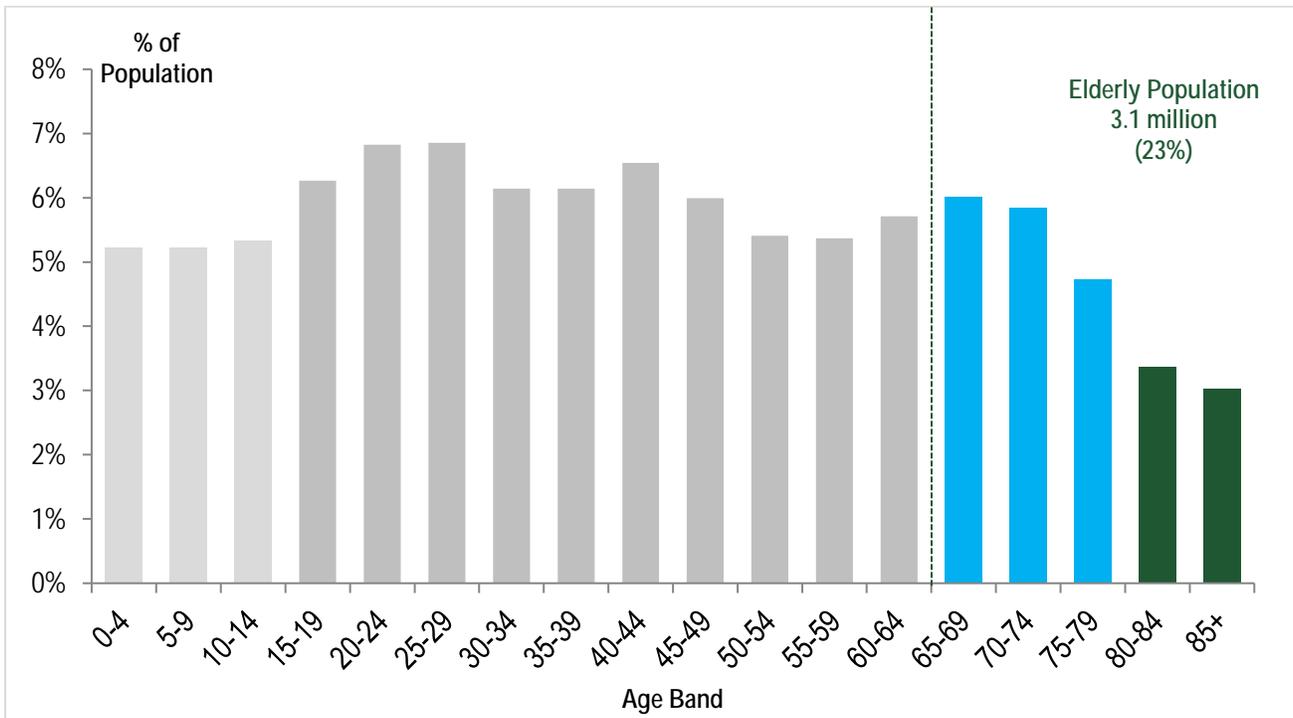


FIGURE 1.1 – AGE DISTRIBUTION OF PENNSYLVANIA’S POPULATION, 2015



Source: US Census Bureau, Pennsylvania IFO

FIGURE 1.2 – PROJECTED AGE DISTRIBUTION OF PENNSYLVANIA’S POPULATION, 2030



Source: US Census Bureau, Pennsylvania IFO

This changing population composition has significant fiscal implications for the Commonwealth of Pennsylvania. State assistance costs are typically larger for retirees than for working-age residents, due in large part to elder care and medical needs. In addition, elderly residents typically have lower incomes than working-age residents, qualifying them in larger numbers for state funded means-tested programs.

This report estimates that state assistance costs for elderly residents in Fiscal Year 2015-2016 were around \$4.2 billion (see Section 2). Further, it estimates that Pennsylvania's elderly residents accounted for around \$50 billion in household spending in 2015 (see Section 3). Each of these figures is anticipated to grow (in real dollar terms) significantly by 2030 due primarily to the projected 42 percent increase of the elderly population (see Section 4).

The extent to which Pennsylvania's residents are able to save adequately impacts their level of income during their retirement years. The retirement income of the state's elderly residents, in turn, impacts both the level of state assistance they will receive, and the amount they will pump into the state's economy and tax base through spending on goods and services. The report that follows will:

- 1) Project the level of insufficiency of income during retirement for Pennsylvania's elderly residents from 2015-2030;
- 2) Quantify the degree to which insufficient retirement savings contribute to public assistance costs for elderly Pennsylvanians;
- 3) Quantify the degree to which insufficient savings reduce economic activity across the state (through reduced household spending);
- 4) Project the potential change in net assistance costs and net economic activity losses due to insufficient retirement savings through the year 2030.

1.3 DEFINING INSUFFICIENT RETIREE SAVINGS

The central task of this report is quantifying the degree to which insufficient savings among elderly residents increase public assistance costs and decrease overall statewide economic activity and tax revenue. Addressing this task necessarily requires defining insufficient savings, which in turns requires defining what would constitute sufficient savings for Pennsylvania's elderly residents.

The concept of sufficient wealth for retirement has been studied and debated for decades. Financial planners and retirement experts typically define the ultimate target for financial security in retirement in relation to the annual income level that a person or household has during their working years. This approach is premised on identifying a target annual income that will enable retirees to maintain their pre-retirement living standards and to support a similar (though reduced, age-adjusted) level of expenses through their retirement years. The approach is typically implemented through one of two frameworks: either a recommended lump sum savings amount (such as eight to ten times one's annual working age income level)⁵ or a recommended percentage of annual working age income

⁵ See for example: Fidelity Viewpoints. "How much do I Need to save for Retirement? Savings factor: Aim to save at least 1x your income at 30, 3x at 40, 7x at 55, 10x at 67." Jun 5, 2017. <<https://www.fidelity.com/viewpoints/retirement/how-much-money-do-i-need-to-retire>>



(such as 70-85 percent)⁶ available each year in retirement.⁷ Since these approaches are tied to working age incomes, rather than a flat dollar figure, they allow for and incorporate factors like variations in cost of living and living standards.

This analysis is based on the income replacement framework rather than the lump sum framework. In other words, savings are evaluated from the perspective of the annual income stream they support during retirement years, rather than their lump sum balance or net wealth. This annualized income framework provides a more comprehensive picture of the financial means of an elderly resident than a lump sum balance alone, since it accounts for ongoing income streams (such as Social Security).⁸ This approach also allows for the evaluation of public assistance program eligibility and household spending, which together comprise the fiscal and economic implications of changes in household income.

The income replacement framework is difficult to utilize to develop replacement income recommendations for low-income residents. For a resident living at or below the Federal Poverty Level (FPL) (which stood at \$11,770 for a one-person household and \$15,930 for a two person household in 2015), replacement with the recommended proportion of annual income would leave them below the FPL and further in poverty. For residents just above the poverty line, the replacement proportion may produce a recommended income that drops them into poverty. In these cases, the recommended replacement rate does not ensure adequate available income to meet basic household needs. Conversely, a strict replacement rate framework may not be applicable to households at the upper end of the income scale from a public policy perspective. For the wealthiest households, replacement rates of less than the recommended 70-80 percent may still yield sufficient resources to live comfortably. These savings levels will not be characterized as insufficient within this report.

To address these issues within a replacement framework, **sufficient income for elderly residents is defined as 75 percent of their annual working age (50-64) income, with a minimum retirement income of the Federal Poverty Level. Incomes for elderly residents above \$75,000 are considered sufficient** regardless of the proportion of working age income replaced.⁹

⁶ A 2016 study by the U.S. Government Accountability Office (GAO) "analyzed 59 articles and reports that discussed how to develop, calculate or evaluate replacement rates" and concluded that "target replacement rates cited in the articles and reports GAO reviewed typically range between 70 and 85 percent." GAO, "Better Information on Income Replacement Rates Needed to Help Workers Plan for Retirement." Mar 1, 2016. <<https://www.gao.gov/products/GAO-16-242>>

⁷ Note that this replacement rate is typically inflation adjusted, such that retirement income represents 70-85% of the purchasing power from a person's working years, rather than just 70-85% of the nominal value. The method for addressing this and other technical issues in calculating replacement rates is described further in Appendix A.3. For a detailed discussion of the replacement rate framework and the challenges in defining and calculating replacement rates, see: Patrick J. Purcell, Social Security Office of Retirement and Disability Policy, "Income Replacement Ratios in the Health and Retirement Study," *Social Security Bulletin*, Vol 72, No 3 (2012). <<https://www.ssa.gov/policy/docs/ssb/v72n3/v72n3p37.html>>

⁸ The total annual income available to an elderly household is often a function of both ongoing revenue streams from funds maintained by third parties (such as annuities, or the previously mentioned Social Security and defined benefit plans) and drawdowns from directly owned funds (such as withdrawals from private savings accounts or distributions from 401(k)s and individual retirement accounts). Annual income can also include wages if an elderly individual continues to work. This analysis, which is based on the Current Population Survey (CPS) dataset, combines all of these components of retirement income, although it does not detail the income streams themselves, presenting instead a singular annualized income figure.

⁹ This replacement rate target falls well within the typical range of 70 to 85 percent. Pennsylvania's exemption on taxes for retirement income suggests that targeted rates at the lower end of the national range may be appropriate (although many other states have partial exemptions and federal income tax liabilities are more significant than state). Conversely, recent research has focused on factors such as increasing lifespans, lower interest rates and reductions in the prevalence of defined benefit plans that increase the likelihood that elderly residents may "outlive their savings." See for example: Alicia Munnell (2015). "Falling Short: The Coming Retirement Crisis and What to do about it." *Center for Retirement Research at Boston College*. <http://crr.bc.edu/wp-content/uploads/2015/04/IB_15-7_508.pdf>.



The term “**sufficient savings**” refers to the amount of savings that will annually yield sufficient income during retirement. The term “**insufficient savings**” rather than “**insufficient income**” is used throughout this report to describe the net difference between elderly incomes under two scenarios (described in section 1.4) in order to highlight the role of saving behavior during working years as a key determinant of the ability of individuals to meet income targets in retirement. Given the fixed nature of public assistance and Social Security, returns on personal retirement savings often fill that gap for those who have successfully prepared for retirement.

The use of the FPL as a minimum standard in this report does not imply that these incomes are necessarily desirable or adequate to meet the needs of retiree households. Rather, the FPL is useful as a well-established and recognized benchmark against which incomes can be compared.¹⁰

1.4 CURRENT AND FUTURE NET IMPACTS

The analytic approach of this report is to estimate public assistance costs and household spending for elderly Pennsylvanians by income level under two scenarios. Observed incomes for elderly residents based on data from the Current Population Survey represent the “baseline” scenario, while incomes under the “sufficient savings” scenario are modeled based on the standards described above in Section 1.3.

State assistance costs and spending elderly households are estimated under each of these scenarios. The net difference in public assistance costs and household spending between the baseline scenario and sufficient savings scenario represents the fiscal costs and economic losses (and attendant economic and tax revenue impacts) attributable to insufficient savings. The implications of insufficient savings are initially estimated for the year 2015, allowing for the use of complete budget data, observed data on the state’s demographics, and other contemporaneous data inputs.

This analysis is then extended to the year 2030 in order to demonstrate the effect of insufficient savings over the period of time in which the baby boomer generation retires.¹¹ Continuity is assumed in program structure, administration and eligibility, meaning that elderly residents at a given income level are assumed to be enrolled in the same programs and receiving the same level of benefits or services in 2030 as in 2015. Similarly, total household spending is assumed to remain constant (in real dollars) for household of a given income band in 2030 and 2015. Finally, the retirement preparedness trends for near-retirees relative to their working age (50-64) incomes are assumed to continue unchanged through 2030.¹²

¹⁰ See Appendix A.3 for further discussion of the concept of the replacement rate framework used in this analysis, and of the use of the Federal Poverty Level as a minimum standard. See Section 1.6 for a glossary of key terms and data sources used throughout the report.

¹¹ This projects is not extended beyond the baby boomer generation due to the declining reliability of extrapolating current trends over an extended time period. In practice, subsequent generations have a greater opportunity to address current savings shortfalls since they have additional years remaining in the workforce. Future generations may also face unique savings challenges (such as elevated student debt levels). Due to these quantification challenges, this analyses is limited to a single generation of retirees.

¹² In practice, a broad range of factors beyond income levels can affect individuals’ retirement readiness (including their current and future savings levels, participation in defined benefit or defined contribution plans, other household assets such as property, length of time in the workforce, trends in health and wellness, and in and out migration with a given geography). Our analysis does not project these elements individually, but rather incorporates the effect of each into the simplifying assumption that the relationship between working age and future retirement income observed from 2000-2015 will remain consistent from 2015-2030. Section 4.3 and Appendix A.2 contain a detailed discussion of both the methodology through which this assumption is applied, and the body of research on the relative preparedness of current near-retirees compared to prior generations.

Changes in assistance costs and household spending estimates from 2015 to 2030 are driven by three factors: population change (due to the demographic wave of aging baby boomers, who comprise the greatest proportion of the population as mentioned above); excess medical inflation (which is anticipated to continue to grow faster than overall inflation, raising the relative cost of healthcare services, which represent a the majority of state assistance expenditures); and current household incomes (which represents a starting point from which to project future income at baseline and sufficient scenarios).¹³

Using the adjustments described above, this report projects state assistance costs and household spending impacts for the year 2030. Elderly incomes are projected under both the baseline scenario (which assumes the continuation of current trends) and under a sufficient savings scenario, where residents meet the income replacement benchmarks (75 percent of working age income or the Federal Poverty Level) as defined in Section 1.3. The net differences in public assistance costs and household spending between these scenarios represent the projected fiscal costs and economic losses (and attendant economic and tax revenue impacts) attributable to insufficient savings in 2030.

Consistent with its focus on the elderly population, the sufficient savings scenario does not make any adjustment for changes in household spending among working age residents that may result from changes in savings behavior. While greater rates of savings during working years could negatively impact consumption, offsetting some of the gains in spending among retirees, changes in savings behavior may also yield increases in consumption over a person's lifespan, rather than simply shifting between working age and retirement years.¹⁴

The structural factors outlined above lead to significant increases in the projected annual level state assistance costs and economic losses due to insufficient savings by 2030. Once estimates have been generated for the starting point (2015) and endpoint (2030) of the analysis period, it is also useful to calculate the cumulative impacts over the intervening years. This is undertaken by assuming a consistent growth rate in net public costs and net economic losses to approximate values for the intervening years, and summing those values to cumulative estimates.

¹³ See Section 4 for further discussion and calculations of each of these factors over the 2015-2030 period.

¹⁴ For example, the compounding effects of investment returns relative to inflation mean that a marginal dollar saved in working years may yield more than a dollar of consumption in retirement. In addition, people that increase their savings rate may choose to work more or longer (or another member of their household might do so) to increase their income by a corresponding amount, or may reduce out of state rather than in state consumption (such as vacations), neither of which would result in a drop in expenditures within the state economy. Since this report does not assume any particular policy or behavioral mechanism through which retirement income benchmarks are achieved, any adjustment for these additional effects would be speculative. See Appendix C.6 for further discussion of this issue.

1.5 ORGANIZATION OF REPORT

The four sections that follow set forth the steps and calculation described above. The report proceeds as follows:

- **Section 2: State Assistance Costs** identifies and quantifies state assistance spending on elderly residents, identifies the relationship between income and assistance costs, and estimates the net effect of insufficient retirement savings on state assistance costs as of 2015.
- **Section 3: Economic Impacts of Reduced Household Spending** defines household spending profiles for elderly households of varying income levels, estimates the loss in household spending due to insufficient savings at each income level and in the aggregate as of 2015, and calculates the total economic impact of that lost spending for the state's economy and tax base.
- **Section 4: Future Assistance Costs and Economic Impacts** projects changes in the state's elderly population as of 2030, accounts for trends in incomes and medical costs, and projects the net growth in state assistance costs and net losses in economic activity and tax revenue due to insufficient retirement savings as of 2030.
- **Section 5: Summary of Results** aggregates findings from the previous chapters, compares net impacts on state assistance costs and economic activity over time, and calculates the cumulative impact in these categories over the 2015-2030 period.

Due to the complexity involved in generating these estimates, the methodology and data sources utilized to arrive at the calculation are detailed in appendices included to this report. Appendix A discusses the methodology for modeling household incomes, Appendix B the methodology for modeling state assistance costs, and Appendix C the methodology for modeling household spending. In addition, Section 1.6 below contains a glossary of terms used throughout the report

1.6 GLOSSARY OF TERMS

Several terms are used throughout the report to address the methodology. In order to clarify the calculations, consistent terms for individuals, households, goods, and costs are necessary. Below are the terms and data sets used (and referenced frequently) throughout the report and appendices.



KEY TERMS

Population

Elderly	Individuals aged 65 and older (note that not all retirees are elderly, and not all elderly residents are retirees)
Near-retiree	Individuals aged 50-64
Dependency ratio	The ratio within a population of individuals of typical working age (20-64) to those above and below that age range (children and elderly)

Income

Replacement rate	The proportion of preretirement income recommended to maintain a similar standard of living during retirement (defined as 75% within this report)
Federal Poverty Level (FPL)	The federally-defined maximum annual household income that constitutes a household in poverty, based on the Federal Poverty Income Guidelines (FPIG) issued by the U.S. Department of Health and Human Services. Set at \$11,770 for a one-person household and \$15,930 for a two-person household (and higher for larger households) for 2015
Federal Benefit Rate (FBR)	The maximum payment in the federal Supplemental Security Income (SSI) program, set at \$733 per month for individuals in 2015, which is used as a benchmark for qualification and benefit levels for some assistance programs.
Baseline	The observed income distribution, assistance cost and household spending for elderly residents in 2015, and the projected income distribution, assistance cost and household spending for elderly residents in 2030 based on the continuation of current trends
Sufficient savings	For purposes of modeling income distribution, "sufficient savings" are savings that provide elderly individuals with an annual household income that is at least 75% of their working age (50-64) annual income, with a minimum of the Federal Poverty Level; and in aggregate, this term describes income distribution, assistance costs and household spending for elderly residents in a scenario in which all elderly residents have achieved this income benchmark
Insufficient savings	For purposes of modeling income distributions, "insufficient savings" are savings that provide elderly individuals with an annual household income that is less than 75% of their annual working income or is less than the Federal Poverty Level (whichever amount is greater); and, in aggregate, this term describes the differential between elderly incomes under the baseline and sufficient savings scenarios
Net	The differential in calculated outcomes (state assistance costs, household spending, economic and tax revenue impact) between the baseline and sufficient savings scenarios (i.e. due to insufficient savings)

KEY DATA SOURCES

CAMS	The Consumption and Activities Mail Survey (part of the longitudinal University of Michigan Health and Retirement Study (HRS)) is used to estimate household spending patterns for elderly households.
CMS	The federal Centers for Medicare and Medicaid Services provides detail on program enrollment and spending for Medicare-Medicaid dual enrollees in Pennsylvania
CPI	The Consumer Price Indices (calculated by the Bureau of Labor Statistics) provides information on inflation level across the economy (though CPI-U, the index for all urban consumers) and for specific sectors (such as CPI-Medical, the index for medical care)
CPS	The Current Population Survey (conducted by the U.S. Census Bureau) provides information on income patterns for elderly and near-retiree Pennsylvanians
IFO	Pennsylvania's Independent Fiscal Office, which calculates state population projections utilized in this report as well as other relevant demographic, economic and fiscal analysis

2.0 STATE ASSISTANCE COSTS

Pennsylvania administers a variety of programs that provide elderly residents services ranging from medical care to housing rebates to transportation assistance. The largest of these programs is Medicaid, which uses a mix of state and federal funds to provide supplemental medical services to qualifying elderly residents (including long-term care). In aggregate, **state expenditures for elderly assistance are estimated at \$4.2 billion for 2015.**

Many programs serving elderly residents use means-testing to determine program eligibility and/or program benefit levels. Based on analysis of program eligibility standards and utilization data, it is estimated that **54 percent of state assistance costs for elderly residents were accounted for by the 21 percent of the population with \$20,000 or less in household income** and 83 percent by the 50 percent of the population with \$40,000 or less in income in 2015.

The inverse correlation between income level and state assistance costs means that insufficient retiree savings have a significant impact on state expenditures for these programs. It is estimated that **state assistance costs would have been \$3.5 billion in 2015 if elderly households had sufficient savings, rather than the nearly \$4.2 billion that was spent. Accordingly, state assistance costs due to insufficient savings were roughly \$700 million for 2015.**

2.1 AGGREGATE STATE ASSISTANCE COSTS FOR ELDERLY RESIDENTS

Using information from the state budget¹⁵ as well as the *Benefits & Rights for Older Pennsylvanians* guide published by the State Department of Aging,¹⁶ this analysis identified eight programs that together capture the major state assistance programs for the elderly. As detailed below in the tables, the aggregate state expenditure on elderly residents is estimated for each of these programs to form a starting point for this analysis.

Most prominent among these is Medicaid, which uses a mix of federal and state funds to provide medical benefits to families, disabled, low income and elderly residents.¹⁷ This program is divided into four sub-programs for the purpose of this analysis, since each of these areas functions somewhat differently with respect to state expenditures for elderly residents. While the Medicare program is the primary health insurance program for most elderly Americans, Medicaid serves as a crucial supplement for many people. Most notably, most long-term care services (whether in institutions or at home) fall outside of Medicare, and are covered by Medicaid for qualifying elderly residents. These Medicaid costs, driven by long-term and home-care in particular, represent the majority of state assistance expenditures for elderly Pennsylvanians.

¹⁵ Throughout this section, budget information is drawn from Fiscal Year 2015-2016 actual expenditures (as reported in the Governor's Proposed Fiscal Year 2017-2018 Budget. FY 2015-16 represents the most recent year for which actual (rather than estimated or budgeted) expenditures are available, and also aligns assistance costs with a year (2015) for which population and income data is available.

¹⁶ Pennsylvania Department of Aging. "2017 Benefits & Rights for Older Pennsylvanians." < <http://www.aging.pa.gov/publications/benefits-and-rights/pages/default.aspx>>

¹⁷ Medicaid is a federal program implemented at the state level using a mix of federal and state funds and regulations. Pennsylvania's Medicaid program is alternately referred to as Medical Assistance. This report uses the term Medicaid throughout for clarity.



Table 2.1 below shows the programs identified, the administering department, and the funding source for state expenditures on the program. State expenditures included in this analysis are inclusive of funding sources (notably the Lottery Fund and Tobacco Settlement Fund, and augmentations such as the Nursing Facility Assessment) in addition to the state's General Fund. The portion of program costs that benefit elderly residents (as opposed to non-elderly) is identified for each program in order to determine the total state funded expenditures on elderly assistance for FY 2015-2016.

TABLE 2.1 – STATE-FUNDED ASSISTANCE PROGRAMS FOR ELDERLY RESIDENTS (FY 2015-2016)

Program	Description	Administering Department	State Funding Source
Medicaid	State portion of shared state / federal costs for medical coverage	Human Services	
Long-Term Care ¹⁸	Institutional care for medically and financially needy individuals in nursing facilities		General, Lottery, Tobacco, Augmentations
Home and Community-Based Services	Long-term care services delivered to qualifying individuals outside of institutional facilities through the aging waiver (age 60+)		General, Lottery, Tobacco
Long-Term Managed Care	Comprehensive health and support services delivered in the community through the LIFE program (age 55+)		General
Payment to Fed Gvt for Medicare Drug Program	Mandated state payment to reduce federal Medicare Part D (prescription drug) costs		General, Augmentations
Medicaid - Other	Remaining inpatient and outpatient services for which Medicaid provides payment (often supplementing Medicare)		General
PennCARE	Statewide network of home and community-based service providers	Aging	Lottery
Property Tax / Rent Rebates	Rebates to low-income elderly residents for housing costs	Revenue	Lottery, Gaming
PACE / PACENET	Prescription drug coverage for low-income elderly residents	Aging	Lottery
Free and Reduced Fare Transit	Subsidized local transportation services for elderly residents	Transportation	Lottery

Source: ESI Analysis of Commonwealth of Pennsylvania Budget Documents

¹⁸ Note that this analysis predates the transition of the Long Term Care and Home and Community-Based Services programs to a managed care system starting in 2018. See: <http://www.dhs.pa.gov/cs/groups/webcontent/documents/document/c_220667.pdf>.

Notably, this analysis does not include all government programs from which Pennsylvania's elderly residents may derive some benefit. Because this report is focused on state level impacts of Pennsylvania's elderly residents, it excludes programs that are exclusively federally funded,¹⁹ programs funded by local governments, and programs that benefit the state's residents broadly but are not targeted or allocated to senior residents in any meaningful sense.²⁰

Four programs are funded exclusively or largely through Pennsylvania Lottery proceeds, and are targeted entirely or largely to elderly residents: PennCARE service providers, Property Tax / Rent Rebates, PACE / PACENET prescription drug coverage, and Free and Reduced Fare Transit. Eighty-seven percent of housing rebates²¹ and all expenditures within the remainder of these programs are allocated to elderly residents.

By contrast, the Medicaid program serves a mix of elderly and non-elderly beneficiaries, and is funded through a mix of state and federal sources (with the federal government providing an estimated 61 percent of total funding). State budget documents provide the portion of total (federal and state) Medicaid expenditures on elderly residents, which was budgeted at 23 percent (or \$6.6 billion) in FY 2015-2016. This report uses available state and federal information to estimate the proportion of expenditures by program attributable to elderly residents. The share of state funding (which varies by sub-program) determined from budget data is then applied to yield the state assistance costs on elderly residents for each sub-program.

Table 2.2 below aggregates total expenditures, expenditures on elderly residents, and state funds dedicated to these expenditures on elderly residents.²² **In total, these programs represent an estimated \$4.2 billion in state assistance costs for elderly residents as of 2015.**²³

¹⁹ For example, the Supplemental Nutritional Assistance Program (SNAP) helps low-income residents, including elderly residents, purchase food, but is fully federally funded. Therefore, insufficient retirement savings or growth in the senior population do not result in greater state expenditures under current budgetary conditions.

This analysis also excludes Supplemental Security Income (SSI), a federal program which does contain a state component via a supplemental state payment for beneficiaries. This program is excluded primarily because SSI payments are included in reported elderly incomes, frustrating the ability to define the relationship between SSI income and retirement income.

²⁰ For example, public safety services (such as the state police) or transportation infrastructure (such as roads or bridges) benefit elderly residents as they do all state residents, but expenditures on these line items are not meaningfully correlated with the level of retirement savings.

²¹ Housing rebates within the Property Tax / Rent Rebate program are also available to widows and widowers age 50 or older and people with disabilities age 18 or older. Program participation data indicates that roughly 87% of rebates are received by elderly Pennsylvanians.

²² Note that no distinction is made in this calculation between state funding sources, as all are considered to be equivalent expenditures of state resources. As of FY 2015-2016, the state's General Fund accounts for about \$2.2 billion in total costs, while other funds and augmentations accounts for about \$2.1 billion. The analysis of future costs makes no specific assumptions about the relative contribution of supplemental funding sources over time. If these sources are reduced or diverted (such as through the potential securitization of the Tobacco Settlement Fund to cover short term needs), impacts on the General Fund or through new revenue streams would be greater.

²³ Importantly, this approach reconciles spending on assistance programs for elderly residents to total program spending as reported in the state budget. As detailed below, per capita estimates of state assistance costs by income level are reconciled to these total expenditures, such that the parts sum to equal the whole. An alternative approach (used by prior studies of state assistance costs for retirees in Utah and Maine) is to estimate per capita assistance costs by income band (either through survey data or program eligibility rules), and then to aggregate those costs to the full population. Given imperfections in survey data or modeling of program participation, aggregate results can potentially deviate significantly from the known program expenditures reflected in the state budget if they are not reconciled to this data.

TABLE 2.2 – STATE SPENDING ON ASSISTANCE COSTS FOR ELDERLY RESIDENTS, FY 2015-2016 (\$M)

Program	Total Expenditures (\$M)	% Spent on Elderly Residents	Expenditures on Elderly Residents (\$M)	% of Spend from State Funds	Total PA Funds for Elderly (\$M)
Long-Term Care	\$3,948	88%	\$3,476	48%	\$1,666
Home and Community-Based Services	\$902	95%	\$855	52%	\$444
Long-Term Managed Care	\$248	93%	\$230	47%	\$108
Payment to Fed Gvt for Medicare Drug Program	\$585	54%	\$315	100%	\$315
Medicaid – Other	\$23,205	7%	\$1,701	48%	\$820
PennCARE	\$314	100%	\$314	100%	\$314
Property Tax / Rent Rebates	\$271	87%	\$235	100%	\$235
PACE / PACENET	\$175	100%	\$175	100%	\$175
Free and Reduced Fare Transit	\$169	100%	\$169	100%	\$169
Total	\$29,815	25%	\$7,471	57%	\$4,246

Source: ESI Analysis of Commonwealth of Pennsylvania Budget Documents and Program Rules. Rows and columns may not sum due to rounding.

2.2 STATE ASSISTANCE COSTS BY INCOME LEVEL

The aggregate state assistance costs for elderly residents detailed in Section 2.1 vary significantly by income level. The relationship between income and assistance levels arises from the eligibility and means-testing rules within each program. Some programs include income qualification rules for enrollment, while others provide differentiated benefit levels depending on the income level of enrollees. In either case, state assistance costs will vary by income level (generally decreasing as income grows). Table 2.3 below lists the eligibility and means-testing rules for the identified programs.

TABLE 2.3 – MEANS-TESTING OF ASSISTANCE PROGRAMS FOR ELDERLY RESIDENTS

Program	Eligibility / Means-Testing
Long-Term Care	Medical eligibility, resource restrictions, income eligibility up to 300% of Federal Benefit Rate (FBR) ²⁴ or countable income net of medical expenses below semi-annual income limit of \$2,550
Home and Community-Based Services	Medical eligibility, resource restrictions, income eligibility up to 300% of FBR (including a "spend down" of eligible medical cost), age 60+
Long-Term Managed Care	Medical eligibility, income and resource eligibility for Long-Term Care, ability to live independently in the community, age 55+
Payment to Fed Gvt for Medicare Drug Program	State payment to federal government based on number of dual-enrollees in Medicaid and Medicare Part D multiplied by state specific per capita rate
Medicaid - Other	Medicaid qualification for elderly residents based on income, or income and resources or income and disability status (limits varying by program)
PennCARE	Array of benefits, services and programs available at the 52 Area Agencies on Aging (AAA) statewide. Eligibility varies by specific service or program.
Property Tax / Rent Rebates	Elderly residents, widowers 50+ and disabled residents age 18-64 based on annual income limit of \$35,000 for homeowners and \$15,000 for renters (excluding half of Social Security income)
PACE / PACENET	Low-income elderly residents eligible for PACE (up to \$14,500 in eligible income for single and \$17,700 for married couple) or PACENET (income between \$14,500 and \$23,500 for single or \$17,700 and \$31,500 for married couple)
Free and Reduced Transit	All elderly residents (65+) eligible for free service on fixed route bus and trolley, reduced fares on commuter rails, and reduced fares on Shared Ride transportation services (no means-testing)

Source: ESI Analysis of Commonwealth of Pennsylvania Budget Documents and Program Rules

Figure 2.1 below shows the total per capita cost estimated for each income band, broken down by program.²⁵ As expected, assistance cost levels decline as income increases. Per capita costs are more than \$6,600 for residents in the lowest income band, decline to around \$1,350 for residents in the \$40,000 - \$45,000 band that represents the median, and are much smaller for upper-income households.

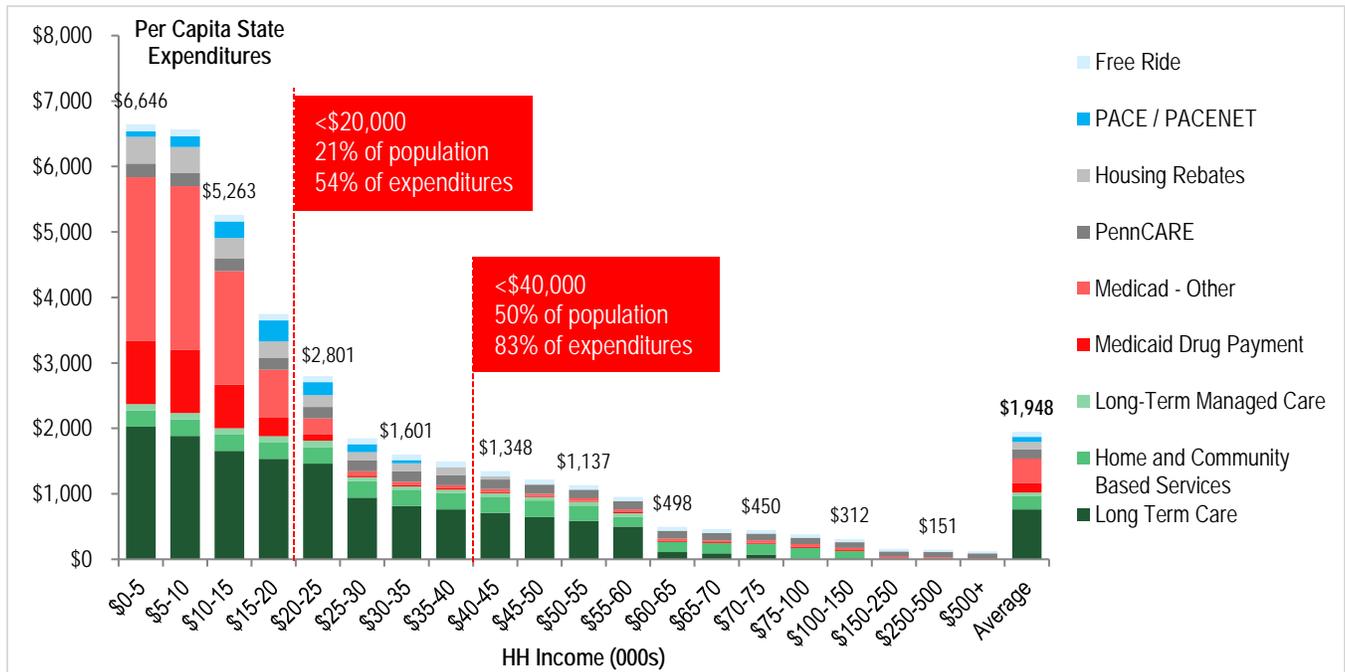
²⁴ The Federal Benefit Rate (FBR) is the amount paid monthly in federal Supplemental Security Income (SSI). For 2015, this figure was less than \$9,000 for an individual, and 300% of this rate was roughly \$26,000. Importantly, the Federal Benefit Rate is distinct from the Federal Poverty Level. The benefit rate is based on expenditure levels within the SSI program, while the FPL is based on Federal Poverty Income Guidelines (FPIG) which varies by household and are higher than the FBR.

²⁵ Typically, program expenditures are not directly tracked by the income level of the recipient. Therefore, program eligibility rules are paired with proxy data that yield insight into the distribution of program utilization or expenditures by income level to estimate state assistance costs by income level. Appendix B.2 details the data and approach utilized for each program.



The average per capita spend is \$1,948.²⁶ However, this figure varies greatly across the income distribution, with lower income households accounting for a disproportionate share of total state costs. **The income bands below \$20,000 account for 21 percent of the state’s elderly population, but generate 54 percent of total state assistance costs**, while the income bands below \$40,000 account for 50 percent of the state’s population and generate 83 percent of state assistance costs.²⁷

FIGURE 2.1 – PER CAPITA STATE ASSISTANCE COSTS BY PROGRAM AND INCOME BAND, 2015



Source: ESI Calculations based on state and federal data

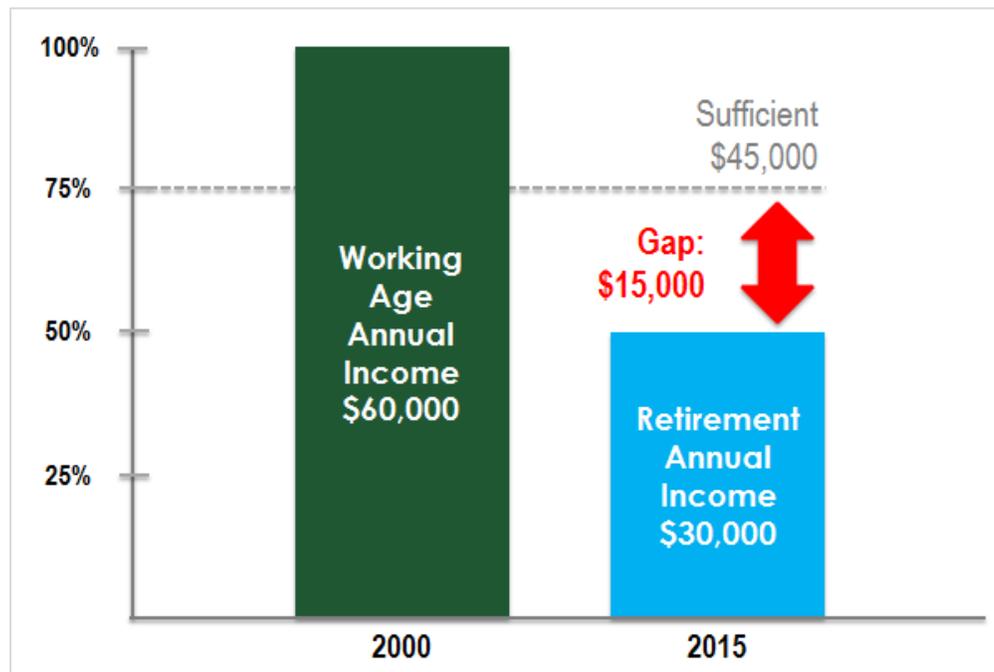
²⁶ Note that the average per capita spend is weighted by the size of the population in each income band, and therefore differs from the unweighted average assistance cost for the twenty bands. This per capita average can also be calculated by dividing the state’s elderly assistance cost of approximately \$4.2 billion (as shown in in Table 2.2 by the state’s 2015 elderly population of roughly 2.2 million (as shown in Figure 1.1).

²⁷ Note that income bands \$40,000 and below represent 49.7% of the state’s population, meaning that the median household (set at 50%) falls into the \$40,000 - \$45,000 band as previously noted.

2.3 QUANTIFYING INSUFFICIENT RETIREE SAVINGS

This report adopts a definition of insufficiency for elderly residents based on whether they achieve a targeted replacement level of 75% of annual working income. Figure 2.2 below illustrates a sufficiency calculation for a sample resident who turned 65 over the 2000-2015 period. A working age income of \$60,000 as of 2000 yields a recommended replacement income of \$45,000 in retirement (based on the 75 percent income replacement standard). If that sample resident had an annual retirement income of \$30,000 in 2015, the gap due to insufficient savings would be \$15,000.

FIGURE 2.2 – SAMPLE INCOME INSUFFICIENCY CALCULATION



This replacement rate calculation must be adjusted for inflation to ensure it meets the intended goal of maintaining sufficient purchasing power to allow elderly residents to maintain their living standards in retirement. Over the 2000-2015 period, inflation was roughly 38 percent.²⁸ By coincidence, this inflation essentially offsets the recommended replacement rate of 75 percent, meaning that a near-retiree household in 2000 could achieve a sufficient income level by maintaining their annual income in nominal terms in 2015.²⁹ Income data on the near-retiree population in

²⁸ This figure is drawn from the Consumer Price Index for Urban Consumers (CPI-U) produced by the federal Bureau of Labor Statistics (BLS). The population covered by CPI-U includes all households in Metropolitan Statistical Areas and urban places of 2,500 inhabitants or more. Thus, this measure covers nearly 90% of U.S. households and is characterized by the BLS as "our broadest and most comprehensive CPI." See: <<https://www.bls.gov/cpi/questions-and-answers.htm>>

²⁹ See Appendix A.3 for additional detail.

2000 and the elderly population in 2015 are drawn from the Annual Social and Economic Supplement to the Current Population Survey (CPS ASEC).³⁰

As discussed in Section 1.3, adjustments are made to address issues with this replacement rate framework at the lowest and highest income levels. For the year 2015, the calculation of the income distribution for elderly residents in the sufficient savings scenario is implemented in a three-step process:

- 1) First, the proportion of near-retirees in 2000 in each income band up to \$75,000 in nominal dollars is maintained in the same income band in 2015 (in nominal dollars).
- 2) Next, those residents falling below the Federal Poverty Level in 2015 are adjusted to an income bands representing the FPL.³¹
- 3) Finally, the distribution of observed household incomes for elderly retirees in 2015 is applied to the remaining retirees within incomes above \$75,000 in the sufficient savings scenario.³²

This process yields a modeled distribution of elderly resident incomes at sufficient savings levels that differs from the observed incomes of Pennsylvania's elderly residents in 2015.³³ For residents with \$75,000 or less in annual income, the **average annual income is about \$4,200 higher in this sufficient savings scenario than the baseline scenario**. This differential represents the average gap between observed and sufficient retirement income levels.³⁴

³⁰ The Current Population Survey is produced by the US Census Bureau, and represents the government's official source for poverty statistics. While this data has some documented weaknesses in assessing retiree incomes, it nevertheless represents the most comprehensive source for income data, and these data concerns likely have a minimal impact on this analysis due to its grounding in observed state costs and household spending for the base year of 2015. For an extended discussion of the data sources and methods utilized to analyze and project household incomes, see Appendix A.2.

³¹ Note that the FPL varies by household size (as well as by year). Data from the American Community Survey was utilized to estimate the proportion of elderly households of various income sizes (with the vast majority falling in either one or two-person households), and these proportions were utilized to adjust the appropriate portion of the population falling below the income bracket into which the FPL falls.

³² Note that the distribution rather than the observed share of elderly residents in each income band in 2015 is used because the proportion of the total population with incomes above \$75,000 differs somewhat between the observed and sufficient scenarios. See Appendix A.3 for further detail on the methodology and calculations used to generate income scenarios.

³³ Table A.1 in Appendix A.3 provides the full income distributions modeled under each scenario.

³⁴ Note that this average includes residents whose retirement incomes are at or above the recommended replacement levels, meaning that shortfalls are above this average for many residents who have not achieved this benchmark.



2.4 THE IMPACT OF INSUFFICIENT SAVINGS ON STATE ASSISTANCE COSTS

Using the per capita assistance costs estimated in Section 2.2, and the population in each band within baseline and sufficient scenarios developed in Section 2.3, state assistance costs for the elderly population are estimated under each scenario. State assistance costs are estimated at \$3.5 billion in the sufficient savings scenario, compared to the baseline estimate of \$4.2 billion. **Accordingly, state assistance costs due to insufficient savings are estimated at \$702 million for 2015** (see Table 2.4).

TABLE 2.4 – NET STATE ASSISTANCE COSTS DUE TO INSUFFICIENT SAVINGS, 2015

Program	Baseline (\$M)	Sufficient Savings (\$M)	Net Difference
Long-Term Care	\$1,666	\$1,473	\$192 million
Home and Community-Based Services	\$444	\$435	\$10 million
Long-Term Managed Care	\$108	\$100	\$8 million
Payment to Fed Gvt for Medicare Drug Program	\$315	\$198	\$117 million
Medicaid - Other	\$820	\$516	\$304 million
PennCARE	\$314	\$304	\$10 million
Property Tax / Rent Rebates	\$235	\$185	\$50 million
PACE / PACENET	\$175	\$168	\$7 million
Free and Reduced Fare Transit	\$169	\$164	\$5 million
Total	\$4,246	\$3,544	\$702 million

Source: ESI Calculations. Rows and columns may not sum due to rounding.

3.0 ECONOMIC IMPACTS OF REDUCED HOUSEHOLD SPENDING

The income levels of Pennsylvania's elderly households also impact their level of disposable income and household expenditures. Using granular survey data, spending profiles are developed for elderly households by income level. While expenditure patterns for each good differ across income levels, total expenditures increase materially as incomes grow. As a result, **reductions in available income translate into reduced spending by elderly households. It is estimated that given sufficient savings levels, Pennsylvania's elderly population would have contributed an additional \$2.0 billion in household spending in 2015.**³⁵

The total economic impact of this reduced spending is even greater than the direct expenditure loss due to spillover effects. Accounting for leakage of household spending outside of the state and for indirect and induced effects, it is **estimated that the total loss in economic output in the state economy from reduced spending due to insufficient savings is nearly \$2.8 billion for 2015. This loss of activity represents a loss of more than 20,000 full-time equivalent (FTE) jobs and more than \$850 million in employee earnings.**

This lost activity also has a significant effect on Pennsylvania's tax base, and thus its revenue collection. Many of the direct expenditures are subject to the state sales tax, and the economic activity associated with household spending creates earnings for employees and businesses that are subject to income and corporation taxes. In total, the **lost state revenue from reduced spending due to insufficient savings is estimated at nearly \$70 million for 2015.** The state budget is thus negatively impacted by both expenditure increases and revenue losses.

3.1 AGGREGATE ELDERLY HOUSEHOLD SPENDING

Estimates of spending by elderly households (both in total and by spending category) are developed using data on household spending patterns for respondents age 65 or older in the Consumption and Activities Mail Survey (CAMS) within the Health and Retirement Study (HRS).³⁶ First, aggregate household expenditures are modeled by income band.³⁷ Next, these aggregate expenditures are allocated to various goods and services to develop a comprehensive spending profile for each income band.³⁸ Notably, the consumption categories exhibit varying growth rates as incomes increase, so the mix of spending varies by income band as well as the aggregate total.³⁹

³⁵ As noted in Section 1.4, this analysis does not make any adjustment for the potential impacts of additional savings among working age households on consumption patterns. The net impact of these changes would depend on both the level and type of change in savings behavior (which are not addressed in this analysis) and corresponding changes in income, short-term and lifetime expenditure patterns. See Appendix C.6 for more discussion.

³⁶ Household Spending data is available through the 2015 Consumption and Activities Mail Survey (CAMS) as part of the University of Michigan Health and Retirement Study (HRS). Data from the HRS is made available online by RAND Corporation. See Appendix C.1 for more information on this data set. <http://hrsonline.isr.umich.edu/modules/meta/rand/randcamsd/RAND_CAMS_Data_Documentation_D.pdf>

³⁷ While total expenditures increase as incomes grow, this increase is not full linear, since households demonstrate an increase savings rate as their incomes grow. See Appendix C.1 for a discussion and visual representation of this statistical relationship.

³⁸ Note that these expenditure estimates by income band are developed from national rather than state level data to allow for sufficient sample size for this granular analysis. Profiles by income band are then applied to the state's distribution of households by income band in each scenario, thereby incorporating Pennsylvania-specific income data.

³⁹ The statistical relationship between expenditures by category and household income is known as its elasticity. These elasticities are modeled first by categorizing of goods that exhibit similar patterns and then by individual goods and services using the observed relationships in the CAMS data. See Appendix C.3 for a full discussion of this approach.

Pennsylvania's elderly population of 2.2 million as of 2015 represents an estimated 1.4 million elderly households.⁴⁰ Based on the expenditure profiles by income level, **these households are estimated to spend a total of \$49.8 billion annually, or \$35,560 per household**, across the twelve modeled expenditure categories (see Table 3.1). Housing and healthcare represent the largest categories of expenditures for Pennsylvania's elderly households.

TABLE 3.1 – AGGREGATE EXPENDITURES BY PENNSYLVANIA'S ELDERLY HOUSEHOLDS BY SECTOR, 2015

Sector	Aggregate Spending	Average Spend Per HH	% of Expenditures
Home goods & insurance & property taxes	\$9.87 billion	\$7,040	19.8%
Mortgage or rent	\$7.90 billion	\$5,640	15.8%
Healthcare	\$6.28 billion	\$4,480	12.6%
Donations & gifts	\$5.89 billion	\$4,200	11.8%
Utilities	\$5.12 billion	\$3,650	10.3%
Automotive	\$4.73 billion	\$3,370	9.5%
Phone/internet/cable	\$3.22 billion	\$2,300	6.5%
Vacation	\$2.46 billion	\$1,760	4.9%
Food	\$1.78 billion	\$1,270	3.6%
Clothing	\$0.89 billion	\$630	1.8%
Hobbies	\$0.87 billion	\$620	1.7%
Personal care	\$0.85 billion	\$600	1.7%
Total	\$49.83 billion	\$35,560	100%

Source: ESI Analysis of CAMS data. Rows and columns may not sum due to rounding.

⁴⁰ This estimate is undertaken using the headship rate, which defines the relationship between the number of households and the total population. The headship rate for Pennsylvania's elderly residents in 2015 is estimated to be 64.3 percent. This can also be expressed mathematically as the inverse of the average household size, which for Pennsylvania's elderly households is 1.6 persons, far smaller than total state average household size of roughly 2.5 persons. This difference is typical, due to both the greater prevalence of children among non-elderly households and the greater likelihood for elderly householders to be widowed. Appendix C.6 contains detail on the data sources and methodology utilized for this calculation.

3.2 IMPACT OF INSUFFICIENT RETIREE SAVINGS ON HOUSEHOLD SPENDING

Next, household spending is modeled on the sufficient retirement savings scenario developed in Section 2.3, with the assumption that the spending profile at a particular income level is identical under either scenario. The net difference between the baseline level of household spending estimated in Section 3.1 and spending at sufficient savings levels represents the annual increment of household spending lost due to insufficient retirement savings. Since spending by income level is held constant, the net difference is driven entirely by difference between scenarios in the number of households in each income band.

Table 3.2 below shows estimated expenditures by good for Pennsylvania's elderly households under the baseline and sufficient savings scenarios. **Insufficient retirement savings are estimated to reduce aggregate spending by elderly households by more than \$2.0 billion.**⁴¹

TABLE 3.2 – NET HOUSEHOLD EXPENDITURE LOSS DUE TO INSUFFICIENT SAVINGS, 2015

Sector	Baseline	Sufficient Savings	Net Difference	% of Net Difference
Home goods & insurance & property taxes	\$9.86 billion	\$10.35 billion	\$480 million	23.9%
Donations & gifts	\$5.89 billion	\$6.25 billion	\$364 million	18.1%
Mortgage or rent	\$7.90 billion	\$8.15 billion	\$257 million	12.8%
Automotive	\$4.73 billion	\$4.96 billion	\$236 million	11.7%
Healthcare	\$6.28 billion	\$6.48 billion	\$196 million	9.7%
Vacation	\$2.46 billion	\$2.61 billion	\$152 million	7.6%
Phone/internet/cable	\$3.22 billion	\$3.31 billion	\$95 million	4.7%
Utilities	\$5.12 billion	\$5.19 billion	\$68 million	3.4%
Food	\$1.78 billion	\$1.84 billion	\$62 million	3.1%
Hobbies	\$0.87 billion	\$0.92 billion	\$48 million	2.4%
Personal care	\$0.85 billion	\$0.87 billion	\$29 million	1.4%
Clothing	\$0.89 billion	\$0.91 billion	\$24 million	1.2%
Total	\$49.83 billion	\$51.84 billion	\$2.01 billion	100%

Source: ESI Calculations. Rows and columns may not sum due to rounding.

⁴¹ Notably, the distribution of net spending by good varies somewhat from the baseline distribution of spending because of the varying relationships of consumption with household income for different goods.

3.3 ECONOMIC AND TAX REVENUE IMPACT OF REDUCED HOUSEHOLD SPENDING

Reductions in household spending by Pennsylvania's seniors due to insufficient savings result in lost activity within the state's economy, as well as reductions in state tax revenue collection. Economic activity is reduced first through the loss of direct spending by households, and then further through the reduction in the spillover activity and employment that the direct spending supports across the economy. Input-output modeling is used to quantify total economic and tax revenue effects.

Adjustments were made to account for economic activity that occurs outside the state. **An estimated \$1.7 billion or 83% of the \$2.0 billion in lost expenditures would have taken place within Pennsylvania** (see Table 3.3).⁴²

TABLE 3.3 – NET EXPENDITURE LOSS IN PENNSYLVANIA DUE TO INSUFFICIENT SAVINGS, 2015

Sector	Net Expenditures w/ Sufficient Savings	% Spent in State	Net Expenditures in Pennsylvania	% of Net PA Expenditures
Home goods & insurance & property taxes	\$480 million	100%	\$480 million	28.8%
Mortgage or rent	\$257 million	100%	\$257 million	15.4%
Automotive	\$236 million	95%	\$224 million	13.4%
Healthcare	\$196 million	95%	\$186 million	11.1%
Donations & gifts	\$364 million	50%	\$182 million	10.9%
Phone/internet/cable	\$95 million	95%	\$91 million	5.4%
Utilities	\$68 million	100%	\$68 million	4.1%
Food	\$62 million	95%	\$59 million	3.5%
Hobbies	\$48 million	95%	\$45 million	2.7%
Vacation	\$152 million	25%	\$38 million	2.3%
Personal care	\$29 million	95%	\$28 million	1.7%
Clothing	\$24 million	50%	\$12 million	0.7%
Total	\$2.01 billion	83%	\$1.67 billion	100%

Source: ESI Calculations. Rows and columns may not sum due to rounding.

The total economic impact of this reduced spending is greater than the direct expenditure loss due to spillover effects.⁴³ Indirect effects stem from goods and services purchased within the state economy and induced effects results from the increased household spending power of employees supported by this initial spending. In other words, due to these interrelationships, the lost activity in the state economy due to insufficient savings is not just

⁴² This leakage can take the form of transactions by Pennsylvania households that are physically made in another state or transactions that take place electronically to an out of state recipient. See Appendix C.6 for more discussion of this adjustment.

⁴³ Note that economic impacts are expressed as positive numbers for clarity, but can also be thought of as lost impact on the state economy relative to the scenario in which elderly households have sufficient savings.

the reduced point of sale spending by elderly households. Instead, it also includes reductions in the supply chain activity and employee compensation that would have resulted from these expenditures.⁴⁴

These spillover effects vary by industry, and therefore are modeled separately for each of the twelve goods shown above and aggregated to yield the total result.⁴⁵ Including these effects, **the total loss in economic output in the state economy from reduced spending due to insufficient savings is nearly \$2.8 billion for 2015. This loss of activity represents a loss of more than 20,000 full-time equivalent (FTE) jobs and more than \$850 million in employee earnings** (see Table 3.4).

TABLE 3.4 – ECONOMIC IMPACT OF REDUCED HOUSEHOLD SPENDING DUE TO INSUFFICIENT SAVINGS, 2015

Metric	Value
Direct Output	\$1.55 billion
Indirect and Induced Output	\$1.24 billion
Total Output	\$2.79 billion
Total Employment (FTE)	20,670 jobs
Total Earnings	\$857 million

Source: ESI Modeling of CAMS and IMPLAN data. Columns may not sum due to rounding.

This activity also has a significant effect on Pennsylvania's tax base, and thus its revenue collection. Many of the direct expenditures are subject to the state's direct sale tax rate of 6 percent, meaning that significant sale tax revenue is lost when spending is reduced due to insufficient savings. In addition, the economic activity associated with household spending creates earnings for employees and for business that are subject to income and corporation taxes. In total, **the lost state revenue from reduced spending due to insufficient savings is estimated at nearly \$70 million for 2015** (see Table 3.5).

TABLE 3.5 – STATE TAX REVENUE LOSS FROM REDUCED HOUSEHOLD SPENDING DUE TO INSUFFICIENT SAVINGS, 2015

Metric	Value
Income Tax	\$16.8 million
Sales Tax	\$46.0 million
Corporation Tax	\$6.8 million
Total	\$69.7 million

Source: ESI Modeling of CAMS, IMPLAN, Commonwealth of Pennsylvania and Federal Reserve Bank of St. Louis data. Columns may not sum due to rounding.

⁴⁴ See Appendix C.7 for further discussion of input-output modeling theory and methodology.

⁴⁵ Note that the direct output modeled varies slightly from the total expenditure loss shown in Table 3.3 because the sectors that are included will, in some cases, only create a portion of the expected impact due to the nature of retail-related sales. Since local stores buy goods from wholesalers and manufacturers outside of the area, the materials, manufacturing, and transportation expenditures cannot be fully attributed to Pennsylvania leaving only the retail margin to be accounted for.

4.0 FUTURE ASSISTANCE COSTS AND ECONOMIC IMPACTS

While state assistance costs and economic activity losses due to insufficient savings are already significant, they are expected to intensify in the future due to broad structural forces. Assuming continuity of policy, program eligibility and economic factors, significant growth is projected in both state assistance costs and lost economic activity through 2030 based on broad structural factors like growth in the elderly population and anticipated growth in medical costs.

Increases in program demand (due to a projected 42 percent increase in the elderly population, as reviewed in Section 4.1) and in program cost for a continuous level of services (due to a projected 21 percent relative increase in medical inflation, as reviewed in Section 4.2) yield a significant increase in anticipated program costs. Under the baseline scenario (which assumes a continuation of current income trends), state assistance costs for elderly residents are projected to rise to \$6.2 billion by 2030, while assistance costs under the sufficient savings scenario are projected at \$5.1 billion. **Net state assistance costs due to insufficient savings are thus projected to grow from \$700 million in 2015 to \$1.1 billion in 2030.**

Economic and tax revenue losses from reduced household spending are expected to magnify with elderly population growth. **The net expenditure loss due to insufficient savings is projected to grow from \$2.0 billion in 2015 to \$3.1 billion by 2030.** Accounting for spillover effects, the **loss in total economic output is anticipated to grow from \$2.8 billion in 2015 to \$4.3 billion in 2030, with lost state tax revenue growing from \$70 million in 2015 to \$106 million in 2030.**

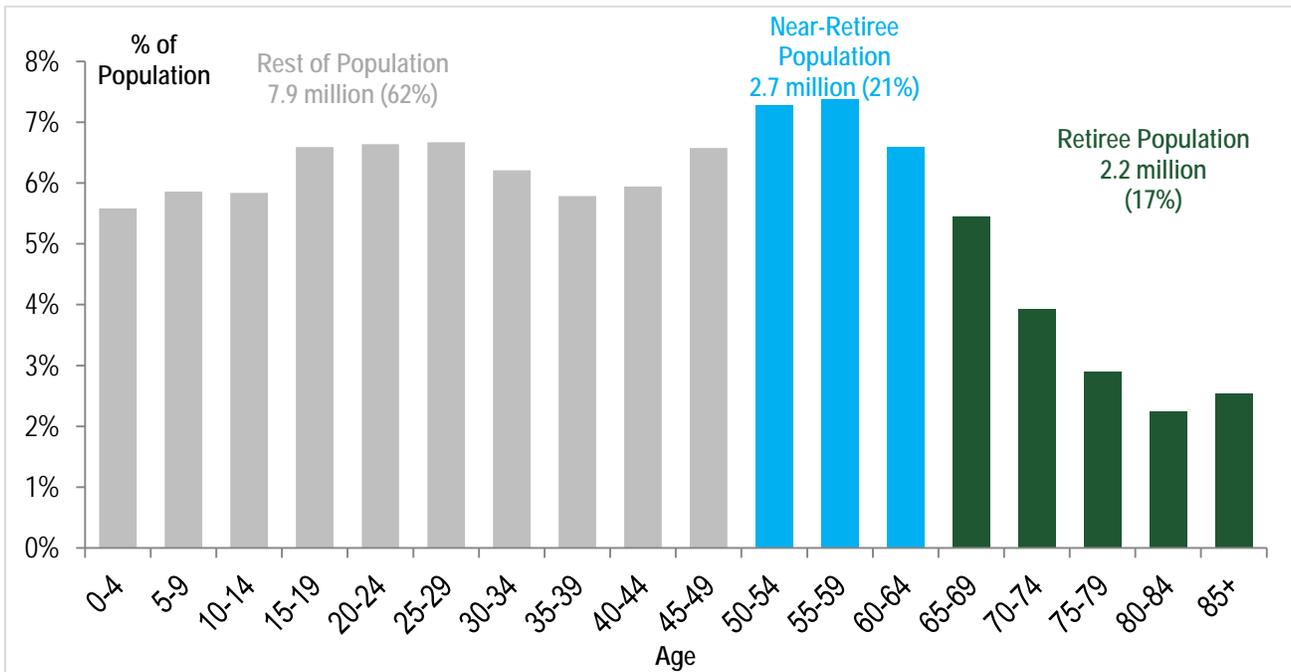
4.1 POPULATION GROWTH

As of 2015, 2.2 million of the Pennsylvania's 12.8 million residents (or 17 percent) were age 65 or older. The "near-retiree" age cohort from 50-64 (those born between 1951 and 1965) total 2.7 million residents (21 percent of the population), with the population in the 50-54 and 55-59 age bands greater than any other five year bands (see Figure 4.1). This demographic composition will lead to a large increase in the elderly population over the next fifteen years as the baby boomer generation ages.

Projections from the Pennsylvania IFO estimate that the state's elderly population will increase to 3.1 million by 2030, representing 23 percent of projected state population of 13.5 million⁴⁶ The largest increases in the elderly population are anticipated in the 70-74, 75-79 and 80-84 age ranges, each of which are projected to increase by more than 50 percent (see Figure 4.2). Notably, these represent the first three age ranges in which the baby boomer population will replace the (much smaller) prior generation. In total, **the state's elderly population is projected to increase by 42 percent from 2.2 million in 2015 to 3.1 million in 2030.**

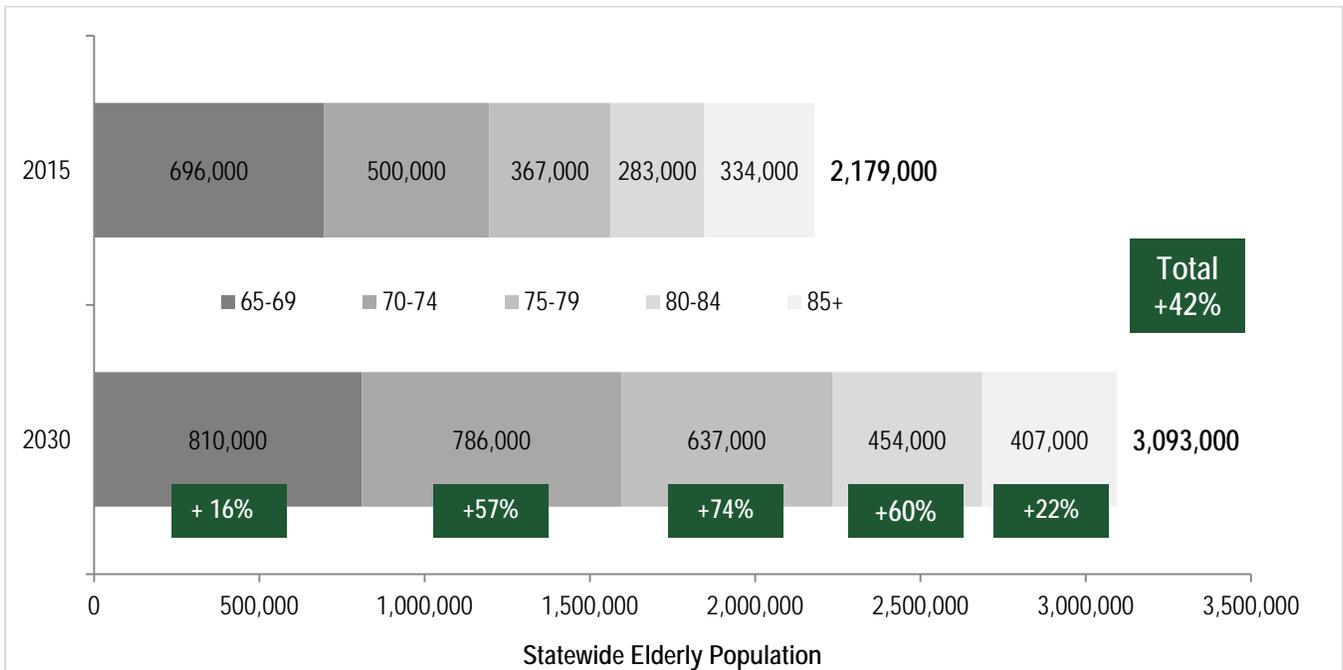
⁴⁶ The Pennsylvania's IFO's Economic & Outlook Report is available online at < <http://www.ifo.state.pa.us/releases.cfm?id=161>>. Population projections by age group are presented within that report from 2015-2025. Projections for 2030 consistent with that time series were provided directly to ESI by IFO staff. Projections within that report originate with forecasts from the Pennsylvania State Data Center, which are then adjusted slightly by IFO to align with recently observed data.

FIGURE 4.1 – AGE DISTRIBUTION OF PENNSYLVANIA’S POPULATION, 2015



Source: US Census Bureau, Pennsylvania IFO

FIGURE 4.2 – PROJECTED ELDERLY POPULATION GROWTH, 2015-2030



Source: Pennsylvania Independent Fiscal Office (IFO)

This 42 percent growth in the elderly population will in and of itself lead to significant increases in state assistance costs and elderly household expenditure impacts. Increases in program enrollment due to growth in the elderly population will lead to growth in program costs. Further, as elderly households represent a greater proportion of the population, their spending will represent a greater proportion of the state's economy, magnifying the impact of potential spending shortfalls. **The state budget therefore faces pressures from both expenditure increases and revenue losses.**

These growing costs and reductions in taxable activity are particularly concerning in the context of the anticipated decline in the relative proportion of working age residents to retirees and children. The IFO projects that Pennsylvania's dependency ratio of working age (20-64) to retiree (65+) residents will fall from 3.9 in 2010 to 2.4 in 2030.⁴⁷ A growing body of research focuses on the challenges these structural forces pose for state budgets, as well as for the federal debt burden in the coming years.⁴⁸

4.2 EXCESS MEDICAL INFLATION

Inflation in medical costs has traditionally grown faster than overall inflation, meaning that medical services have become relatively more expensive over time. Most forecasts anticipate a continuation of this trend, which has two important implications for this analysis. First, state assistance costs for providing a consistent level of healthcare benefits⁴⁹ (which represent the majority of state assistance spending) will increase in real dollar terms. Second, elderly household spending in other categories will be displaced or constrained.

Based on annualized inflation trends forecasted by the Congressional Budget Office (CBO), medical inflation (CPI-M) is projected at 72 percent over the 2015-2030 time period, while overall inflation is projected at 43 percent.⁵⁰ **The ratio of projected growth in medical inflation and overall inflation indicates that medical costs are expected to grow by 21 percent in real terms over the 2015-2030 period.**⁵¹

This excess medical inflation (relative to overall inflation) means that the cost to the state of providing the same level of medical benefits or assistance to elderly residents will increase. To account for this, per capita state

⁴⁷ IFO November 2017 Five Year Budget Outlook, page 10. < <http://www.ifo.state.pa.us/releases.cfm?id=161> >

⁴⁸ See for example Louise Sheiner, "The Long-term Impact of Aging on the Federal Budget." *Hutchings Center on Fiscal and Monetary Policy, Brookings Institution*. January 2018 < <https://www.brookings.edu/research/the-long-term-impact-of-aging-on-the-federal-budget/> >, which discusses the implications for the federal debt path of the falling dependency ratio, anticipated increases in health costs, and anticipated sluggish economic growth.

⁴⁹ Note that continuity of programs and benefits is assumed for the purpose of the calculation even in instances when the future program changes are known as of today. Most notably, the state is undertaking changes to the structure and implementation of the Long Term Care and Home and Community-Based Services programs that take effect in 2018, transitioning to a managed care system. Potential changes in costs and benefits due to this transition are external to the analysis in this report and are not included.

⁵⁰ Forecasts generated by the Congressional Budget Office (CBO) (for the purpose of producing budgetary projections for proposed federal legislation) anticipate growth in CPI-Medical of 3.7% per year through 2025, relative to growth of 2.4% in overall inflation during that time. Congressional Budget Office (2017). "Longer Term Effects of the Better Care Reconciliation Act of 2017 on Medicaid Spending." < <https://www.cbo.gov/system/files/115th-congress-2017-2018/reports/52859-medicaid.pdf> >. (The legislation evaluated in this CBO analysis is better known as the Affordable Care Act repeal, and was not enacted). Notably, this differential is conservative relative to the observed data from the 1983-2015 period, which indicates an even larger differential due to a faster rate of medical inflation. See Appendix B.3 for further discussion and visualization of observed and forecasted medical inflation.

⁵¹ For example, if an item cost \$100 in 2015 and followed the overall inflation rate forecast, its price would be assumed to increase by 43% and therefore cost \$143 in 2030. The same \$100 in medical services would be forecast to increase by 72%, and therefore cost \$172 in 2030. The ratio between these two endpoint calculations ($\$172 / \143) is 1.21, implying medical inflation that is 21% faster than overall inflation.

assistance costs for all Medicaid programs and the PACE / PACENET prescription drug coverage program are assumed to increase by 21 percent by 2030 over their estimated 2015 levels.⁵² Since medical spending represents the vast majority of state assistance expenditures, this increase in medical costs results in a significant increase in anticipated per capita state assistance costs, particularly at lower income levels.⁵³

While increases in medical costs are assumed to result in higher state expenditures to maintain program continuity, households are assumed to be constrained in their total expenditures by their income level.⁵⁴ Therefore, increases in medical costs for households are modeled to be offset by decreases in other spending categories to maintain a constant total spending per household for each income band. This adjustment is apportioned based on the observed elasticity of the consumption categories.⁵⁵ It results in a revised estimate of spending on fixed goods (which grows due to increased medical costs), variable and discretionary goods (which shrink to offset these increases) by income band for 2030.

4.3 INCOME SCENARIOS

Projected incomes for elderly residents in 2030 in the baseline scenario are modeled by extending recent retirement savings trends into the future at the same rate. First, the relationship between near-retiree (50-64) income in 2000 and elderly incomes for the same cohort in 2015 is observed and modeled. Next, this savings relationship is applied to the observed income level of near-retirees from 2015 to project the income distribution of the elderly population as of 2030. Said another way, the trends in retiree savings are observed from 2000-2015 in order to mirror that trend going forward from 2015-2030.⁵⁶

There is a robust debate among retirement researchers on the relative preparedness of the current near-retiree generation to those that preceded it. Briefly, a broad range of factors beyond income levels can affect retirement readiness, including current and future savings levels, participation in defined benefit or defined contribution savings plans, length of time in the workforce, relative health and associated dependence on health care, and other household assets such as property. Retirement researchers give varied emphasis to each of these factors, rely on different data sources, and offer mixed evidence as to whether the baby boomer generation is better or worse

⁵² Medicaid programs include Long-Term Care, Home and Community-Based Services, Long-Term Managed Care, Medicare Payment to the Federal Government, and Medicaid—Other. The Pennsylvania IFO also anticipates growth in medical inflation in excess of the overall inflation rate in estimating state expenditure growth in these programs (see Appendix B.4 for more discussion). IFO projections by program are not used directly in this analysis because they incorporate additional information about changes in program structure and eligibility that would dilute the goal of the analysis in isolating the incremental difference in assistance costs due only to retirement insufficiency.

⁵³ See Appendix B.3 and Figure B.6 for further detail.

⁵⁴ Importantly, 2030 results are expressed in \$2015, meaning that expenditures by income band are held constant in real terms (though they are of course anticipated to increase in nominal terms due to inflation).

⁵⁵ The first step in this adjustment is to increase anticipated healthcare spending by 21 percent for each income band, and to calculate the magnitude of that increase in dollar terms. For each income band, 2/3 of this increase is assumed to be offset through reductions in total discretionary spending, while 1/3 is assumed to be offset through reductions in variable spending, with spending maintained in the remaining fixed categories. This allocation is informed by observed elasticities. Since discretionary goods show the greatest variance with income, they are understood to be the most easily adjusted as discretionary income declines, followed by variable goods. See Appendix B.5 and Figure C.10 for further detail.

⁵⁶ The mathematical process used to implement this assumption is detailed in Appendix A.3.



prepared for retirement than previous generations.⁵⁷ Further, future generations of retirees may face additional retirement savings challenges.⁵⁸

This report does not adjudicate these debates, or seek to develop individual projections of each of the potential factors that could influence retirement readiness for the state's current near retirees. Instead, **we utilize the simplifying assumption that the observed relationship between incomes of near-retirees in 2000 to the incomes of retirees in 2015 serves as the best proxy for projecting how the incomes of near-retirees in 2015 will translate into retiree incomes in 2030.** This approach does not ignore the influence of any individual factor, but rather reflects all savings factors to the same extent that they influenced observed income change over the 2000-2015 period.⁵⁹ Notably, if bleaker savings scenarios prove true for baby boomer retirees, the fiscal and economic picture outlined in this report is correspondingly bleaker than this baseline scenario.

Next, an alternative income distribution is modeled for 2030 that assumes sufficient savings for the 2015 near-retiree cohort.⁶⁰ This produces a distribution of incomes for the state's elderly population in 2030 under a sufficient savings scenario which can be compared to the projected distribution of incomes in the baseline scenario. For residents with \$75,000 or less in annual income, **the average gap between baseline and sufficient income levels is around \$4,800** in 2030.

4.4 PROJECTED ASSISTANCE COSTS FROM INSUFFICIENT RETIREE SAVINGS

Projected state assistance costs for 2030 are calculated by multiplying per capita assistance costs for each program in each income band by the population in each income band in the baseline and sufficient savings scenarios calculated in Section 4.3. Costs are aggregated for the full population in both the baseline and sufficient savings scenarios. The net difference in these two estimates represents the projected increase in state assistance costs attributable to insufficient savings in 2030.

State assistance costs for the elderly population are estimated at \$5.1 billion in the sufficient savings scenario, compared to the baseline estimate of \$6.2 billion. **The state assistance costs due to insufficient savings are therefore estimated at \$1.1 billion for 2030** (see Table 4.1).

⁵⁷ See Appendix A.3 for a more complete discussion and citations of these issues in the context of this study.

⁵⁸ For example, Generation X faces financial pressure from both raising children and looking after aging parents while the Millennial generation entered their working years with unprecedented levels of student debt and well-documented struggles in household formation and purchasing their first home

⁵⁹ It is also recognized that while many residents appearing in the age 50-64 age band in a given year will also be represented in the 65+ age band fifteen years later, the match is of course inexact. Each year, residents of a given age band are lost through death, aged into an older age band, or removed and replaced through migration. The approach of applying the observed relationship from 2000-2015 to project income change from 2015-2030 is again useful, because the presence of existing elderly households is common to both periods, and can thus be expected to influence the income profile of elderly residents in a similar manner in the end year.

⁶⁰ This calculation uses the same income replacement framework and standard outlined in Sections 1.3 and 2.3. The mathematical process varies somewhat from the 2015 calculation, because 2030 incomes are projected in \$2015 terms, and therefore do not require accounting for inflation. See Appendix A.3 and Table A.2 for a detailed description and results of this calculation.

TABLE 4.1 – NET STATE ASSISTANCE COSTS DUE TO INSUFFICIENT SAVINGS, 2030 (IN \$2015)

Program	Baseline (2030) (\$M)	Sufficient Savings (2030) (\$M)	Net Difference (2030)
Long-Term Care	\$2,444	\$2,126	\$318 million
Home and Community-Based Services	\$698	\$681	\$17 million
Long-Term Managed Care	\$157	\$144	\$13 million
Payment to Fed Gvt for Medicare Drug Program	\$485	\$296	\$189 million
Medicaid- Other	\$1,263	\$771	\$492 million
PennCARE	\$422	\$408	\$14 million
Property Tax / Rent Rebates	\$284	\$220	\$64 million
PACE / PACENET	\$240	\$238	\$3 million
Free and Reduced Transit	\$227	\$219	\$8 million
Total	\$6,221	\$5,103	\$1.12 billion

Source: ESI Calculations. Rows and columns may not sum due to rounding

It is important to note that the anticipated growth in the elderly population between 2015 and 2030 and the anticipated relative increase in medical costs contribute to a forecasted increase in state assistance costs under both the baseline and sufficient savings scenarios. However, while growth is similar in percentage terms, these increases are applied to a larger base of spending in the baseline scenario. **As a result, insufficient savings cost the state over \$400 million more in 2030 than in 2015, an increase of 59 percent** (see Table 4.2).

TABLE 4.2 - STATE ASSISTANCE COSTS FOR ELDERLY RESIDENTS, 2015-2030 (IN \$2015)

	Baseline	Sufficient Savings	Net Difference
2015	\$4.25 billion	\$3.54 billion	\$0.70 billion
2030	\$6.22 billion	\$5.10 billion	\$1.12 billion
% Growth	47%	44%	59%

Source: ESI Calculations. Rows and columns may not sum due to rounding

4.5 PROJECTED ECONOMIC IMPACT FROM REDUCED HOUSEHOLD SPENDING

In order to project the impact on economic and tax revenues of reduced household spending in 2030, expenditures profiles are multiplied by the population in each income band in the baseline and sufficient savings scenarios. The net difference in aggregate spending under each scenario represents the projected loss in household spending attributable to insufficient savings in 2030. The total economic and tax revenue impact on the Pennsylvania economy of this loss in expenditures is then modeled

The forecasted elderly population of 3.1 million is estimated to represent to 2.0 million households in 2030, up from 1.4 million in 2015. Expenditures per household in each income band are constant between the baseline and

sufficient savings scenarios, meaning that the aggregate differences in spending arise entirely due to differences in the income distribution between the scenarios (i.e. the level of insufficient savings).

Expenditures by elderly households are estimated at \$80.8 billion in the sufficient savings scenario, compared to the baseline estimate of \$77.7 billion. Accordingly, the **lost expenditures due to insufficient savings are estimated at \$3.1 billion for 2030** (see Table 4.3).

TABLE 4.3 – NET HOUSEHOLD EXPENDITURE LOSS DUE TO INSUFFICIENT SAVINGS, 2030 (IN \$2015)

Sector	Baseline (2030)	Sufficient Savings (2030)	Net Difference (2030)	% of Net Difference
Home goods & insurance & property taxes	\$15.03 billion	\$15.77 billion	\$737 million	24.1%
Donations & gifts	\$9.18 billion	\$9.73 billion	\$548 million	17.9%
Mortgage or rent	\$12.23 billion	\$12.62 billion	\$392 million	12.8%
Automotive	\$7.58 billion	\$7.93 billion	\$349 million	11.4%
Healthcare	\$11.20 billion	\$11.54 billion	\$335 million	10.9%
Vacation	\$3.84 billion	\$4.07 billion	\$229 million	7.5%
Phone/internet/cable	\$4.74 billion	\$4.87 billion	\$135 million	4.4%
Utilities	\$7.33 billion	\$7.43 billion	\$96 million	3.1%
Food	\$2.64 billion	\$2.73 billion	\$87 million	2.9%
Hobbies	\$1.34 billion	\$1.41 billion	\$72 million	2.4%
Personal care	\$1.25 billion	\$1.30 billion	\$41 million	1.3%
Clothing	\$1.36 billion	\$1.39 billion	\$37 million	1.2%
Total	\$77.73 billion	\$80.79 billion	\$3.06 billion	100.0%

Source: ESI Calculations. Rows and columns may not sum due to rounding

Insufficient savings are anticipated to **lead to losses in household spending that are more than 50 percent greater in 2030 than in 2015** (see Table 4.4).

TABLE 4.4 - HOUSEHOLD SPENDING BY ELDERLY RESIDENTS, 2015-2030 (IN \$2015)

	Baseline	Sufficient Savings	Net Difference
2015	\$49.8 billion	\$51.8 billion	\$2.01 billion
2030	\$77.7 billion	\$80.8 billion	\$3.06 billion
% Growth	56%	56%	52%

Source: ESI Calculations. Rows and columns may not sum due to rounding

An estimated \$2.5 billion, or 83 percent of the total \$3.1 billion in spending lost to insufficient savings, would have taken place within Pennsylvania. The total economic effect of these lost expenditures is expanded by the spillover impacts lost to the Pennsylvania economy. Including direct, indirect and induced effects, **the total loss in economic output in the state economy from reduced spending due to insufficient savings is projected at more than nearly \$4.3 billion for 2030. This loss of activity represents a loss of nearly 32,000 full-time equivalent (FTE) jobs and more than \$1.3 billion in employee earnings** (see Table 4.5). Each of these impacts is more than 50 percent greater than the lost impact from 2015, in line with the growth in net spending loss from 2015 to 2030 shown above.

TABLE 4.5 – ECONOMIC IMPACT OF REDUCED HOUSEHOLD SPENDING DUE TO INSUFFICIENT SAVINGS, 2030 (IN \$2015)

Metric	Value
Direct Output	\$2.38 billion
Indirect and Induced Output	\$1.91 billion
Total Output	\$4.28 billion
Total Employment (FTE)	31,830 jobs
Total Earnings	\$1.32 billion

Source: ESI Modeling of CAMS and IMPLAN data. Columns may not sum due to rounding.

The impact of this lost activity on state tax revenues also grows similarly from 2015 to 2030. In total, the **lost state revenue from reduced spending due to insufficient savings is estimated at \$106 million for 2030** (see Table 4.6).

TABLE 4.6 – STATE TAX REVENUE LOSS FROM REDUCED HOUSEHOLD SPENDING DUE TO INSUFFICIENT SAVINGS, 2015 (IN \$2030)

Metric	Value
Income Tax	\$26.0 million
Sales Tax	\$69.1 million
Corporation Tax	\$10.5 million
Total	\$105.7 million

Source: ESI Modeling of CAMS, IMPLAN, Commonwealth of Pennsylvania and Federal Reserve Bank of St. Louis data. Columns may not sum due to rounding.

5.0 SUMMARY OF RESULTS

This report quantifies two categories of public impacts from insufficient savings for elderly Pennsylvanians:

- **Current and future costs to the state for public assistance programs for elderly residents.** State funding supports programs for elderly residents like medical services and long-term care that are frequently means-tested for eligibility and/or benefit levels. This means that the level of income available to the state's elderly population has significant impacts on state assistance costs.
- **Current and future loss of economic activity due to reduced household spending by elderly households.** The income level of elderly households also impacts their level of spending on a variety of goods and services each year. Household spending losses ripple through the economy, resulting in lower levels of activity and employment within the state economy, and ultimately less tax revenue accruing to the state government.

Throughout the report, estimated public assistance costs and household spending in the baseline scenario are compared to estimated costs and spending if Pennsylvania's elderly residents were able to achieve sufficient savings levels. This approach isolates the net impacts of insufficient savings on the state's budget and its economy. The magnitude of assistance costs and lost economic activity illustrates the collective public impact of the private retirement savings of millions of Pennsylvanians. Further, the budgetary and economic implications of insufficient savings are expected to grow materially over the 2015-2030 period, due to structural forces like population aging and increasing medical costs.

This section summarizes estimates of increases in state assistance costs and reductions in household spending and associated economic activity losses presented throughout the report. Results are shown for both 2015 and 2030, for both the baseline and sufficient savings scenarios. Finally, these endpoint results are expressed in cumulative terms over the 2015 to 2030 period.

5.1 CUMULATIVE COSTS AND IMPACTS, 2015-2030

The methodology detailed in this report generates estimates for the starting point and end point of the 2015-2030 analysis period, but does not directly produce projections for the intermediate years. IFO projections indicate a relatively linear growth in the state's elderly population over the 2015-2030 period. Therefore, a consistent growth rate in net assistance costs, net spending reductions and net economic activity losses is assumed from 2015 to 2030.⁶¹ These estimates are then summed to cumulative estimates over the sixteen year 2015-2030 period.

⁶¹ Growth is calculated as a compound annual growth rate (CAG), such that outputs are expected to increase by the same percentage each year in order to connect from the 2015 to 2030 estimates. Since this consistent percentage growth is applied to a growing base value in each successive year, the annual growth level (for example, net dollars of assistance costs) will increase slightly in each successive year.



INCREASED STATE ASSISTANCE COSTS

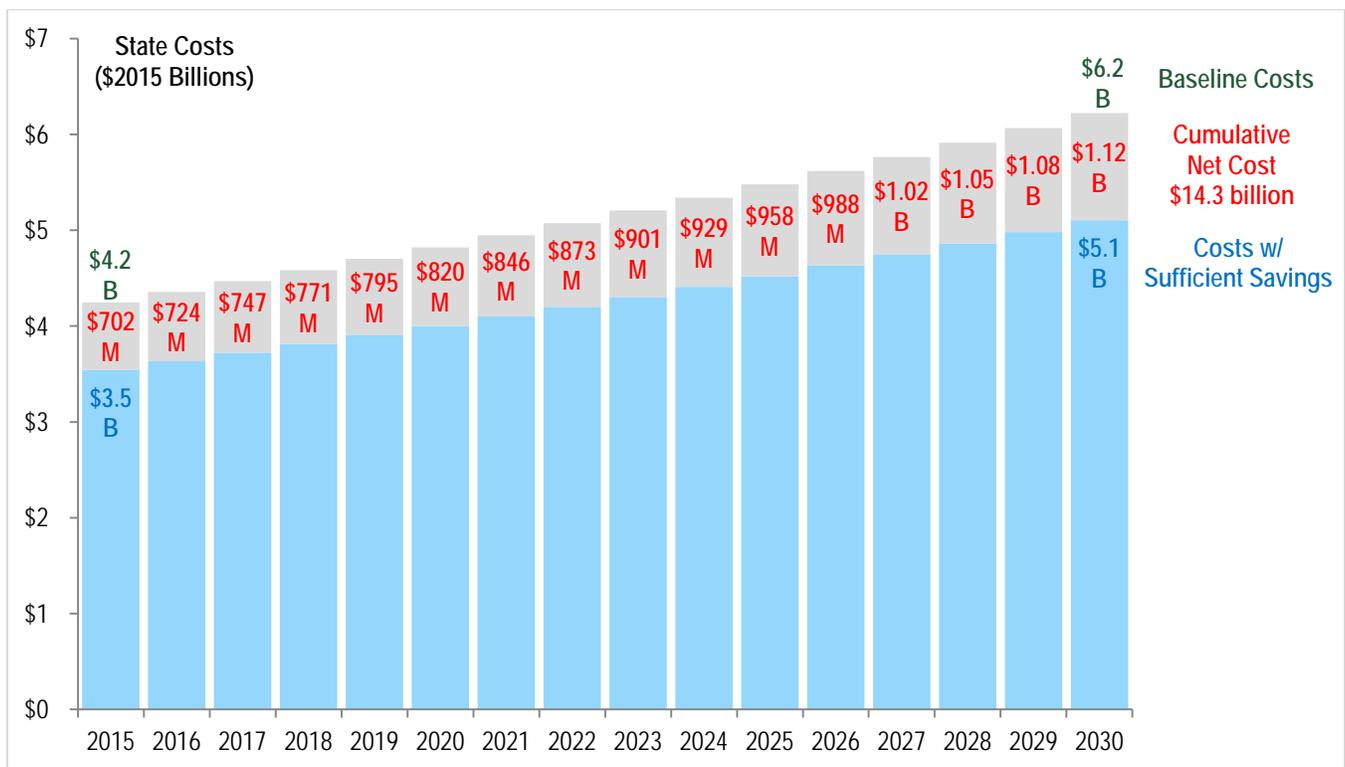
Net state assistance costs due to insufficient savings (reflecting the difference in state costs under the baseline and sufficient savings scenarios) are projected to grow due to both growth in the elderly population and anticipated increases in the relative costs of medical care. State assistance costs are projected to grow to \$6.2 billion in 2030 under the baseline scenario, \$1.3 billion higher than in the sufficient savings scenario. This represents an increase of more than 50 percent from the \$835 million in net assistance costs attributable to insufficient savings in 2015. **Cumulative net state assistance costs are estimated to total \$14.3 billion over the 2015-2030 period** (see Table 5. 1 and Figure 5.1).

TABLE 5.1 - STATE ASSISTANCE COSTS FOR ELDERLY RESIDENTS, 2015-2030 (IN \$2015)

	2015	2030	Cumulative 2015-2030
Baseline	\$4.2 billion	\$6.2 billion	\$82.8 billion
Sufficient Savings	\$3.5 billion	\$5.1 billion	\$68.5 billion
Net Difference	\$702 million	\$1.1 billion	\$14.3 billion

Source: ESI Calculations. Rows and columns may not sum due to rounding

FIGURE 5.1 – STATE ASSISTANCE COSTS DUE TO INSUFFICIENT SAVINGS, 2015-2030 (IN \$2015)



DECLINE IN ECONOMIC ACTIVITY DUE TO REDUCED HOUSEHOLD SPENDING

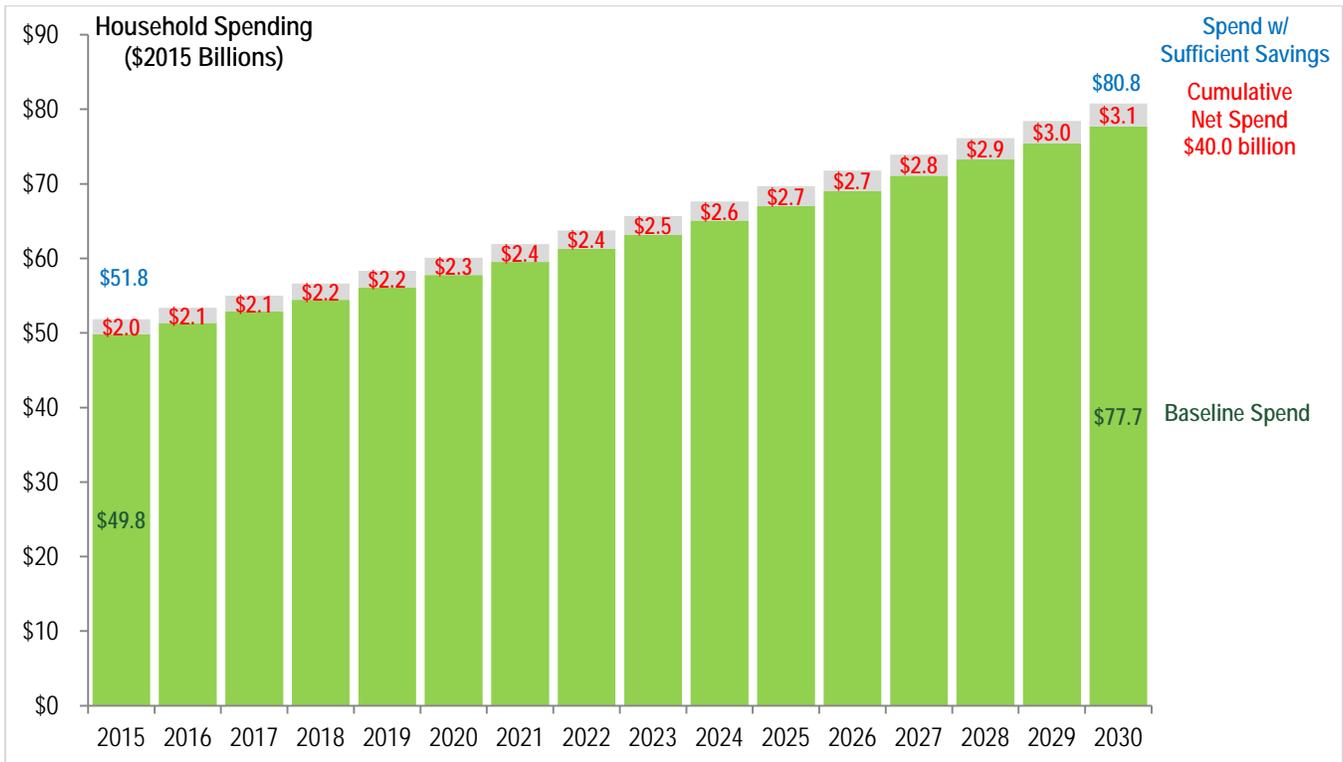
Reductions in household spending due to insufficient savings are also expected to magnify over time. While household spending among elderly residents are anticipated to grow from \$49.8 billion in 2015 to \$77.7 billion in 2030, it is estimated that these expenditures would reach \$80.8 billion in 2030 given sufficient savings level among elderly households. Thus, the net expenditure loss due to insufficient savings is anticipated to grow from \$2.0 billion in 2015 to \$3.1 billion in 2030. **Cumulative net expenditure losses are estimated to total \$40.0 billion over the 2015-2030 period** (see Table 5. 2 and Figure 5.2).

TABLE 5.2 - HOUSEHOLD SPENDING BY ELDERLY RESIDENTS (IN \$2015)

	2015	2030	Cumulative 2015-2030
Baseline	\$49.8 billion	\$77.7 billion	\$1.005 trillion
Sufficient Savings	\$51.8 billion	\$80.8 billion	\$1.045 trillion
Net Difference	\$2.0 billion	\$3.1 billion	\$40.0 billion

Source: ESI Calculations. Rows and columns may not sum due to rounding

FIGURE 5.2 – REDUCED HOUSEHOLD SPENDING DUE TO INSUFFICIENT SAVINGS, 2015-2030 (IN \$2015)



ECONOMIC AND TAX REVENUE IMPACTS

The reduced spending of elderly households as a result of insufficient savings affects the state's economy in multiple ways. The decreased spending reduces supply chain activity and the associated employee compensation. This lost activity also has a significant effect on Pennsylvania's tax base, and thus its revenue collection. Many of the direct expenditures are subject to the state sales tax, and the economic activity associated with household spending creates earnings for employees and businesses that are subject to income and corporation taxes. **The state budget is thus negatively impacted by both expenditure increases and revenue losses.**

The total **loss in economic output** in the state economy from reduced spending due to insufficient savings is projected to grow from \$2.8 billion in 2015 to \$4.3 billion in 2030, and to total **a cumulative \$55.8 billion over the 2015-2030 period**. This loss of activity represents a loss of employment (growing from more than 20,700 FTE jobs in 2015 to more than 31,800 in 2030) and associated earnings. It also **shrinks the state's tax base**, reducing state revenue collections by an estimated \$70 million in 2015 and \$106 million in 2030, and **a cumulative total of \$1.4 billion for the 2015-2030 period** (see Table 5.3)

TABLE 5.3 – NET ECONOMIC AND TAX REVENUE IMPACTS OF REDUCED HOUSEHOLD SPENDING DUE TO INSUFFICIENT SAVINGS, 2015-2030 (IN \$2015)

	2015	2030	Cumulative 2015-2030
Economic Output	\$2.8 billion	\$4.3 billion	\$55.8 billion
Employment (FTE)	20,680 jobs	31,830 jobs	25,880 jobs per year
Earnings	\$857 million	\$1.3 billion	\$17.2 billion
State Tax Revenue	\$70 million	\$106 million	\$1.4 billion

Source: ESI Calculations. Rows and columns may not sum due to rounding

APPENDIX A – MODELING HOUSEHOLD INCOMES

This report defines the relationship between income and state assistance costs and household spending in order to estimate the net impacts of insufficient retirement savings. Accordingly, defining the distribution of household incomes under various scenarios is an important step in the methodology.

Four income distributions of Pennsylvania’s retirees are modeled in this report:

- 1) Baseline incomes in 2015 (based on observed data)
- 2) Baseline incomes in 2030 (projected based on the continuation of current savings trends)
- 3) Sufficient incomes in 2015 (relative to near-retiree incomes in 2000)
- 4) Sufficient incomes in 2030 (relative to near-retiree incomes in 2015)

This appendix details the series of data inputs and calculations undertaken to derive the income distribution of Pennsylvania’s elderly households in each of these scenarios.

- First, three sets of household income distribution for Pennsylvania’s households are observed using data from the Current Population Survey (CPS). The first set details the 65+ households living in Pennsylvania in 2015 while the remaining sets reflect the near-retirees (50-64) both in 2000 and in 2015.
- Next, the income change of the 2000 near-retiree cohort as they aged to become the 65+ cohort in 2015 is observed and modeled. This relationship is applied to the income profile of near-retirees in 2015 to project the anticipated income distribution of the 65+ cohort in 2030.
- Finally, alternative income distributions are generated in which the elderly population has sufficient retirement savings in both 2015 and 2030. This is undertaken by applying a replacement rate framework to the observed incomes of near-retirees in 2000 (for the 2015 elderly population) and 2015 (for the 2030 elderly population), with adjustments at the top and bottom of the income scale.

These four income distribution form the base from which the analysis of net assistance costs and net household spending detailed in Appendix B and Appendix C are conducted.

A.1 OBSERVED HOUSEHOLD INCOMES

The Annual Social and Economic Supplement to the Current Population Survey (CPS ASEC) is conducted by the US Census Bureau and serves as the basis for the federal government’s official poverty statistics. It serves as a robust data set on current and historical household incomes of Pennsylvanians by age.

Details from the CPS related to state of residence, relationship to household head, age, and various sources of income were used to determine the income distribution of the population relevant to the analysis. In order to obtain a significant sample size of near-retirees and elderly residents within Pennsylvania for the appropriate years, multiple years of data were collected to estimate the 2000 and 2015 income distributions. This observed data is used to define the income distributions of Pennsylvania’s elderly population in 2015 (Figure A.1), near-retiree population in 2000 (in \$2015, Figure A.2), and near-retiree population in 2015 (Figure A.3)



FIGURE A.1 – INCOME DISTRIBUTION OF PENNSYLVANIA’S NEAR-RETIRES (50-64) IN 2000 (IN \$2015)

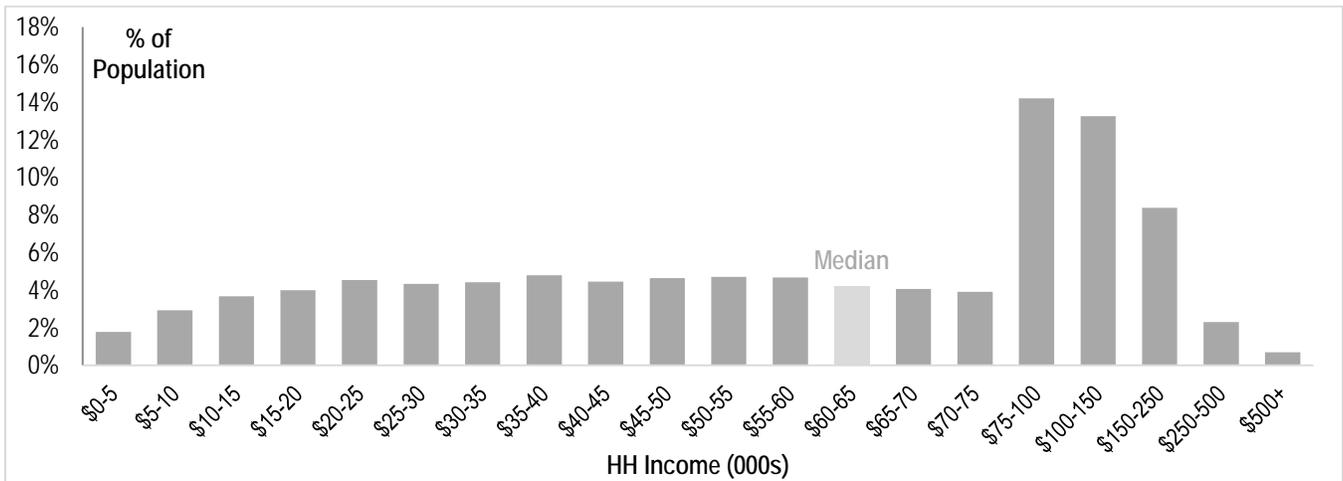


FIGURE A.2 – INCOME DISTRIBUTION OF PENNSYLVANIA’S NEAR-RETIRES (50-64) IN 2015

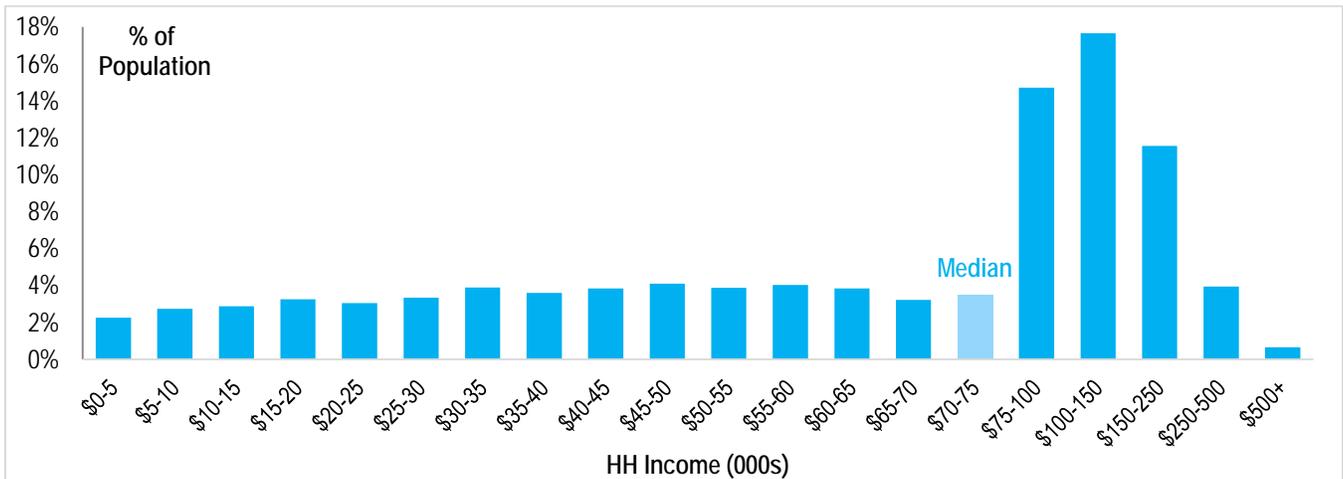
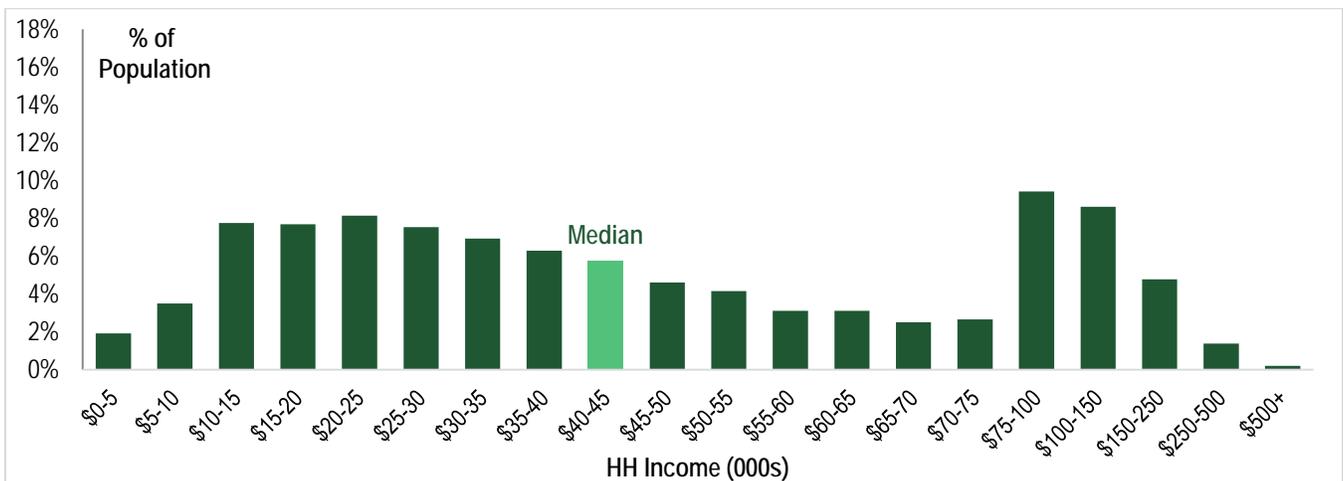


FIGURE A.3 – INCOME DISTRIBUTION OF PENNSYLVANIA’S ELDERLY POPULATION (65+) IN 2015



Source: CPS ASEC



While the CPS ASEC is a widely used source on income characteristics, concerns have been raised about its robustness in capturing retiree incomes. In particular, comparisons of CPS results to IRS data have identify a systematic underreporting of income from private savings (401(k) and IRA plans) in prior waves of the CPS survey.⁶² Starting in 2014, the CPS revised its questionnaire in an attempt to more accurately capture withdrawals from these assets as a source of annual income. The extent to which these changes (which apply to part of the sample utilized in this analysis) have addressed this underreporting issue is unclear at this time.

The impact that these reporting issues have on the income statistics for a typical household is a matter of some debate. A recent analysis by the Census Bureau matches 2012 CPS results with linked administrative data, and finds a significant gap in median income calculations between the two sources.⁶³ However, other research has demonstrated a significant gap in retirement account ownership between low-income and upper-income households, a dynamic which mitigates income reporting issues for many households.⁶⁴ Research from the Center for Retirement Research (CRR) at Boston College indicates that the vast majority of underreporting is concentrated among upper income households, such that “the survey still provides a relatively accurate picture of retirement income for the typical middle-income household, which holds little wealth from retirement plans.”⁶⁵

The underreporting of private savings by elderly households is likely to have a relatively limited impact on estimated net differences on the net calculation of state assistance costs, because these costs are largely driven by lower income households, who are less likely to hold significant private savings. More broadly, as described in Appendix B, assistance costs estimates by income bracket are scaled to the observed spending level by program from the state’s FY 2015-2016 budget. Therefore, inaccuracies in reported incomes would lead to a redistribution of estimated costs by income band (and accordingly to small changes in the net difference between baseline and sufficient savings scenarios) but would not impact the total spending.

Implications may be larger for household spending estimates, where higher income households have a greater relative contribution. As described in Appendix C, spending profiles by household income are defined through reported data from the Consumption and Activities Mail Survey (CAMS). To the extent that the CAMS faces some of the same reporting challenges as the CPS ASEC in capturing this income type, the relationships between income and reported expenditures may be applicable to CPS income data. In addition, as described below, the definition of sufficient savings utilized in this analysis adopts the observed or projected distribution of upper income households rather than adjusting to a recommended replacement rate. Therefore, upper income households are a limited contributor to the net differential in household spending in the sufficient savings scenario within this framework.

⁶² Adam Bee and Joshua Mitchell, US Census Bureau (2017). “Do Older Americans Have More Income Than we Think?” <<https://www.census.gov/content/dam/Census/library/working-papers/2017/demo/SEHSD-WP2017-39.pdf>>

⁶³ Bee and Mitchell (2017) find a median household income for persons aged 65 and over of \$44,300 in the linked administrative data, 30% higher than the median income of \$33,800 for this same cohort in the 2012 CPS.

⁶⁴ See for example: Nari Rhee and Ilana Boivie (2015), “The Continuing Retirement Savings Crisis. *National Institute on Retirement Security (NIRS)*. <http://www.nirsonline.org/storage/nirs/documents/RSC%202015/final_rsc_2015.pdf> which finds that “Retirement Account Ownership if Heavily Concentrated Among Higher Income Households” (see Figure 7, p.10).

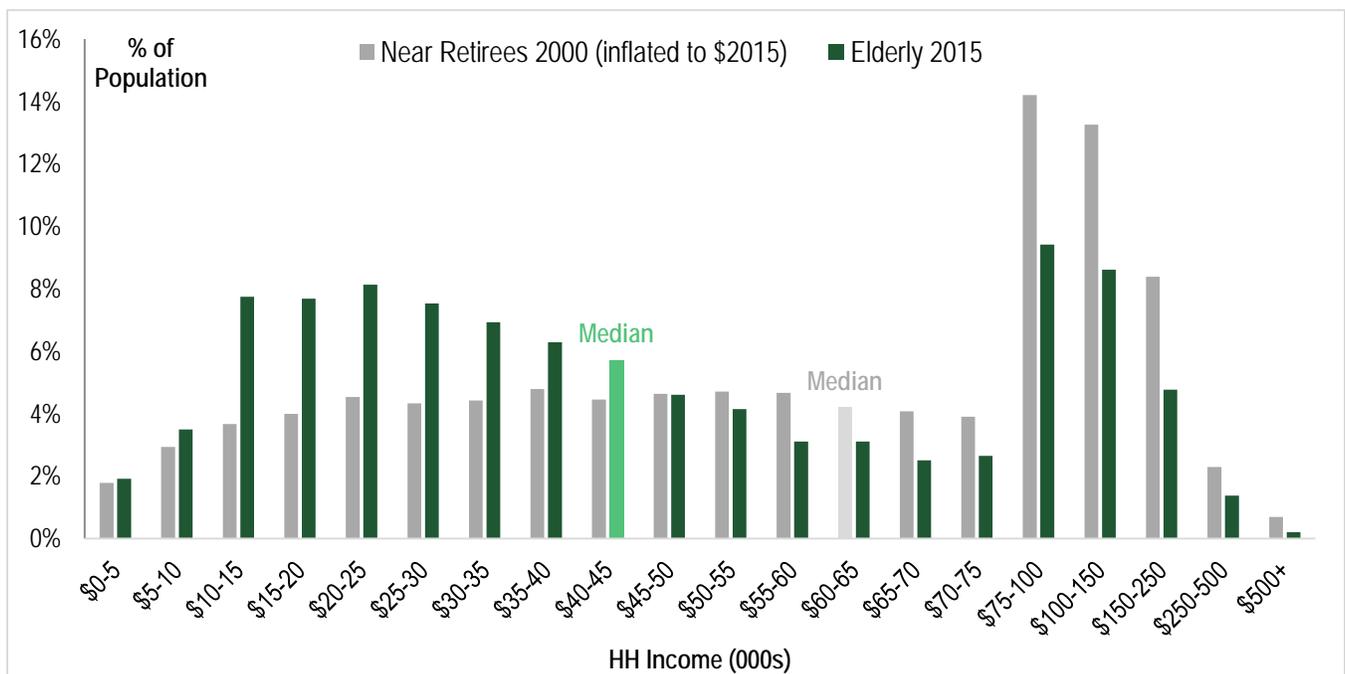
⁶⁵ Alicia Munnell and Anqi Chen (2014). “Do Census Data Understate Retirement Income? *Center for Retirement Research at Boston College*. <http://crr.bc.edu/wp-content/uploads/2014/12/IB_14-19-508.pdf>

A.2 INCOME CHANGE OVER TIME

The next step is to project the distribution of household incomes in 2030. This is undertaken by applying the observed income change from the near-retiree cohort in 2000 as it transitioned to become the elderly cohort in 2015, and applying that change to the income profile of current retirees as of 2015. This observed and projected change in income for the cohort entering retirement can ultimately be compared to the sufficient savings scenario calculated below, in which income replacement for these cohorts meets recommended levels.

As expected, household incomes of Pennsylvania’s near-retirees in 2000 are materially higher than the incomes of this same cohort in 2015. When accounting for inflation in the intervening years, these now elderly households in 2015 have lower incomes than they did at age 50-65. The median income for near-retiree households in 2000 was \$60,000 - \$65,000 (in \$2015), with a relatively flat distribution of incomes below that median. By contrast, their median income as elderly households fifteen years later in 2015 was \$40,000 - \$45,000, with a clustering of incomes observed between \$10,000 and \$40,000 (see Figure A.4).

FIGURE A.4 – INCOME DISTRIBUTION OF NEAR-RETIREE (50-64) IN 2000 AND ELDERLY POPULATION IN 2015 (65+)



Source: CPS ASEC, Bureau of Labor Statics Consumer Price Index (Inflation)

The relationship between near-retiree and retiree incomes for the same cohort over time can be calculated mathematically. This relationship is then applied to the observed incomes of near-retiree households in 2015 to project the income distributions of elderly households in 2030. Said another way, the trends in retiree savings observed from 2000-2015 are modeled to continue at the same rate from 2015-2030.

There is a robust debate among retirement researchers on the relative preparedness of the baby boomer cohort to the generations that preceded it. A broad range of factors beyond income levels can affect retirement readiness.

These include current and future savings levels, participation in defined benefit or defined contribution savings plans, length of time in the workforce, relative health and associated dependence on health care, and other household assets such as property. Retirement researchers give varied emphasis to each of these factors, and rely on different data sources to support their views. One line of research indicates that the current near-retirees have levels of private savings (such as IRA and 401(k) plans) in excess of prior generations, and is accordingly relatively well prepared for retirement.⁶⁶ Another line of research emphasizes falling participation in defined benefit plans, and indicates increases in household debt and reductions in total assets available for future retirees, including real estate.⁶⁷ In addition, generations below the baby boomers may face additional challenges in accumulating retirement savings. For example, Generation X faces financial pressure from both raising children and looking after aging parents,⁶⁸ while the Millennial generation entered their working years with unprecedented levels of student debt and well-documented struggles in household formation and purchasing their first home.

Other research focuses on anticipated changes in retirement costs rather than anticipated incomes, arguing that factors like increasing healthcare costs, lengthening life spans, reductions in Social Security associated with the increased retirement age, and a lower interest rate environment mean that future retirees will need greater assets than prior generations to enjoy the same standard of living.⁶⁹ From a government standpoint, the declining dependency ratio of working age households to retiree households as the disproportionately large baby boomer cohort reaches retirement also suggests that even equivalent per capita assistance costs may create a larger strain on government budgets, since the size of the working age tax base relative to the retiree population will be significantly diminished. In simpler terms, the retirement of the baby boomer generation will mean higher costs for the government with a proportionately smaller tax base from the working age residents to support them. In Pennsylvania, the Independent Fiscal Office projects that the state's dependency ratio of working age (20-64) to retiree (65+) residents will fall from 3.9 in 2010 to 2.4 in 2030.⁷⁰ From a fiscal standpoint, this problem is compounded by the anticipated increases in relative medical cost and anticipated sluggish financial growth.⁷¹

It is worth noting that many of these findings are not necessarily contradictory, but rather may differ in focus. For example, increased participation in defined contribution relative to defined benefit plans may mean that accumulated private savings have risen while some measures of net wealth (taking into account all assets and liabilities) have not. Further, the relative level of savings accumulated by different generations is in some respects a distinct analytical question from the level of savings that future retirees will need, whether from the perspective of the

⁶⁶ See: Andrew Biggs, "What the GAO's Skewed Retirement Saving Report Doesn't Tell You." *Forbes*, November 21, 2017. <<https://www.forbes.com/sites/andrewbiggs/2017/11/21/what-the-gaos-skewed-retirement-saving-report-doesnt-tell-you/#5ab3eb3f36db>>

⁶⁷ For a discussion of retirement plan types and household debt, see: US Government Accountability Office (2017), "The Nation's Retirement System: A Comprehensive re-Evaluation is needed to Better Promote Future Retirement Security." <<https://www.gao.gov/assets/690/687797.pdf>>

For an analysis of relative retirement assets over time using HRS data, see "Trends in Retirement Assets" section (p. 11-15) in Trostel (2017)

⁶⁸ See: "Perspectives on Retirement: Baby Boomer, Generation X and Millennials." *Transamerica Center for Retirement Studies*, August 2016. <https://www.transamericacenter.org/docs/default-source/retirement-survey-of-workers/tcrs2016_sr_perspectives_on_retirement_baby_boomers_genx_millennials.pdf>

⁶⁹ Alicia Munnell (2015). "Falling Short: The Coming Retirement Crisis and What to do about it." *Center for Retirement Research at Boston College*. <http://crr.bc.edu/wp-content/uploads/2015/04/IB_15-7_508.pdf>

⁷⁰ IFO November 2017 Five Year Budget Outlook, page 10. <<http://www.ifo.state.pa.us/releases.cfm?id=161>>

⁷¹ For a discussion of the implications of these changes for the federal budget, see e Louise Sheiner, "The Long-term Impact of Aging on the Federal Budget." *Hutchings Center on Fiscal and Monetary Policy, Brookings Institution*. January 2018 <<https://www.brookings.edu/research/the-long-term-impact-of-aging-on-the-federal-budget/>>.



individual retiree (due to lengthening lifespans and changing financial pressures) or from a government perspective (due to the fiscal implications of the changing demographic mix).

Our report does not adjudicate these debates, or seek to develop individual projections of each of the potential factors that could influence retirement readiness for the state's current near retirees. Instead, we utilize the simplifying assumption that the observed relationship between incomes of near-retirees in 2000 to the incomes of retirees in 2015 serves as the best proxy for projecting how the incomes of near-retirees in 2015 will translate into retiree incomes in 2030. This approach does not ignore the influence of any individual factor, but rather reflects all savings factors to the same extent that they influenced observed income change over the 2000-2015 period.⁷²

Income change over time is modeled by assuming an even distribution within the aggregated income band and calculating the associated 2015 retiree incomes for near-retiree incomes within each band.⁷³ These calculated relationships are matched to the near-retiree population in each income band to project the income distribution of the elderly population in 2030.⁷⁴ These projected incomes are then aggregated into the same 20 income bands utilized throughout this report.

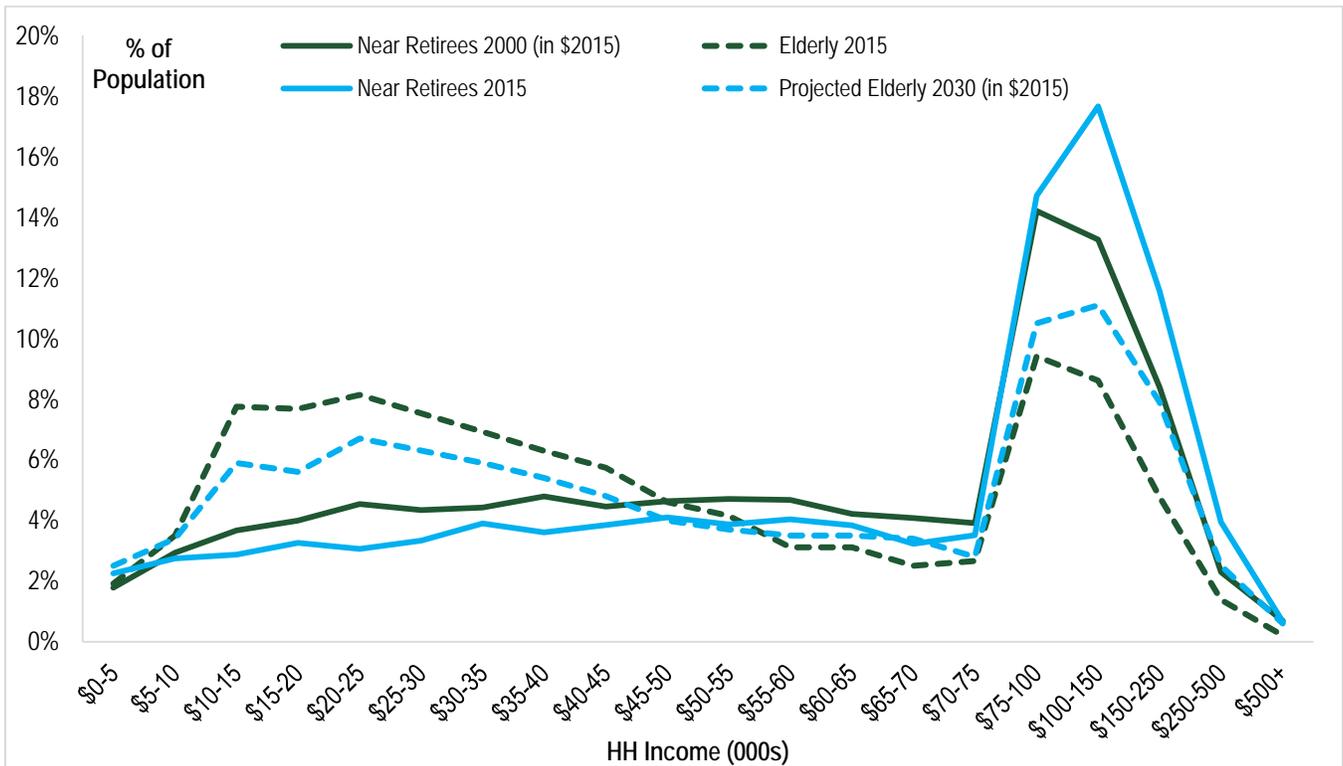
Figure A.5 below shows the relationship between observed near-retiree and retiree income from 2000-2015 (in green) and the projected relationship from 2015-2030 (in blue). By design, the net change observed for 2000-2015 (between the straight and dashed green lines) is replicated from 2015-2030 (from the straight to dashed blue lines).

⁷² It is also recognized that while many residents appearing in the 50-64 age band in a given year will also be represented in the 65+ cohort fifteen years later, the match is of course inexact. Each year, residents of a given age band are lost through death, aged into an older age band, or removed and replaced through migration. Notably, an analysis of recent net migration in and out of Pennsylvania by the IFO finds that "there is no clear pattern that suggests lower or upper-income taxpayers are more inclined to migrate out of the state" (IFO Five Year Outlook – page 17). Further, since the 65+ age band is not bounded by a maximum age, those residents 80 years or older will have already been a part of the elderly age cohort (65+) rather than the near-retiree cohort fifteen years earlier. Here, the approach of applying the observed relationship from 2000-2015 to project income change from 2015-2030 is again useful, because the presence of existing elderly households is common to both periods, and can thus be expected to influence the income profile of elderly residents in a similar manner in the end year.

⁷³ Note that while this approach in effect calculates replacement rates for each age band, it does not longitudinally track individual households. Therefore, replacement is measured on net across the population, rather than for individuals. Rates should therefore not be compared to studies (such as NRRI – cite) which often seek to quantify on a longitudinal basis the percentage of individual households that are anticipated to meet replacement rate targets (such as the National Retirement Risk Index from the Center for Retirement Research at Boston College).

⁷⁴ A linear spline interpolation between the midpoints of each band (which are assigned the band average) is utilized to avoid discontinuous income percentages

FIGURE A.5 – INCOME DISTRIBUTION OF PENNSYLVANIA’S NEAR-RETIREE AND ELDERLY POPULATION



Source: ESI Modeling of CPS Data

A.3 DEFINING SUFFICIENT RETIREMENT SAVINGS

A definition of sufficient retirement savings is developed in order to quantify state assistance costs and economic losses attributable to insufficient savings. This definition is implemented by modeling what the income distribution of Pennsylvania’s elderly households would be in 2015 and 2030 at sufficient savings levels. Projections of state assistance costs and household spending under these scenarios are then compared to costs and spending in the baseline scenarios to isolate the impact of insufficient savings.⁷⁵

Financial planners and retirement experts typically define retirement savings targets relative to the annual income level that a person has during their working years, rather than a flat dollar figure. This framework is premised on enabling retirees to maintain their pre-retirement living standards through their retirement years. It is typically implemented through either a targeted lump sum savings amount relative to working age incomes (such as eight to ten times) or a targeted percentage of annual working age income available each year in retirement (such as 70-85 percent). This benchmarking to working age income allows for and incorporates factors like variations in cost of living and living standards. It is generally assumed that living standards can be maintained in retirement on less

⁷⁵ Note that this report does not assume any particular policy or behavioral mechanism through which these savings benchmarks are achieved. It is possible that these changes in policy or behavior could themselves have additional effects. For example, additional savings could change spending patterns among working age residents.

than 100 percent of working-age salary due to changes in life stage, which can reduce expenses on items like housing (if for example a mortgage has been paid off) and on family (if children are no longer in the household).

Importantly, lump sum savings targets are often themselves aimed to provide sufficient annual income for a similar replacement rate of annual income.⁷⁶ Lump sum benchmarks assume other income sources like Social Security and asset income, as the recommended savings level would be inadequate to last through a full retirement period absent other ongoing income sources.⁷⁷ Savings in this report are evaluated from the perspective of the annual income stream it supports during retirement years, which provides a more comprehensive picture of the financial means of an elderly resident than a lump sum balance alone. This approach is also more appropriate for evaluating fiscal and economic implications due to the role of annual income in program eligibility and the statistical relationship between annual income and annual household spending.

A 2016 study by the U.S. Government Accountability Office (GAO) “analyzed 59 articles and reports that discussed how to develop, calculate or evaluate replacement rates” and concluded that “target replacement rates cited in the articles and reports GAO reviewed typically range between 70 and 85 percent.”⁷⁸ Pennsylvania’s exemption on taxes for retirement income suggests that targeted rates at the lower end of the national range may be appropriate (although many other states have partial exemptions and federal income tax liabilities are more significant than state). Conversely, factors like increasing longevity, increasing health care costs and lower interest rates support rates at the higher end of the range (or beyond). This report uses an income replacement target of 75 percent, well within the typical range.

The replacement rate calculation is adjusted for inflation (in keeping with its core objective of maintaining living standards, which depends on real purchasing power). Over the 2000-2015 period, the Consumer Price Index for Urban Consumers (CPI-U) grew by roughly 38 percent, meaning that a representative basket of goods and services that cost \$1.00 in 2000 would cost \$1.38 in 2015.⁷⁹ Conversely, a dollar in 2015 has the same purchasing power as \$0.73 did in 2000.⁸⁰ By coincidence, this inflation essentially offsets the recommended replacement rate of 75 percent, meaning that a near-retiree household in 2000 could achieve sufficient savings levels by maintaining their annual income level in nominal terms in 2015. This dynamic allows for a straightforward comparison of near-retiree incomes in 2000 to elderly incomes in 2015 in nominal dollars to see the extent to which the desired 1:1 replacement rate was met over this period (see Figure A.6).

⁷⁶ For example, Fidelity’s 2012 recommended lump sum target of eight times a person’s annual working age salary by the age of 67 was premised on an income replacement rate of 85%. See: “Fidelity: Put Aside 8 Times Your Salary Before You Retire.” *Associated Press*, September 14, 2012. <<https://www.cnbc.com/id/49031856>>

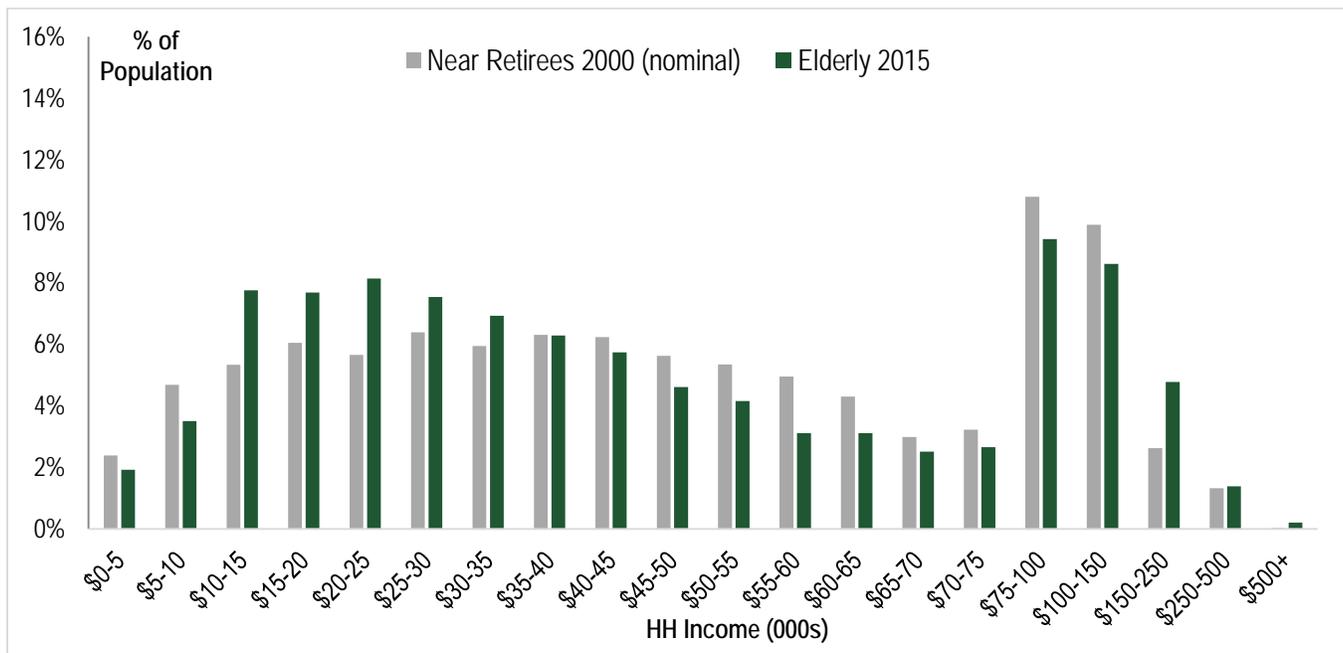
⁷⁷ For example, private savings of 8x an annual income would be exhausted in just ten years if it provided an 85 percent replacement rate of annual working age income by itself without any additional income streams.

⁷⁸ GAO, “Better Information on Income Replacement Rates Needed to Help Workers Plan for Retirement.” Mar 1, 2016. <<https://www.gao.gov/products/GAO-16-242>>

⁷⁹ The population covered by CPI-U includes all households in Metropolitan Statistical Areas and urban places of 2,500 inhabitants or more. Thus, this measure covers nearly 90% of U.S. households and is characterized by the BLS as “our broadest and most comprehensive CPI.” See: <<https://www.bls.gov/cpi/questions-and-answers.htm>>

⁸⁰ This is calculated as the inverse of the inflation rate, or $(\$1.00) / (\$1.38) = \$0.73$ or 73 percent

FIGURE A.6 – INCOME DISTRIBUTION OF NEAR-RETIREE (50-64) IN 2000 AND ELDERLY IN 2015 (65+)



Source: CPS ASEC

This comparison yields insight into weaknesses of the replacement rate framework for lower and upper income households that need to be accounted for within this report.

- Many residents in both the 2000 and 2015 are within income bands at or below the federal poverty level (FPL). To the extent that residents are in the same income band in both 2000 and 2015 (in nominal terms), they can be said to have appropriately replaced their income to the recommended level. However, residents in poverty cannot be said to have accumulated sufficient retirement savings for an adequate standard of living that meets their needs.
- In addition, the distribution of household incomes above \$75,000 varies between the 2000 and 2015 groups in nominal dollars. From a financial planning perspective, residents may be said to have failed to save adequately if they do not meet the recommended replacement rate, even if their retirement income is comfortably above the median. However, from a public policy perspective, these residents are adequately resourced, and do not represent the definition of insufficient savings as commonly understood.

To address these issues within a replacement framework, sufficient savings for elderly households are defined as 75 percent of their annual working age (50-64) income, with a minimum retirement income of the federal poverty level. Incomes for elderly residents above \$75,000 are considered sufficient regardless of the proportion of working age income replaced.

Importantly, the use of the Federal Poverty Level (FPL) as a minimum standard in this report does not imply that FPL incomes are necessarily desirable or adequate to meet the needs of all retiree households. Use of the federal poverty level to define a sufficient amount of income during retirement is itself not without controversy. It can be argued that the thresholds cited above cannot truly be considered adequate to allow individuals or families to maintain a minimally decent quality of life. It is also possible that many households close to the poverty level would

potentially be marginally better off if they qualify for public benefits that are far more valuable to the recipients than having slightly more income but being disqualified for those benefits.

These considerations are important, but not adequate justifications to disregard the utility of the federal poverty levels in conducting the instant analysis. The analysis is not premised upon, and not intended to promote, any particular policy recommendation or programmatic design that employs the federal poverty level as a measure of real world income sufficiency. Rather, this report utilizes these levels, which are externally established standards that serve as recognizable benchmarks of poverty, to allow quantification of the impacts of inadequate retirement savings. The conclusions of the methodology applied here can relatively easily be adjusted to derive the fiscal implications of subsequent policy/programmatic decisions that determine that sufficiency might better be identified at any other level chosen.

For the year 2015, this standard is implemented in a three-step process:

- 1) First, the proportion of near-retirees in 2000 in each income band up to \$75,000 in nominal dollars is maintained in the same income band in 2015 (in nominal dollars).
- 2) Next, those residents falling below the Federal Poverty Level in 2015 are adjusted to an income bands representing the FPL.⁸¹
- 3) Finally, the distribution of observed household incomes for elderly retirees in 2015 is applied to the remaining retirees within incomes above \$75,000 in the sufficient savings scenario.⁸²

This process yields a modeled distribution of elderly resident incomes at sufficient savings levels that differs from the observed incomes of Pennsylvania's elderly residents in 2015. A net difference can be calculated for each income range by subtracting the observed incomes from the modeled sufficient incomes. This net difference in population by income band will drive the differential in state assistance costs and household spending calculated in this report (see Table A.1).

⁸¹ Note that the FPL varies by household size (as well as by year). For 2015 (the standard utilized to align with the starting point of the analysis and the demographic data used), the FPL was \$11,700 for a single person (falling in the \$10,000-\$15,000 income band in this analysis). For a household of two, the FPL was \$15,900 (falling in the \$15,000-\$20,000 income band), and for families larger than two the FPL was greater than \$20,000. Data from the American Community Survey was utilized to estimate the proportion of elderly households of various income sizes (with the vast majority falling in either one or two-person households), and these proportions were utilized to adjust the appropriate portion of the population falling below the income bracket into which the FPL falls.

⁸² Note that the observed share of elderly residents in each income band in 2015 cannot be applied directly to the sufficient savings scenario because the proportion of the total population with incomes above \$75,000 differs somewhat between the observed and sufficient scenarios. Applying these percentages directly would therefore produce a full household distribution that sums to less than 100% of the population. This adjustment (driven by the greater total volume of residents with more than \$75,000 in annual income in the sufficient scenario) accounts for the net increases in upper income residents in the sufficient scenarios relative to the baseline scenarios shown below.

TABLE A.1 – INCOME DISTRIBUTION OF ELDERLY RESIDENTS – BASELINE VS. SUFFICIENT SAVINGS (2015)

Income Band (000s)	Baseline – % of Population	Sufficient Savings - % of Population	Baseline – Population	Sufficient Savings - Population	Net Difference
\$0-5	1.9%	0.0%	41,800	0	(41,800)
\$5-10	3.5%	0.0%	76,200	0	(76,200)
\$10-15	7.8%	5.8%	168,900	125,600	(43,300)
\$15-20 ⁸³	7.7%	12.4%	167,500	270,800	103,300
\$20-25	8.1%	5.9%	177,400	128,700	(48,700)
\$25-30	7.5%	6.4%	164,200	139,300	(24,900)
\$30-35	6.9%	5.9%	151,000	129,500	(21,500)
\$35-40	6.3%	6.3%	137,100	137,300	200
\$40-45	5.7%	6.2%	125,000	135,800	10,800
\$45-50	4.6%	5.6%	100,400	122,500	22,100
\$50-55	4.2%	5.3%	90,500	116,400	25,900
\$55-60	3.1%	5.0%	67,800	107,900	40,100
\$60-65	3.1%	4.3%	67,800	93,700	25,900
\$65-70	2.5%	3.0%	54,600	64,900	10,300
\$70-75	2.7%	3.2%	57,900	70,200	12,300
\$75-100 ⁸⁴	9.4%	9.5%	205,200	207,400	2,200
\$100-150	8.6%	8.7%	187,600	189,600	2,000
\$150-250	4.8%	4.8%	104,100	105,200	1,100
\$250-500	1.4%	1.4%	30,000	30,400	400
\$500+	0.2%	0.2%	4,400	4,400	0
Total	100%	100%	2,179,400	2,179,400	0

Source: ESI Modeling of CPS Data

⁸³ Note that the increase in residents within this income band in the sufficient savings scenario is a function of the minimum threshold of the Federal Poverty Level. Many of the residents in this band would be placed in a lower income band under a strict replacement rate calculation based on their working age income as of 2000, but are instead assigned to the \$15,000-\$20,000 band based on the FPL for a two-person household of \$15,930.

⁸⁴ Note that the size of income bands above \$75,000 are discontinuous, covering increments larger than the \$5,000 increments for the fifteen bands from \$0-\$5,000. The larger population observed in these bands is not a result of a clustering of incomes at this level, but rather simply a function of the larger income span of the bands. Aggregation of higher income households into larger bands is necessary from a logistical standpoint for modeling, since a continuation of \$5,000 bands up to incomes as high as \$500,000 would require thousands of bands, each of which would yield insufficient sample size for analysis.

This same framework is then applied to model sufficient incomes for retirees in 2030 based on the observed income distribution of the near-retiree population in 2030. Incomes are maintained in \$2015 over time, so that current and future results can be compared in like terms.⁸⁵ The near-retiree population in each band is distributed proportionally to the bands representing 75 percent of their 2015 income to achieve the targeted replacement rate.⁸⁶ The lowest and highest income brackets are treated in the same manner described above, with residents below the poverty level adjusted to the FPL and the projected distribution of household incomes for retirees above \$75,000 in 2030 is applied to those remaining households above \$75,000 in the sufficient savings scenario.

This process produces a distribution of incomes for the state's elderly population in 2030 at sufficient savings which can be compared to the projected distribution of incomes previously modeled.⁸⁷ Table A.2 compares income distributions under these projected and sufficient scenarios and expresses the net difference in the population in each income band by subtracting the projected scenario from the sufficient scenario.

⁸⁵ This means that a given income level (and assistance cost or household spending level) for 2030 should be understood in today's terms. For instance, a resident projected to have an income of \$50,000 in 2030 would in practice have a higher income in nominal dollars, but that income would have an equivalent purchasing power to \$50,000 today.

⁸⁶ For example, replacement incomes at a rate of 75% for the \$50,000-\$55,000 income band range from \$37,500 (75% of \$50,000) to \$41,250 (75% of \$55,000). An even distribution across these bands would place 2/3 within the \$35,000-\$40,000 band and 1/3 within the \$40,000-\$45,000 band in 2030 (since the income range of \$2,500 between \$37,500 and \$40,000 is 2/3 of then full replacement income range of \$37,500-\$41,250). Therefore, 2/3 of the proportion of the 2015 near-retiree population in the \$50,000-\$55,000 band is placed in the \$35,000-\$40,000 band in the 2030 sufficient scenario, and 1/3 is placed in the \$40,000-\$45,000 band. This process is repeated for all income bands up to \$100,000 in near-retirement income and \$75,000 in retiree income.

⁸⁷ The approach to modeling this distribution is described above and shown in Figure A.5. Note that this scenario assumes that near-retiree incomes in 2015 will translate to retiree incomes in 2030 by the same relationship that near-retiree incomes in 2000 translated to retiree incomes in 2015. Therefore, this scenario can be thought of as a "baseline" estimate of anticipated elderly incomes in 2030, absent any changes in trends or policy.



TABLE A.2 – INCOME DISTRIBUTION OF ELDERLY RESIDENTS – BASELINE VS. SUFFICIENT SAVINGS (2030)

Income Band (000s)	Baseline – % of Population	Sufficient Savings - % of Population	Baseline – Population	Sufficient Savings - Population	Net Difference
\$0-5	2.5%	0.0%	77,300	0	(77,300)
\$5-10	3.4%	0.0%	105,200	0	(105,200)
\$10-15	5.9%	5.2%	182,500	160,200	(22,300)
\$15-20	5.6%	9.9%	173,200	306,800	133,600
\$20-25	6.7%	5.0%	207,200	155,600	(51,600)
\$25-30	6.3%	4.9%	194,800	151,600	(43,200)
\$30-35	5.9%	5.2%	182,500	161,300	(21,200)
\$35-40	5.4%	5.3%	167,000	164,400	(2,600)
\$40-45	4.8%	5.3%	148,400	164,900	16,500
\$45-50	4.0%	4.9%	123,700	151,900	28,200
\$50-55	3.7%	4.5%	114,400	138,900	24,500
\$55-60	3.5%	4.1%	108,200	127,100	18,900
\$60-65	3.5%	3.9%	108,200	121,300	13,100
\$65-70	3.4%	3.9%	105,200	121,300	16,100
\$70-75	2.8%	3.9%	86,600	121,300	34,700
\$75-100	10.5%	10.9%	324,700	336,900	12,200
\$100-150	11.1%	11.5%	343,300	356,200	12,900
\$150-250	7.9%	8.2%	244,300	253,500	9,200
\$250-500	2.5%	2.6%	77,300	80,200	2,900
\$500+	0.6%	0.6%	18,600	19,300	700
Total	100%	100%	3,092,700	3,092,700	0

APPENDIX B – MODELING STATE ASSISTANCE COSTS

This appendix details the series of data inputs and calculations undertaken to determine the level of state assistance costs for retirees by income level. State budget documents from FY 2015-2016 are reviewed to assess the baseline level of state assistance spending for elderly residents, and the relationship between state costs and income levels are modeled for each program. The relationship between state assistance costs and retiree income is modeled in the following steps:

- First, the Pennsylvania Budget and the *Benefits & Rights for Older Pennsylvanians* guide published by the State Department of Aging are reviewed in detail to identify state assistance programs relevant to elderly residents, and to define their total costs.
- Next, the portion of total spending within these programs that are dedicated to elderly residents and utilized state funds is estimated.
- Finally, this state spending is allocated across the income distribution of Pennsylvania's retiree population. This yields an estimate of the per capita cost for households in each income band for each program.

These per capita estimates of household spending by income band are then be utilized to estimate the net state assistance costs to be modeled under the four population and income distribution scenarios described in Appendix A.

B.1 RELEVANT STATE PROGRAMS

State assistance costs for the elderly population as of 2015 are estimated using budget information from the state's fiscal year 2015-2016, which runs from July 1, 2015 to June 30, 2016. Current budget documents (from the FY 2017-2018 budget cycle) include actual (rather than projected) expenditures for each line item for FY 2015-2016. A detailed review of these budget documents as well as the *Benefits & Rights for Older Pennsylvanians* guide published by the State Department of Aging was undertaken to identify state programs that assist elderly residents. Each identified programs.

Table B.1 below shows the programs identified, the administering department, and the funding source for state expenditures on the program. State expenditures included in this analysis are inclusive of additional funds (notably the Lottery Fund and Tobacco Settlement Fund and augmentations such as the Nursing Facility Assessment) in addition to the state's General Fund.

The Medical Assistance (or Medicaid) program is comprised of a number of sub-programs and is funded through a combination of federal and state funds. This program is sub-divided into five sub-programs for the purpose of this analysis, since each of these areas functions somewhat differently with respect to state expenditures for elderly residents.⁸⁸

⁸⁸ Note that the state's Medicaid expansion, implemented in 2015, was not targeted to the elderly population, and does not fall within this analysis. The program was also fully federal funded in its initial years.

TABLE B.1 – STATE-FUNDED ASSISTANCE PROGRAMS FOR ELDERLY RESIDENTS (FY 2015-2016)

Program	Description	Administering Department	State Funding Source
Medicaid	State portion of shared state / federal costs for medical coverage	Human Services	
Long-Term Care ⁸⁹	Institutional care for medically and financially needy individuals in nursing facilities		General, Lottery, Tobacco, Augmentations
Home and Community-Based Services	Long-term care services delivered to qualifying individuals outside of institutional facilities through the aging waiver (age 60+)		General, Lottery, Tobacco
Long-Term Managed Care	Comprehensive health and support services delivered in the community through the LIFE program (age 55+)		General
Payment to Fed Gvt for Medicare Drug Program	Mandated state payment to reduce federal Medicare Part D (prescription drug) costs		General, Augmentations
Medicaid - Other	Remaining inpatient and outpatient services for which Medicaid provides payment (often supplementing Medicare)		General
PennCARE	Statewide network of home and community-based service providers	Aging	Lottery
Property Tax / Rent Rebates	Rebates to low-income elderly residents for housing costs	Revenue	Lottery, Gaming
PACE / PACENET	Prescription drug coverage for low-income elderly residents	Aging	Lottery
Free and Reduced Fare Transit	Subsidized local transportation services for elderly residents	Transportation	Lottery

Source: ESI Analysis of Commonwealth of Pennsylvania Budget Documents

Notably, this analysis does not include all government programs from which Pennsylvania seniors may derive some benefit. First, it excludes programs that benefit elderly residents but are exclusively federally funded. For example, the Supplemental Nutritional Assistance Program (SNAP) helps low-income residents (including the elderly) purchase food, but is fully federally funded. Therefore, neither insufficient savings nor growth in the elderly population would result in greater state expenditures under current budgetary conditions.

In addition, the analysis excludes programs that benefit the state's residents broadly but are not targeted or allocated to elderly residents in any meaningful sense. For example, public safety services (such as the state police) or transportation infrastructure (such as roads or bridges) benefit seniors as they do all state residents, but expenditures on these line items are not meaningfully correlated with the level of retirement savings. Also excluded are a number of non-Medicaid programs administered by the Department of Human Services that serve the population at large, and as such have some utilization by elderly residents.⁹⁰

⁸⁹ Note that this analysis predates the transition of the Long Term Care and Home and Community-Based Services programs to a managed care system starting in 2018. See: <http://www.dhs.pa.gov/cs/groups/webcontent/documents/document/c_220667.pdf>.

⁹⁰ These include programs supporting mental health, intellectual disabilities, autism intervention and services, behavioral health, domestic violence, rape crisis, legal assistance, homeless assistance, and more. While these programs serve some portion of elderly residents and are in some cases means-tested, they are not targeted to elderly residents, and the proportion of elderly beneficiaries is unclear. Further, expenditures are in some cases capped

One additional program that is excluded from this analysis is Supplemental Security Income (SSI). SSI is a federal program providing additional assistance for qualifying households (based on income, assets and other characteristics such as disability) within the broader Social Security program. Pennsylvania provides an additional monthly supplemental payment from state funds to federal SSI enrollees, including low-income elderly residents. However, this program creates unique conceptual and statistical challenges in quantifying its incremental impact on the state budget due to insufficient savings. These challenges arise because SSI payments (like Social Security income) are included in the income of elderly households reported in the CPS, and because SSI qualification is tied to the federal poverty level, which represents the which is the minimum assumed income of many households under the sufficient savings scenario developed in this report.⁹¹ Due to these modeling challenges, the program is excluded from the calculation of state assistance costs. Importantly, Pennsylvania's SSI expenditures for elderly households are modest, well below state expenditures on any of the programs listed above.⁹²

B.2 STATE EXPENDITURES ON ELDERLY ASSISTANCE

Next, the portion of program costs that benefit elderly residents (as opposed to non-elderly) is identified for each program, as well as the portion of those assistance costs that is funded by the state (rather than the federal government). Applying these two proportions in succession to the total spending on each program identified above yields the base of total state funded expenditures on elderly assistance for FY 2015-2016.

All state expenditures are included in this calculation, whether revenue is initially derived through the General Fund or through other sources. The state's Lottery Fund and Tobacco Settlement Fund are important sources for programs benefitting elderly residents. In addition, the Medicaid program includes a number of "augmentations" that raise additional revenue from service providers to support additional expenditures.⁹³ In avoiding any distinction between funding sources, this report also makes no specific projections of the future availability of these funding sources for their current programmatic uses. If these funds are reduced or diverted for other purposes, the cost to state remains, whether in the form of increased expenditures through the general fund, new sources of revenue, or reduced services for elderly residents.

rather than entitlement based, meaning that changes in demand among the elderly population might result in a shift in beneficiaries rather than a change in state costs.

⁹¹ This means that SSI cannot be correlated with household income bands in a straightforward way, because the SSI payments are in some cases a part of the income by which the bands are defined. It would be possible to simply assume that SSI costs therefore are effectively reduced to \$0 within the sufficient savings scenario, since residents at the poverty level no longer qualify. However, this analysis does not assume a specific mechanism by which incomes reach the FPL minimum, and federal SSI benefits could serve as one of the means allowing post-benefit incomes to reach this level. This interaction between income and benefits is unique to the SSI program due to its structure as a cash payment, and creates an internal tension in defining the relationship with increased savings that is contrary to the analytic exercise this report undertakes.

⁹² Federal enrollment data from the Social Security Administration indicates that 19% of Pennsylvania's SSI enrollees as of December 2016 are 65 or older. See: <https://www.ssa.gov/policy/docs/statcomps/ssi_sc/2016/pa.pdf>. Applying that proportion to the \$132 million in state spending on this program in FY 2015-2016 yields an estimated state expenditure for elderly residents of roughly \$25 million.

⁹³ For example, the Nursing Home Assessment levies an assessment on certain nursing facilities to maintaining rates and provide additional reimbursements within the Medicaid program. See: <<http://dhs.pa.gov/provider/longtermcarecasemixinformation/assessment/>>



Three identified programs are targeted exclusively to elderly residents: PennCARE,⁹⁴ PACE / PACENET, and Free and Reduced Fare transit. In addition, these programs are funded entirely through proceeds of the Pennsylvania lottery. Therefore, state assistance costs for elderly residents match the full expenditure amount for these programs (since both the elderly and state-funded share of expenditures is 100 percent).

The Lottery Fund and Gaming Fund provide funding for Property Tax and Rent Rebate program administered by the Department of Revenue. While this program is broadly utilized by elderly residents, it is also open to widow and widowers age 50 or older, and people with disabilities age 18 or older.⁹⁵ Program data provided by the Department of Revenue for claim year 2014 indicates that approximately 87 percent of rebates are issued to elderly Pennsylvanians.⁹⁶ 100 percent of these costs are state funded.

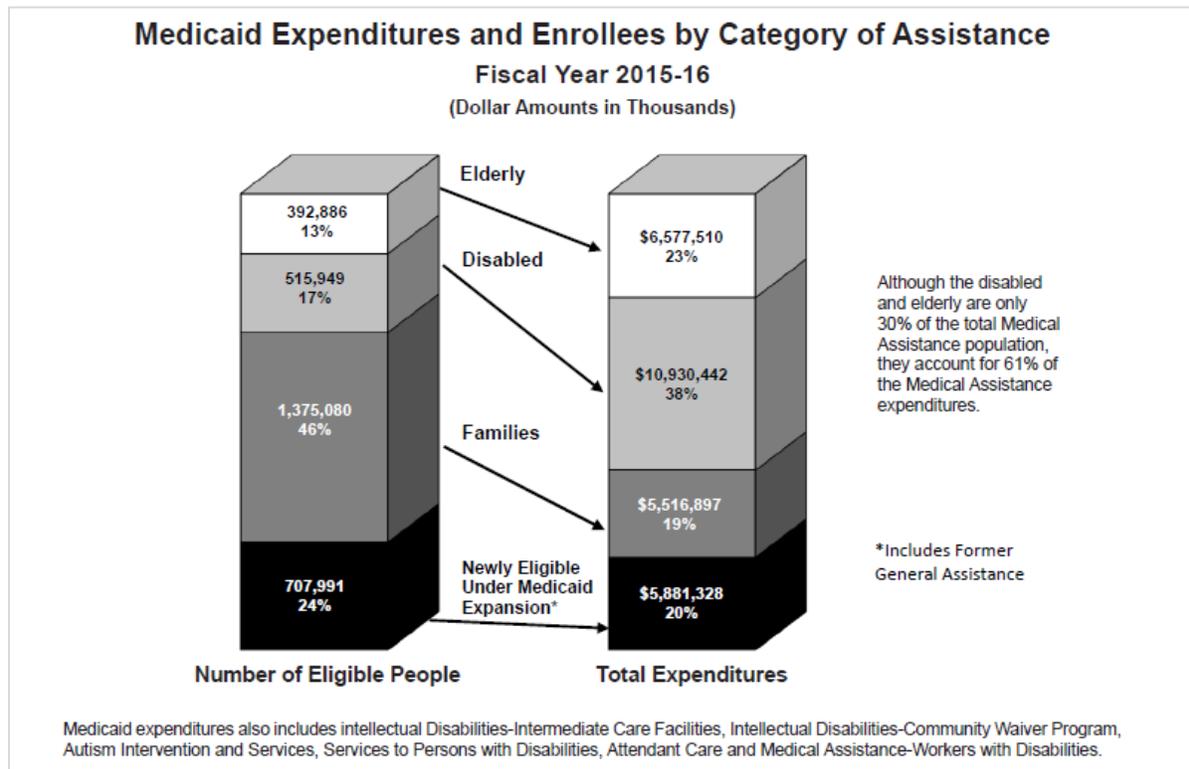
The distribution of Medicaid programs was determined through a multi-step process. The state's FY 2015-2016 proposed budget provides a distribution of total Medicaid spending by category (elderly, disabled, families, and the Medicaid expansion population of low-income adults), and documents which programs are included in this distribution. This breakdown indicates that the elderly population represents 23 percent of total Medicaid expenditures for a total of \$6.577 billion (including both state and local funds) (see Figure B.1).

⁹⁴ PENNCare is the collective name for the program through which grant funding is provided to the state's 52 Area Agencies on Aging (AAA), which administer a variety of programs and services for elderly residents.

⁹⁵ See: Pennsylvania Department of Revenue, "Property Tax/Rent Rebate Program." <<http://www.revenue.pa.gov/GeneralTaxInformation/PropertyTaxRentRebateProgram/Pages/default.aspx>> Note that throughout this analysis, elderly costs are inclusive of all residents 65 or older, even if they may have originally qualified for a program through a different categorical designation (such as disability).

⁹⁶ See: PTRR Annual Statistical Report for Claim Year 2014 <http://www.revenue.pa.gov/GeneralTaxInformation/News%20and%20Statistics/Documents/PTRR%20Stats/2014_ptrr_stats.pdf>

FIGURE B.1 – STATE-FUNDED ASSISTANCE PROGRAMS FOR ELDERLY RESIDENTS (FY 2015-2016)



Source: 2015-2016 Governor’s Executive Budget, p. E 30-16

This information provides a reliable basis for total Medicaid costs allocated for elderly residents. However, while the proportion of state funding for the full Medicaid program is roughly 39 percent, that portion varies by program. Therefore, to estimate state costs only for spending on elderly residents, it is necessary to analyze specific programs in greater detail. Medical assistance costs for seniors are divided into four program areas, and the proportion of costs for elderly residents and proportion of state funds are estimated for each as described below.

The Long-Term Care program provides institutionalized care, typically in nursing homes. Qualification for this program is determined by medical necessity (in addition to income and resource qualifications) rather than age qualification, and it is largely but not exclusively utilized by elderly residents. Data published by LeadingAge PA based on Pennsylvania Department of Health survey data indicates that 88 percent of residents in Long-Term Care Nursing Facilities were 65 or older in 2014.⁹⁷ Pennsylvania budget information for the Long-Term Care line items indicates that 48 percent of the \$3.9 billion in expenditures for this program in FY 2015-2016 came from state sources (including the Lottery, Tobacco Settlement Funds and Nursing Home Assessment in addition to the General Fund) while 52 percent came from federal funds

The Home and Community-Based Services program allows medically and income-qualifying residents to receive waivers from institutionalized care and to instead receive comparable services at home. An “aging waiver” is

⁹⁷ “Long-term Care Services and Supports Statistics and Information: A Comprehensive Statistical Analysis of Aging Services in Pennsylvania.” *LeadingAgePA*, p.29 <<http://www.leadingagepa.org/Portals/0/154869%20Long%20Term%20Care%20Statistics%20Book%20revised%20final.pdf>>. LeadingAge PA is an association of non-for-profit senior service providers.

available to qualifying residents who are 60 or older. Using nursing facility enrollment (which requires the same medical qualification) as a proxy, it is estimated the 95 percent of waiver recipients are age 65 or older. Pennsylvania budget information indicates that 52 percent of the \$900 million in funding for these programs in FY 2015-2016 came from state sources (including the Lottery and Tobacco Settlement Funds in addition to the General Fund) while 48 percent came from federal funds.

The Long-Term Managed Care program provides comprehensive health and support services to residents who wish to continue living independently through the Living Independence for the Elderly (LIFE) network of service providers.⁹⁸ This program provides more comprehensive services on a managed care model to residents 55 or older who are medically eligible and financially eligible for Medicaid. Using nursing facility enrollment (which requires the same medical qualification) as a proxy, it is estimated the 93 percent of program participants are age 65 or older.⁹⁹ Pennsylvania budget information for the Long-Term Managed Care line items indicates that 47 percent of the \$248 million in expenditures for this program in FY 2015-2016 came from state sources while 53 percent came from federal funds

The state makes a payment to the federal government on a monthly basis to reimburse a portion of the prescription drug costs incurred under Medicare Part D coverage. This state payment is determined by the number of Medicare and Medicaid dual-enrollees participating in the Part D program, as well the state's per capita expenditures as determined federally.¹⁰⁰ The federal Centers for Medicare and Medicaid Services (CMS) publishes a robust data source on dual enrollees of Medicare and Medicaid programs by state.¹⁰¹ Most elderly residents enrolled in Medicaid are dual enrollees, since Medicare enrollment among the elderly population is near universal.¹⁰² In addition, many of the non-elderly residents qualifying for Medicare due to physical or mental disabilities are also qualified for Medicaid. Accordingly, elderly residents represented just over half of the dual enrollee population in Pennsylvania according to calendar year 2011 data.¹⁰³ The 54 percent of total enrollees that are 65 or older is utilized as the apportionment of this total payment arising from elderly residents. Since this cost is a transfer from the state to the federal government, it is fully state funded.

Finally, the remaining programs within Medicaid are consolidated into a single line item, covering a range of programs including fee for service care.¹⁰⁴ To estimate the proportion of these expenditures allocated to elderly residents, total spending and spending attributable to elderly residents for the four programs described above are deducted from overall Medicaid spending and elderly Medicaid spending are reported in the state's FY 2015-2016

⁹⁸ See: <<http://www.palifeprograms.org/about-life>>

⁹⁹ Note that program data published by DHS does not include a breakdown of enrollment by age, but does state that the average participant age is 80 years old. See: <<http://pahra.org/wp-content/uploads/2017/03/2017-Capitol-Conference-PA-DHS-LIFE-Program.pdf>>

¹⁰⁰ See: Department of Health and Human Service, Governor's Executive Budget Appropriation Committee Hearings (March 2017), p. 203

¹⁰¹ Center for Medicare and Medicaid Services, "Medicare-Medicaid Enrollee State Profiles" <<https://www.cms.gov/Medicare-Medicaid-Coordination/Medicare-and-Medicaid-Coordination/Medicare-Medicaid-Coordination-Office/StateProfiles.html>>

¹⁰² CMS Medicare-Medicaid Enrollee State Profiles (Pennsylvania), Table 2: Demographic Characteristics of Dual-Eligible Beneficiaries Compared to Other Medicare and Medicaid Beneficiaries (CY 2011), Table 4: Total Medicare and Medicaid Spending by Type of Service (CY 2011)

¹⁰³ For calendar year 2011, 236,000 out of 438,000 beneficiaries (54%) were age 65 or older (according to CMS Medicare-Medicaid State Profile Table 4B). Note that throughout the analysis, calendar year 2011 data (the most recent year available through CMS) is not used directly to define the level of spending, but rather utilized to allocate proportions, which are more likely to approximate the not yet available 2015 data.

¹⁰⁴ This includes costs of approximately \$700 million total and \$330 million in state funds for Medicare Part A Premium Payments and Medicare Part B Buy-In.

budget (as shown in Figure B.1). This yields a figure of \$23.2 billion in remaining Medicaid spending, of which \$1.7 billion is spent on elderly residents, of 7 percent.¹⁰⁵ Similarly, state and federal funding for the programs above is deducted from total Medicaid federal and state funding to estimate the proportion of these remaining expenditures born by the state, yielding an estimate that 48 percent of these expenditures come from state funds.¹⁰⁶

Table B.2 below aggregates total expenditures, expenditures on elderly residents, and state funds dedicated to these expenditures on elderly residents. In total, it is estimated that these programs represent \$4.2 billion in state assistance costs for elderly residents as of 2015.

TABLE B.2 – STATE SPENDING ON ASSISTANCE COSTS FOR ELDERLY RESIDENTS, FY 2015-2016 (\$M)

Program	Total Expenditures (\$M)	% Spent on Elderly Residents	Expenditures on Elderly Residents (\$M)	% of Spend from State Funds	Total PA Funds for Elderly (\$M)
Long-Term Care	\$3,948	88%	\$3,476	48%	\$1,666
Home and Community-Based Services	\$902	95%	\$855	52%	\$444
Long-Term Managed Care	\$248	93%	\$230	47%	\$108
Payment to Fed Gvt for Medicare Drug Program	\$585	54%	\$315	100%	\$315
Medicaid - Other	\$23,205	7%	\$1,701	48%	\$820
PennCARE	\$314	100%	\$314	100%	\$314
Property Tax / Rent Rebates	\$271	87%	\$235	100%	\$235
PACE / PACENET	\$175	100%	\$175	100%	\$175
Free and Reduced Fare Transit	\$169	100%	\$169	100%	\$169
Total	\$29,815	25%	\$7,471	57%	\$4,246

Source: ESI Analysis of Commonwealth of Pennsylvania Budget Documents and Program Rules

Importantly, this approach reconciles spending on assistance programs for elderly residents to total program spending as reported in the state budget. As described below, this total allocation is then distributed into per capita expenditures by income band based on proportional analysis, which forms the basis to estimate the incremental impacts on state costs of changes in the income levels of elderly residents. An alternative approach is to estimate per capita assistance costs by income band (either through survey data or program eligibility rules), and then to aggregate those costs to the full population.¹⁰⁷ However, given imperfections in survey data or modeling of program participation, this approach can produce aggregate results that deviate significantly from the known program expenditures reflected in the state budget. In either approach, assumptions are necessary and results should be

¹⁰⁵ This low percentage relative to the 23% of overall program spending on elderly residents arises because basic medical care for most seniors is largely covered by Medicare, while Medicaid serves as the primary health insurance programs for many non-elderly residents. For this reason, Medicaid costs for elderly residents are concentrated in long-term care programs.

¹⁰⁶ This step also deducts the nearly \$5.9 billion in Medicaid expansion funding, which was 100% federally funded in FY 2015-2016 and did not impact the elderly population

¹⁰⁷ For example, prior studies of state assistance costs for retirees in Utah (Notalys LLC, 2015) and Maine (Trostel 2017) begin with per capita estimates of assistance costs and aggregate them to the total population without reconciling these estimates to state budget information.

understood to represent estimates. This analysis takes an approach that maximizes accuracy in accounting for the aggregate spending (with imprecision growing as that spending is allocated to individual income bands), rather than an approach that begins with granular data by income level but has imprecision in aggregate estimates that are not reconciled to budget data.

B.3 STATE ASSISTANCE COST BY INCOME LEVEL

Next, the estimated state costs for elderly assistance for each program are allocated to residents by income band based on program eligibility rules and reported data. This allocation by income band is expressed as per capita state spending for each program for each elderly resident within a given income band. These per capita estimates are then used to estimate state assistance costs under the sufficient scenario detailed in Appendix A.3.

The relationship between income and assistance levels arises from the eligibility and means-testing rules within each program. Some programs include income qualification rules for enrollment, while others provide differentiated benefit levels depending on the income level of enrollees. In either case, state assistance costs will vary by income level (generally decreasing as income grows). Table B.3 lists the eligibility and means-testing rules for the identified programs.



TABLE B.3 – MEANS-TESTING OF ASSISTANCE PROGRAMS FOR ELDERLY RESIDENTS

Program	Eligibility / Means-Testing
Long-Term Care	Medical eligibility, resource restrictions, income eligibility up to 300% of Federal Benefit Rate (FBR) ¹⁰⁸ or countable income net of medical expenses below semi-annual income limit of \$2,550
Home and Community-Based Services	Medical eligibility, resource restrictions, income eligibility up to 300% of FBR (including a "spend down" of eligible medical cost), age 60+
Long-Term Managed Care	Medical eligibility, income and resource eligibility for Long-Term Care, ability to live independently in the community, age 55+
Payment to Fed Gvt for Medicare Drug Program	State payment to federal government based on number of dual-enrollees in Medicaid and Medicare Part D multiplied by state specific per capita rate
Medicaid - Other	Medicaid qualification for elderly residents based on income, or income and resources or income and disability status (limits varying by program)
PennCARE	Array of benefits, services and programs available at the 52 Area Agencies on Aging (AAA) statewide. Eligibility varies by specific service or program.
Property Tax / Rent Rebates	Elderly residents, widowers 50+ and disabled residents age 18-64 based on annual income limit of \$35,000 for homeowners and \$15,000 for renters (excluding half of Social Security income)
PACE / PACENET	Low-income elderly residents eligible for PACE (up to \$14,500 in eligible income for single and \$17,700 for married couple) or PACENET (income between \$14,500 and \$23,500 for single or \$17,700 and \$31,500 for married couple)
Free and Reduced Transit	All elderly residents (65+) eligible for free service on fixed route bus and trolley, reduced fares on commuter rails, and reduced fares on Shared Ride transportation services (no means-testing)

Source: ESI Analysis of Commonwealth of Pennsylvania Budget Documents and Program Rules

Typically, program expenditures are not directly tracked by the income level of the recipient. Therefore, proxy data is identified that yields insight into the distribution of program utilization or expenditures by income level. This data is matched with program eligibility rules that in many cases define the availability of programs and the level of assistance available at various income levels. In all cases, these data are utilized to generate the proportion of spending by income band, rather than a direct estimate of aggregate expenditures. The proportional estimates are applied to the estimated state expenditures for elderly households detailed above to ensure that estimates by income band are controlled to the aggregate spending estimates by program (i.e. the whole adds up to the sum of its parts).

One exception is the PACE / PACENET prescription drug program, which reports the state share of claims paid by participant income level in its annual report to the state legislature.¹⁰⁹ Expenditures by income band included in that report are allocated to the income band groups used in this report, yielding a proportion of expenditures attributed

¹⁰⁸ The Federal Benefit Rate (FBR) is the amount paid monthly in federal Supplemental Security Income (SSI). For 2015, this figure was less than \$9,000 for an individual, and 300% of this rate was roughly \$26,000. Importantly, the Federal Benefit Rate is distinct from the Federal Poverty Level. The benefit rate is based on expenditure levels within the SSI program, while the FPL is based on Federal Poverty Income Guidelines (FPIG) which varies by household and are higher than the FBR.

¹⁰⁹ Pharmaceutical Assistance Contract for the Elderly (PACE) Annual Report to the Pennsylvania General Assembly (2016) <<http://www.aging.pa.gov/publications/annual-reports/Documents/2016%20PACE%20Annual%20Report.pdf>>, Table 4.2A and 4.2B



to each income band. These proportions are matched to the statewide spending estimate to refine the estimate of total expenditures in each band, which is then divided by the population in that band to yield an estimate of per capita cost.

The property tax and rental rebate program determines eligibility by income level,¹¹⁰ and provides rebates on a sliding scale based on income levels and homeowner or renter status.¹¹¹ The maximum base rebate is \$650, with an additional supplemental rebate of up to \$325 under certain conditions. Therefore, it is possible to allocate program benefits by income band by assigning the rebate amounts applicable to each income level.¹¹² The proportion of program expenditures yielded by this allocation are applied to the total state spending on elderly households as estimated above to yield estimated assistance spending in each income band. This estimate is then divided by the population of each income band to yield the per capita cost.

The Free and Reduced Fare Transit and PennCARE programs have no specific means testing component, and are accessible to all elderly residents. However, participation in these programs is unlikely to be consistent across income levels. For example, it is well documented that public transit services are more heavily used among the lower income population, which has less access to personal vehicles or other more expensive means of public transportation.¹¹³ Similarly the range of benefits, services and programs offered by the 52 Area Agencies on Aging across the state are targeted in some cases to support low-income residents. In the absence of detailed data, costs are allocated by income band for these programs by assuming that the lowest income band represents 150 percent of the average per capita cost and the highest income band 50 percent, and modeling a linear decrease in this proportion as income increases across the 20 income bands. Spending estimates are again scaled to the total state expenditures for these programs to produce per capita estimates by income band.

Medicaid expenditures are allocated based largely on program eligibility rules. The Long-Term Care, Home and Community Based-Services, and Long-Term Managed Care Programs all have a combination of medical, income and resource standards for program eligibility. While these eligibility standards are similar, the programs vary somewhat in both eligibility and the cost of care borne by the program participants.

Eligibility for the Long-Term Care program requires a medical need for a Nursing Facility level of care and resource limits.¹¹⁴ For most participants, there is an income limit of 300% of the Federal Benefit Rate, which equates to

¹¹⁰ Program eligibility rules and rebate amounts by income band are listed online by the Pennsylvania Department of Revenue: <<http://www.revenue.pa.gov/GeneralTaxInformation/PropertyTaxRentRebateProgram/Pages/default.aspx#.WgRw3lWnGUL>>

Notably, half of Social Security income is excluded from this calculation. Income brackets are shifted slightly to account for this exclusion, using the assumption that 1/3 of senior income is derived from Social Security based on data from the Social Security Administration: <<https://www.ssa.gov/news/press/factsheets/basicfact-alt.pdf>>

¹¹¹ Based on data from the American Community Survey on Pennsylvania's elderly households, it is assumed that 77% of households are homeowners and 23% are renters.

¹¹² This approach in effect assumes equivalent program participation, relative to the population level, for each eligible income band. The program also includes supplements which adjust the maximum rebate from \$650 to \$975 for seniors in certain areas of the state or claimants whose property taxes represent 15% or more of their eligibility income. The method used in our analysis also in effect assumes that qualification for these supplements is proportional across income bands.

¹¹³ See for example: Mike Maciag, "Public Transportation's Demographic Divide." *Governing Magazine*, February 25, 2014. <<http://www.governing.com/topics/transportation-infrastructure/gov-public-transportation-riders-demographic-divide-for-cities.html>>

¹¹⁴ These resource limits include a "look back" period of five years to prevent residents from transferring assets in order to gain qualification. The level of assets beyond their annual income is not directly considered in this analysis, which assumes that program participation is proportional to the population size within bands that are income qualified. This approach is likely conservative with respect to the net impacts of income changes for households below

approximately \$26,000 per year for an individual.¹¹⁵ Residents above that income level can qualify as “Medically Needy Only” if their qualifying monthly medical expenses reduce their semi-annual income below a limit of around \$2,500.¹¹⁶ Once qualified, the annual income of a participant (such as Social Security benefits and pension income) beyond an expenditure allowance is paid towards the cost of care.¹¹⁷ As a result, state costs by income band are a function not only of program participation within that band, but also by the extent to which participants offset some of the state costs through their own income. Accordingly, the per capita costs for the state decline as income increases (holding participation and the cost of care constant). Expenditures are allocated to each income band by modeling enrollment by income band based on eligibility, netting the estimated contribution from personal income from the per capita state costs, and scaling proportional expenditures to the estimate of total state spending for elderly residents. This method produces state expenditures by income bands the program, which is divided by the population in each income band to yield per capita estimates.

The Aging Waiver for Home and Community-Based services requires participants to be 60 years or older, to have a medical need for a Nursing Facility level of care, and meet resource limits. This program also has a base income qualification of 300% of the Federal Benefit Rate. However, applicants can be eligible if they “spend down” their income on qualifying medical expenses to lower their countable income below this threshold. Once qualified, participants do not contribute to the cost of their care. State costs per participant are therefore assumed to be equivalent regardless of income, and per capita costs are therefore estimated as a function of eligibility by income band.¹¹⁸

The Long Term Managed Care program, or LIFE, requires participants to be 55 years or older and to be medically eligible to participate. Further, applicants must be financially eligible for Medicaid long-term care services (as described above). Medicaid eligible participants generally do not contribute to their cost of care (which is provided comprehensively through a managed care system). State costs per participant are thus again assumed to be

the poverty line, since those households may be less likely than higher income households to be disqualified by the resource limits, and therefore may in fact participate at disproportionate rates.

¹¹⁵ For 2015, this figure was \$733 per month for an individual and \$1,100 for a couple. This figure can be converted to an annual threshold by multiply by 300% and by 12 months. Equivalent participation as a proportion of the population is assumed for all eligible income bands

¹¹⁶ Medical expenses for care in nursing facilities can exhaust a significant level of personal income due to the high cost of care. Accordingly, elderly households which are otherwise well above the median income can qualify through this Medically Needy Only calculation. The proportion of program participants within this category is estimated at 11%, based on data from CMS on dual enrollees (see: CMS Medicare-Medicaid Enrollee State Profiles (Pennsylvania), Table 12A: Characteristics of Dual-Eligible Beneficiaries by Long Term Use (CY 2011)). In addition, this data set indicates that around 5% of enrollees qualify through their participation in SSI. The distribution of these enrollees by income band is modeled based on data from the Current Population Survey, which includes SSI as an income source.

¹¹⁷ In determining an individual’s responsibility in contributing to payment for their LTC services, a personal needs allowance (PNA) of \$45 per month is allowed for housing, clothing, and other personal items. Further, while spousal income factors into the contribution, there is a Minimum Monthly Needs Allowance (MMNA) (which begins at around \$2,000) as well as shelter and utility expense allowance for a spouse who remains in the community to avoid spousal impoverishment. The level of personal payment towards cost of care is modeled by estimating the proportion of single and married participants and calculating and deducting the contribution for the average enrollee in each income band from the state’s assistance cost.

¹¹⁸ Eligibility is modeled based on the estimated proportion of single and multi-person households by income band, which is turn are utilized to convert household income estimates to participant income estimates. Per capita medical cost to estimate the “spend down” amounts are modeled based on the program per capita cost of roughly \$22,000 reported by the state. (see: See: Pennsylvania Department of Human Services and Department of Aging “Community Health Choices MCO Meet and Great Presentations, November 4th and 5th, 2015.

<http://www.healthchoices.pa.gov/cs/groups/webcontent/documents/document/c_216881.pdf>, p.22) Equivalent participation as a proportion of the population is assumed for all eligible income bands.



equivalent regardless of income, and per capita costs are again estimated as a function of eligibility by income band.¹¹⁹

As discussed above, state costs for the federal reimbursement for Medicare drug costs are calculated based on a flat per capita rate applied to Medicaid-Medicare dual enrollees. State costs for this program are therefore allocated by income band based on available data on the income status of Pennsylvania's elderly dual enrollees. CMS data sorts dual enrollees by age and "beneficiary type," which sub-divides enrollees into various programs.¹²⁰ Income eligibility standards for these programs (which are generally scaled relative to the federal poverty level) are then used to assign these enrollees to corresponding income brackets. About one-quarter of elderly beneficiaries are listed as "other dual eligible" who do not qualify under the specified programs. Since the income distribution of these enrollees is unknown, the relative participation within each income band in Supplement Security Income (SSI) is utilized as a proxy.¹²¹ Since the per capita reimbursement rate to the federal government is fixed within this program, the proportion of enrollees in each income band is utilized to allocate the total state expenditures attributable to elderly residents, and this amount is divided by the population in each income band to yield per capita estimates.

Finally, the proportion of expenditures by income band from the dual enrollee analysis above is used to allocate the estimated spending from the remainder of the Medicaid program.¹²² The proportions by income band are again scaled to the estimated state spending, and calculated on a per capita basis for each income band.

Figure B.2 below shows the total per capita cost estimated for each income band, broken down by program. As expected, assistance cost levels decline as income increases. Per capita costs are more than \$6,600 for residents in the \$0-\$5,000 income band, decline to around \$1,350 for residents in the \$40,000 - \$45,000 which represents the median, and are much smaller for upper-income households. The average per capita spend (which is weighted by the volume of population in each income band) is \$1,948.

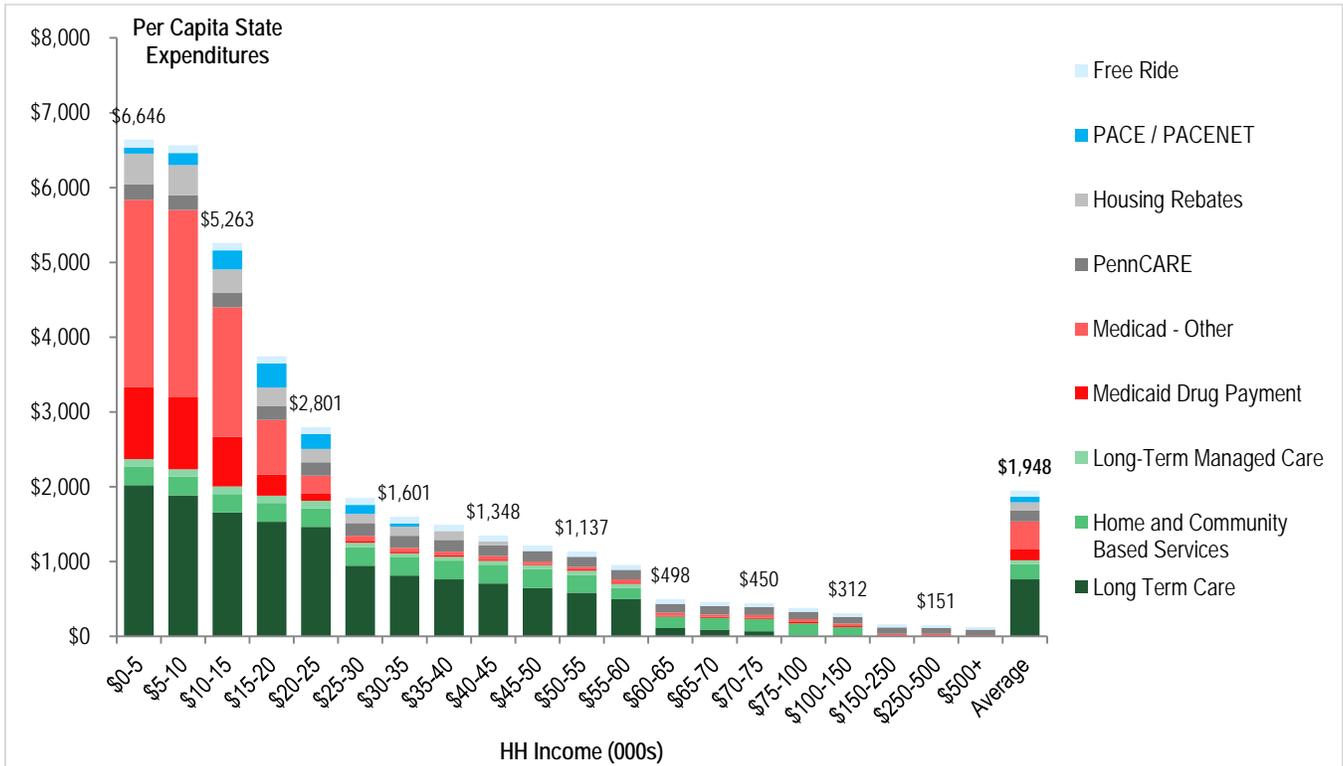
¹¹⁹ Eligibility is modeled based on the distribution utilized for the Long-Term Care program, since Long-Term Managed Care eligibility standard resemble those standards more closely than they resemble the Home and Community-Based Services standards.

¹²⁰ CMS Medicare-Medicaid Enrollee State Profiles (Pennsylvania), *Table 1A: Medicare and Medicaid Enrollment and Spending by Dual-Eligible Status, Age, and Other Characteristics by Year (CY 2011)*. This table includes enrollment totals for beneficiary types which are correlated with various income qualification levels, and can thus be used to proxy the income distribution of beneficiaries. The Qualified Medicare Beneficiary (QMB) Program covers incomes at or below 100% of the FPL, the Specified Low-Income Medicare Beneficiary (SLMB) Program covers incomes from 100% to 120% of the FPL, and the Qualifying Individual (QI) Program covers incomes from 120% to 135%. See: <https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/downloads/Medicare_Beneficiaries_Dual_Eligibles_At_a_Glance.pdf>

¹²¹ Qualification for SSI is based on a mix of income and other criteria, such as disability. Accordingly, while the majority of enrollees are lower-income, the distribution spans all of the income bands utilized in this analysis. Accordingly, it serves as a reasonable proxy for the range of potential qualification standards (some of which include enrollment in SSI itself) across different Medicaid programs. The proportion of SSI qualification by income band among elderly residents is determined through data from the Current Population Survey, which includes SSI as an income source.

¹²² Since the remainder of the Medical Assistance program spans a wide array of individualized programs, allocation on a program by program basis is not feasible. The distribution of estimated dual enrollment is therefore taken as a reasonable indicator. This approach effectively assumes a flat cost amount per enrollee regardless of income.

FIGURE B.2 – PER CAPITA STATE ASSISTANCE COSTS BY PROGRAM AND INCOME BAND

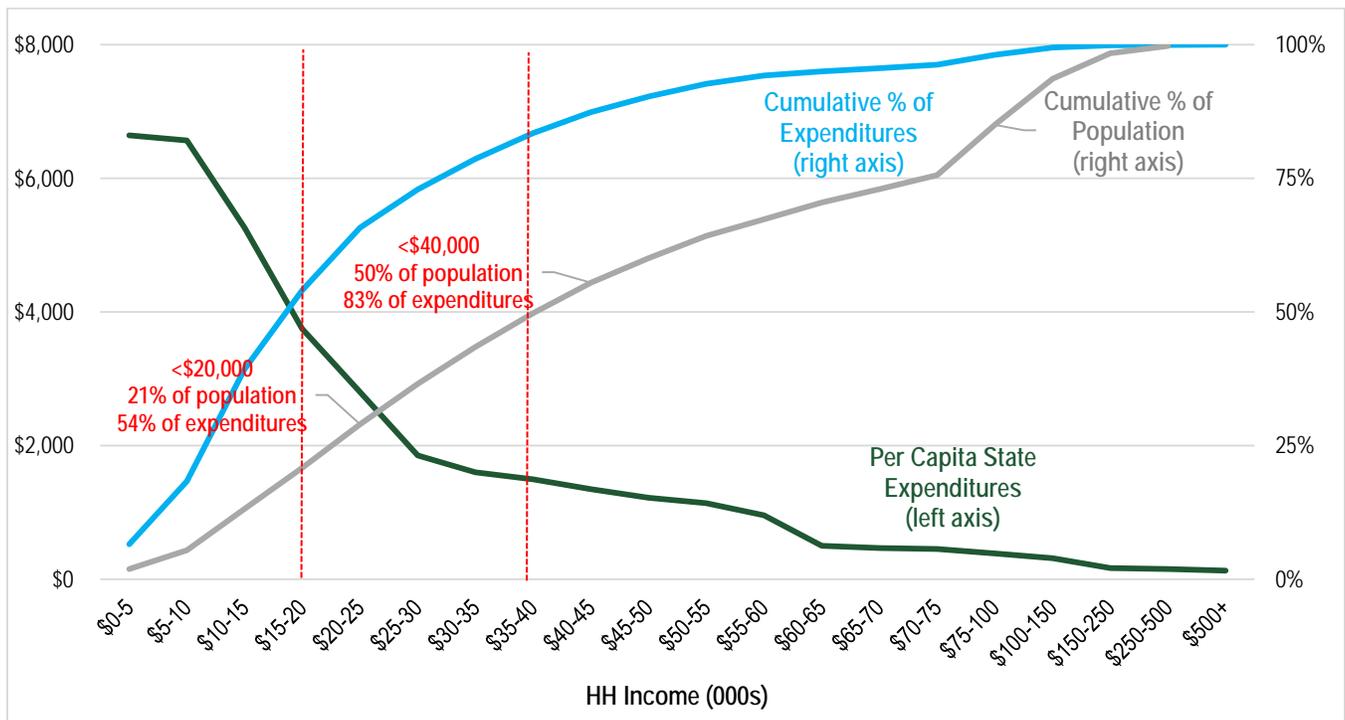


Source: ESI Calculations based on state and federal data

Since per capita spending declines as income increases, lower income households account for a disproportionate share of total state costs. Figure B.3 below shows per capita state expenditures by income band (in green) as well as the cumulative proportion of aggregate state expenditures (in blue) and of the elderly population (in gray) accounted for within or below each income band. Income bands below \$20,000 account for 21 percent of the state’s elderly population, but generate 54 percent of total state assistance costs, while the income bands below \$40,000 account for 50 percent of the state’s population and generate 83 percent of state assistance costs.¹²³

¹²³ Note that income bands \$40,000 and below represent 49.7% of the state’s population, meaning that the median household (set at 50%) falls into the \$40,000 - \$45,000 band as previously noted.

FIGURE B.3 – PER CAPITA AND CUMULATIVE STATE EXPENDITURES BY INCOME LEVEL, 2015



Source: ESI Calculations based on state and federal data

B.4 FUTURE ASSISTANCE COST PROJECTIONS

Projecting future assistance costs necessarily involves a number of projections and assumptions about the demographics and economic status of future residents, as well as the course of future state and federal policy. Like our approach to projecting future incomes, this approach seeks to simplify the analysis by holding many factors constant from 2015 to 2030. Continuity is assumed in program structure, administration and eligibility, meaning that elderly residents at a given income level are assumed to be enrolled in the same programs and receiving the same level of benefits or services in 2030 as in 2015. Consistency is also assumed in federal policy (to the extent that it may impact any program eligibility or state funding obligations).

Given the assumption of consistent program structure, a number of factors can still drive changes in future state assistance costs in the baseline scenario. The first is growth in the state’s elderly population. As reviewed in Section 4.2, Pennsylvania’s Independent Fiscal Office projects an increase in the state’s elderly population of 42 percent from 2015 to 2030. This influx of elderly residents will increase program demand and enrollment, and therefore state assistance costs. Second is the income profile of the elderly population. Appendix A.3 develops a baseline projection of incomes of the elderly population as of 2030, as well as an alternate scenario of household incomes at sufficient savings levels. State assistance costs would naturally vary between these two scenarios (or for any other income profile) given the relationship between income and program eligibility and benefit levels.

Finally, state program costs can vary even given a consistent level of service provision and program eligibility. Most notably, a program cost structure can change when the underlying price of a service changes relative to price

changes in the overall economy (i.e. inflation). The most prominent example of this dynamic involves the growth in medical costs, which represent the majority of state assistance costs for the elderly population.

The federal Bureau of Labor Statistics calculates the Consumer Price Index (CPI-U), the most widely utilized measure of overall inflation, as well as sub-indexes for specific goods and services. Among these indexed is the index for the cost of medical care, or CPI-Medical. For the 2000 to 2015 period, overall inflation (CPI-U) grew at a compound annual growth rate of 2.2 percent per year. Over the same period, CPI-Medical grew by 3.8 percent per year. As a result of these diverging growth rates, the medical cost index grew 24 percent faster than overall inflation from 2000-2015 (see Figure B.4).¹²⁴

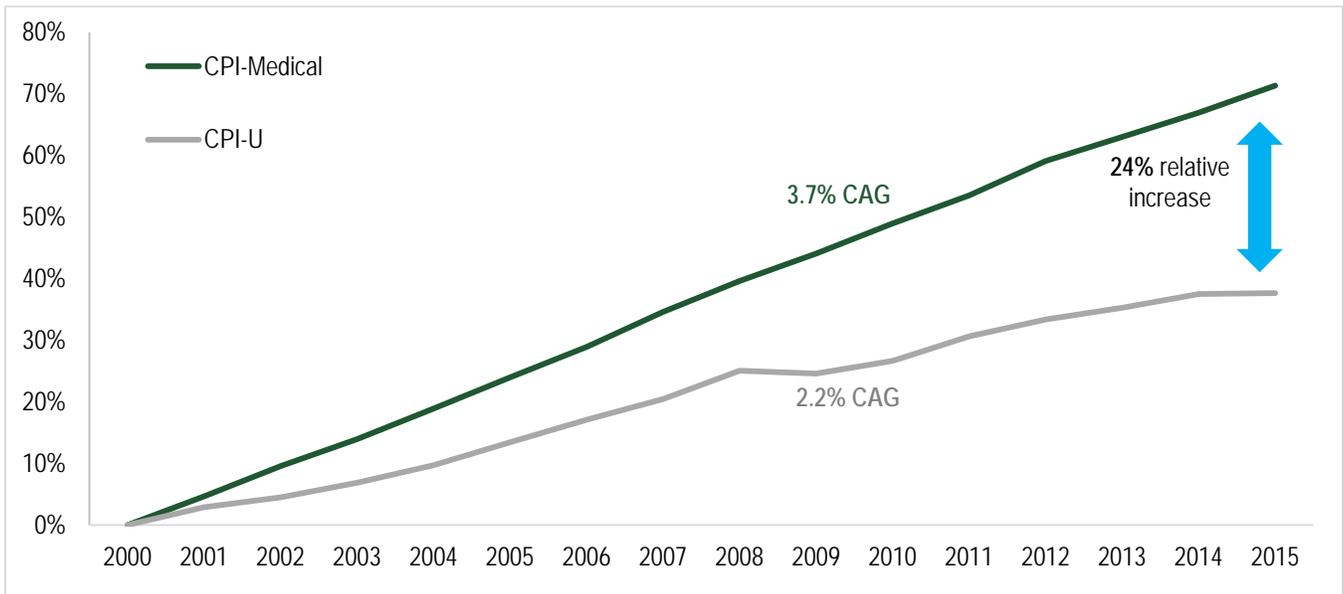
Most forecasts anticipate that the rate of growth in medical costs will continue to increase over the next decade relative to overall inflation. For example, the Congressional Budget Office (CBO) generates forecasts of relative inflation as part of its budgetary projections for proposed federal legislation. In its June 2017 analysis of the impacts of the Better Care Reconciliation Act of 2017, the CBO projected growth in CPI-Medical of 3.7 percent per year through 2025, relative to growth of 2.4 percent in overall inflation during that time (see Figure B.5).¹²⁵

¹²⁴ Notably, this period represented a slowdown from historic levels of both overall and medical inflation. From 1985 to 2000, CPI-U grew by 3.2% per year while CPI-M grew by 5.7% per year. At these elevated levels, medical cost growth outpaced inflation by 44% over this period.

¹²⁵ Congressional Budget Office (2017). "Longer Term Effects of the Better Care Reconciliation Act of 2017 on Medicaid Spending." <<https://www.cbo.gov/system/files/115th-congress-2017-2018/reports/52859-medicaid.pdf>>. Note that the legislation evaluated in this CBO analysis is better known as the Affordable Care Act repeal, and was not enacted.

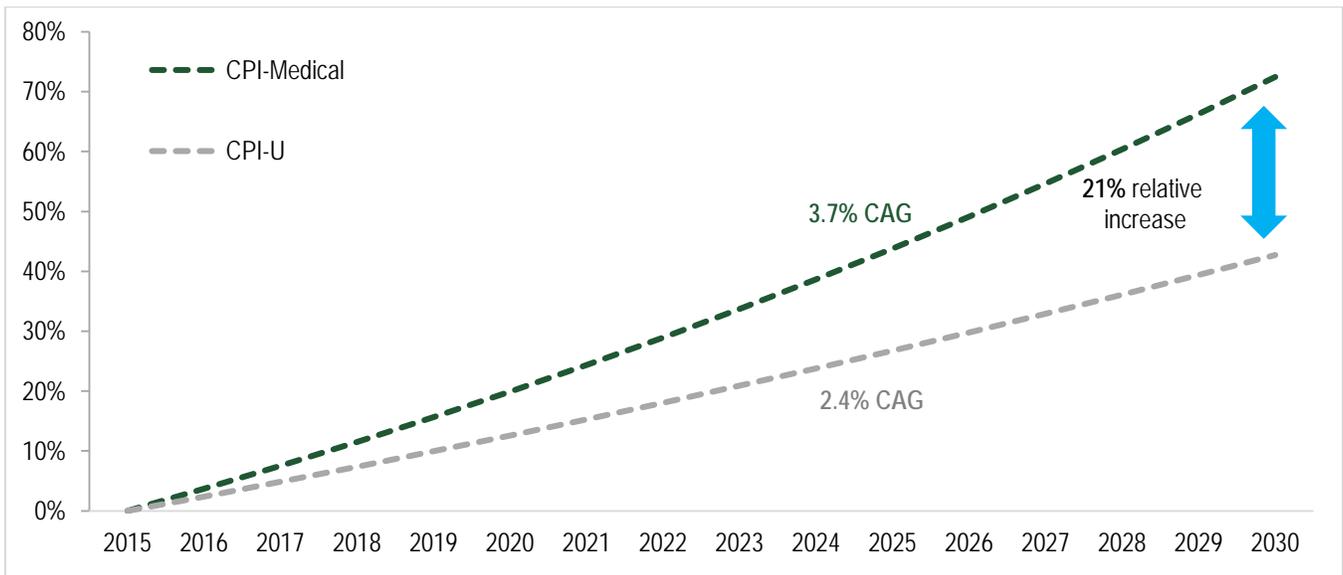


FIGURE B.4 – MEDICAL INFLATION RELATIVE TO OVERALL INFLATION, 2000-2015



Source: Bureau of Labor Statistics

FIGURE B.5 – PROJECTED MEDICAL INFLATION RELATIVE TO OVERALL INFLATION, 2015-2030



Source: Congressional Budget Office (forecast through 2025)

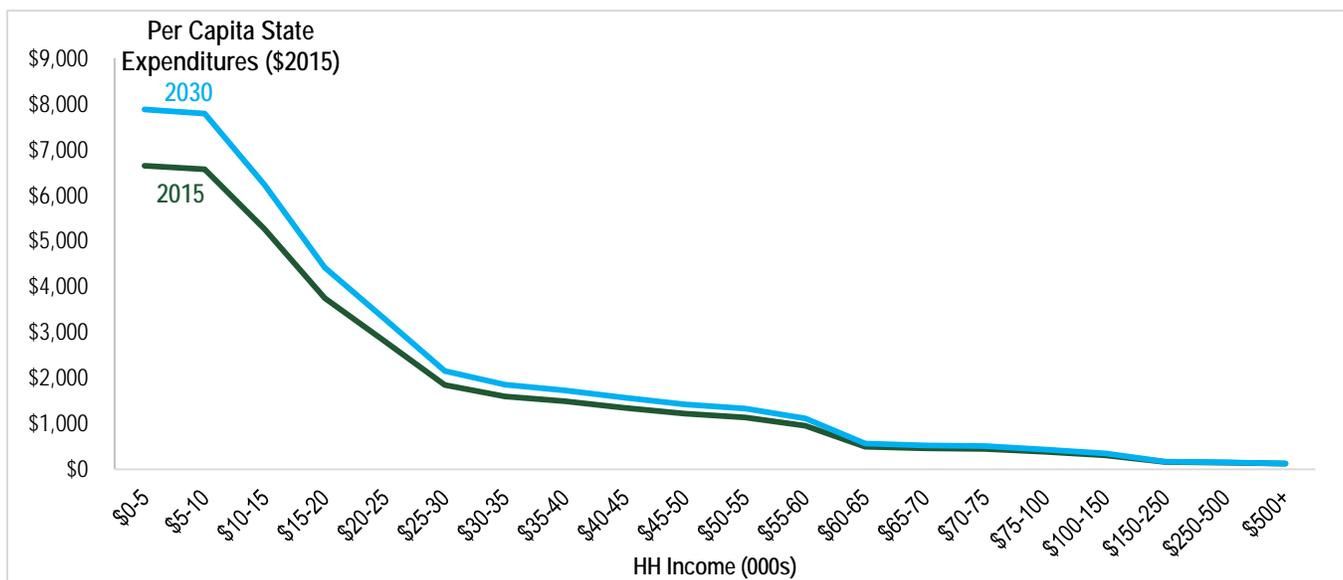
This differential between forecasted medical and total inflation implies that medical care will become relatively more expensive in the future than it is today. Extending the annualized trends forecasted by CBO out to 2030, the medical inflation is projected at 72 percent over the time period, while overall inflation is projected at 43 percent.¹²⁶ Since all

¹²⁶ Notably, this differential is conservative relative to the observed data from 1983-2015 shown in Figure B.4, which indicates an even larger differential due to a faster rate of medical inflation.

calculations for 2030 are expressed in \$2015, it is not necessary to incorporate this baseline rate of overall inflation or the total rate of increase in medical costs into program cost estimates as of 2030. However, it is necessary to account for the difference in growth rates between medical and overall inflation, which means that medical services are anticipated to grow relatively more expensive in real terms. The ratio of projected growth in medical inflation and overall inflation indicates that medical costs are expected to grow by 21 percent in real terms over this period.¹²⁷ Therefore, per capita assistance costs for medical services for 2030 are increased by 21 percent over their estimated levels for 2015. This adjustment is applied to all Medicaid programs (Long-Term Care, Home and Community-Based Services, Long-Term Managed Care, Medicare Payment to the Federal Government, and Medicaid-Other) as well as the PACE / PACENET prescription drug coverage program.¹²⁸

Figure B.5 shows the estimated difference in per capita assistance costs by income band for 2015 and 2030 due to the anticipated increase in medical costs. Since medical spending represents the vast majority of state assistance expenditures, particularly for the lowest income elderly residents, the forecasted 21 percent relative increase in medical costs results in a significant increase in anticipated per capita cost. For example, within the lowest income bracket (\$0-\$5,000), per capita costs are estimated to increase from \$6,646 to \$7,879 in constant dollars, an increase of 19 percent (or \$1,233). This growth rate diminishes somewhat at higher income levels due to the lesser proportion of medical spending as a share of overall assistance (see Figure B.6).

FIGURE B.6 – PER CAPITA STATE ELDERLY ASSISTANCE COSTS FOR BY INCOME BAND, 2015-2030 (IN \$2015)



Source: ESI Calculations based on CBO Projections

¹²⁷ For example, if an item cost \$100 in 2015 and followed the overall inflation rate forecast, its price would be assumed to increase by 43% and therefore cost \$143 in 2030. The same \$100 in medical services would be forecast to increase by 72%, and therefore cost \$172 in 2030. The ratio between these two endpoint calculations ($\$172 / \143) is 1.21, implying medical inflation that is 21% faster than overall inflation.

¹²⁸ The Pennsylvania Independent Fiscal Office (IFO) also anticipates growth in medical inflation in excess of the overall inflation rate. In correspondence with ESI, the IFO reported that “expenditure extrapolators” for the Medical Assistance and Long-Term Care programs over the next five years in IFO’s November 2017 “Economic & Budget Outlook” were calculated by assuming CPI growth + 1%. Based on a CPI estimate of 2.1% for the next five years, this assumption would yield a similar excess medical cost growth estimate of 16%. IFO projections by program are not used directly in this analysis because they incorporate additional information about changes in program structure and eligibility that would dilute the goal of the analysis in isolating the incremental difference in assistance costs due only to retirement insufficiency.

B.5 AGGREGATE STATE ASSISTANCE COSTS

The per capita assistance cost estimates by program and income band for 2015 and 2030 are then matched with the population in each band within each of the income distribution scenarios modeled in Appendix A.3 to yield estimated state assistance costs in each scenario. Per capita assistance costs for 2015 and 2030 by income band are held constant under both the baseline and sufficient savings income scenarios.¹²⁹ Therefore, changes in aggregate assistance costs between the two scenarios in a given year are entirely a function of changes in the income distribution. The net difference thus represents the increase in state assistance costs attributable to insufficient savings.

State assistance costs for the elderly population are estimated at \$3.5 billion in the sufficient savings scenario, compared to the baseline estimate of more than \$4.2 billion. Accordingly, the state assistance costs due to insufficient savings are estimated at about \$700 million for 2015 (see Table B.4).

TABLE B.4 – NET STATE ASSISTANCE COSTS DUE TO INSUFFICIENT SAVINGS, 2015

Program	Baseline (\$M)	Sufficient Savings (\$M)	Net Difference
Long-Term Care	\$1,666	\$1,473	\$192 million
Home and Community-Based Services	\$444	\$435	\$10 million
Long-Term Managed Care	\$108	\$100	\$8 million
Payment to Fed Gvt for Medicare Drug Program	\$315	\$198	\$117 million
Medicaid - Other	\$820	\$516	\$304 million
PennCARE	\$314	\$304	\$10 million
Property Tax / Rent Rebates	\$235	\$185	\$50 million
PACE / PACENET	\$175	\$168	\$7 million
Free and Reduced Fare Transit	\$169	\$164	\$5 million
Total	\$4,246	\$3,544	\$702 million

Source: ESI Calculations. Rows and columns may not sum due to rounding.

¹²⁹ Said another way, the state assistance costs for a given income band (for example, \$50,000 - \$55,000) is the same in the baseline and sufficient savings scenarios. While per capita assistance costs within a given band remains constant, aggregate costs for each band will differ to the extent that the number of people in each band changes with changes in the modeled population distribution. These changes in the distribution of the population, rather than any changes in program participation and cost at a given income level, drive changes in total aggregate costs. This matches the approach utilized to calculate net household spending between scenarios.

Assistance costs are modeled in the same manner for 2030, with per capita expenditure estimates by program for each income bracket multiplied by the population within each income bracket to yield aggregate expenditures under each scenario. Importantly, the anticipated growth in the elderly population between 2015 and 2030 as well as the anticipated relative increase in medical costs contribute to the forecasted increase in state assistance costs under both the baseline and sufficient savings scenarios.

State assistance costs for the elderly population are estimated at \$5.1 billion in the sufficient savings scenario, compared to the baseline estimate of \$6.2 billion. Accordingly, the state assistance costs due to insufficient savings are estimated at \$1.1 billion for 2030 (see Table B.5).

TABLE B.5 – NET STATE ASSISTANCE COSTS DUE TO INSUFFICIENT SAVINGS, 2030 (IN \$2015)

Program	Baseline (2030) (\$M)	Sufficient Savings (2030) (\$M)	Net Difference (2030)
Long-Term Care	\$2,444	\$2,126	\$318 million
Home and Community-Based Services	\$698	\$681	\$17 million
Long-Term Managed Care	\$157	\$144	\$13 million
Payment to Fed Gvt for Medicare Drug Program	\$485	\$296	\$189 million
Medicaid- Other	\$1,263	\$771	\$492 million
PennCARE	\$422	\$408	\$14 million
Property Tax / Rent Rebates	\$284	\$220	\$64 million
PACE / PACENET	\$240	\$238	\$3 million
Free and Reduced Transit	\$227	\$219	\$8 million
Total	\$6,221	\$5,103	\$1.12 billion

Source: ESI Calculations. Rows and columns may not sum due to rounding.

APPENDIX C – MODELING HOUSEHOLD SPENDING

Estimates of household spending by income bracket are derived from household level data reported in the Consumption and Activities Mail Survey (CAMS) within the Health and Retirement Study (HRS).¹³⁰ The data utilized are household spending patterns reported by respondents aged 65 or older across the country. These spending patterns by income bracket (derived from national data) are then applied to the baseline and sufficient income distributions of Pennsylvania's elderly population as developed in Appendix A.3.¹³¹

Annual household spending is tabulated in twelve household goods and services,¹³² which sum to represent aggregate household spending. Estimates of household spending are cross-tabulated by household income level, using the same 20 household income bands utilized throughout this report.

While this cross-tabulation analysis yields clear patterns in the relationship between spending and income by category, natural variance common to granular analysis of survey data exist between income bands. To avoid deviations from the broader relationship between income and spending for each category, survey data is analyzed to construct smoothed spending profiles by income band rather than utilized directly. This is undertaken in a sequence of steps:

- First, average annual household spending is estimated for each income band. This involves estimating the effective savings rate by income band, since households do not necessarily spend 100 percent of their income.
- Next, twelve goods are grouped into three household spending categories based on the elasticity of spending on these goods. This step identifies a set of goods for which spending increases slowly as income increases (termed fixed), a set of goods for which spending increases at a similar rate to income increases (variable), and a set of goods for which spending increase rapidly with income (discretionary).
- Next, the proportion of household spending dedicated to each category (fixed, variable and discretionary) is estimated for each income band. These categories sum to 100 percent of household spending, as

¹³⁰ Household Spending data is available through the 2015 Consumption and Activities Mail Survey (CAMS) as part of the University of Michigan Health and Retirement Study (HRS). Data from the HRS is made available online by RAND Corporation.
<http://hrsonline.isr.umich.edu/modules/meta/rand/randcamsd/RAND_CAMS_Data_Documentation_D.pdf>

HRS is a longitudinal study, which means it surveys the same population over multiple years. Expenditure data from the 2015 CAMS is matched to the most recently available household income available through the 2014 HRS data. HRS has recorded data for the same households every two years starting in 1992 (wave 1) and continuing through 2014 (wave 12). When household income was not available for a specific household in 2014 (wave 12), the most recently reported household income in an earlier wave was used to match that household with its household spending reported in the 2015 CAMS data.

¹³¹ National rather than state level data is utilized in this analysis due to the insufficient sample size of Pennsylvania respondents within the CAMS for the granular analysis described below. The use of national data to define spending profiles by income does not imply that the cost of goods in Pennsylvania is assumed to be equivalent to the national average. Instead, it uses national data on the *distribution of spending on goods* by households of a given income level as a proxy for the level and distribution of spending by households of the same income level in Pennsylvania. To the extent that Pennsylvania's cost of living varies from the national average, this will be reflected in the actual or projected distribution of incomes in Pennsylvania, which are utilized to translate these spending profiles into aggregate spending estimates.

¹³² The selected goods and services from the CAMS data will be referred to as goods throughout Appendix C. They have been aggregated from 39 detailed household expenditures into twelve goods and then further categorized into three spending categories (fixed, variable and discretionary).



calculated in the first step above, and reflect the degree to which consumption patterns vary between households of different income levels.

- Finally, the proportion of spending on each individual good within the fixed, variable and discretionary categories is estimated by income band. This yields a unique spending profile by good for each of the 20 modeled income bands.

C.1 AVERAGE ANNUAL HOUSEHOLD SPENDING

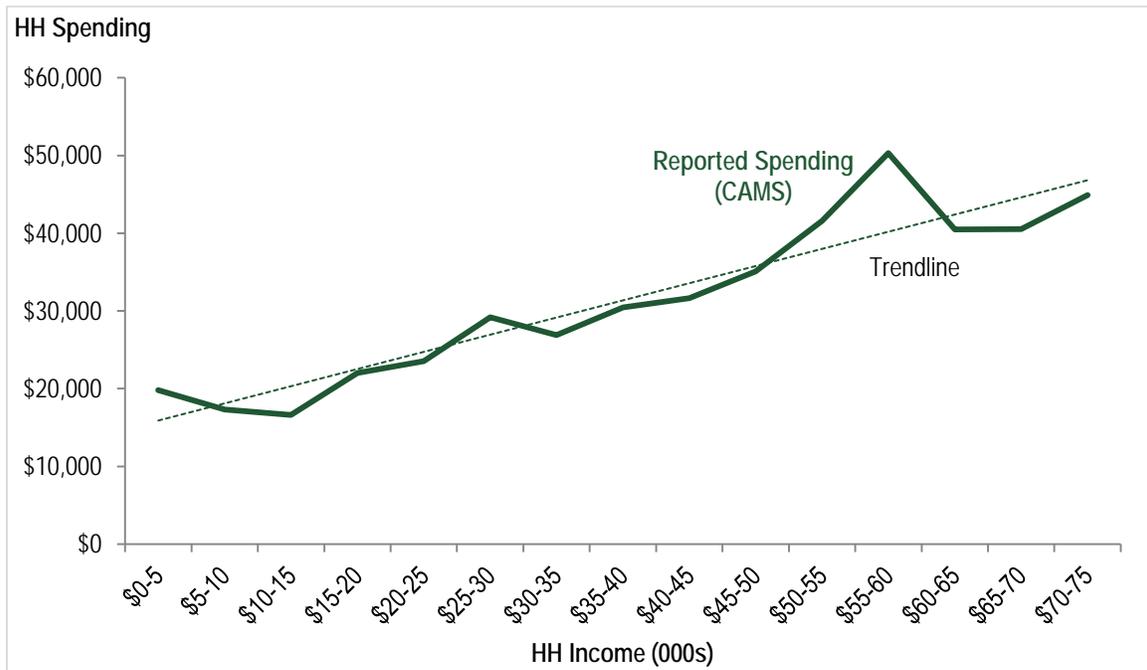
Survey response data from the CAMS is utilized to define the statistical relationship between annual household income and household spending for households aged 65 and older. As expected, household spending increases as income increases. However, higher income households have a greater ability to save a portion of their income, thereby decreasing the proportion of income dedicated to consumption as income increases (even as total consumption grows). This analysis estimates the average proportion of household income spent by households in each income band (in effect the inverse of the savings rate) as a starting point for generating the spending profile within each income band.

This analysis begins by determining the linear relationship between household incomes and spending for each of the first 15 income bands, which are generated in \$5,000 increments between \$0 and \$75,000.¹³³ The relationship is defined by a linear trendline (as estimated within Microsoft Excel), shown below in Figure C.1. This trendline has a strong relationship with the observed data and removes variances from this broad trend in specific income bands that are likely attributable to statistical noise.

¹³³ These first 15 bands are equidistant from each other, allowing for a straightforward linear analysis of relationships between spending and income, while the final five bands starting at \$75,000 and above are discontinuous from this pattern, incorporating a larger range of incomes. For this reason, statistical relationships throughout the spending analysis are typically set through analysis of the first 15 bands only.



FIGURE C.1 – HOUSEHOLD SPENDING BY INCOME BAND



Source: ESI Analysis of CAMS data

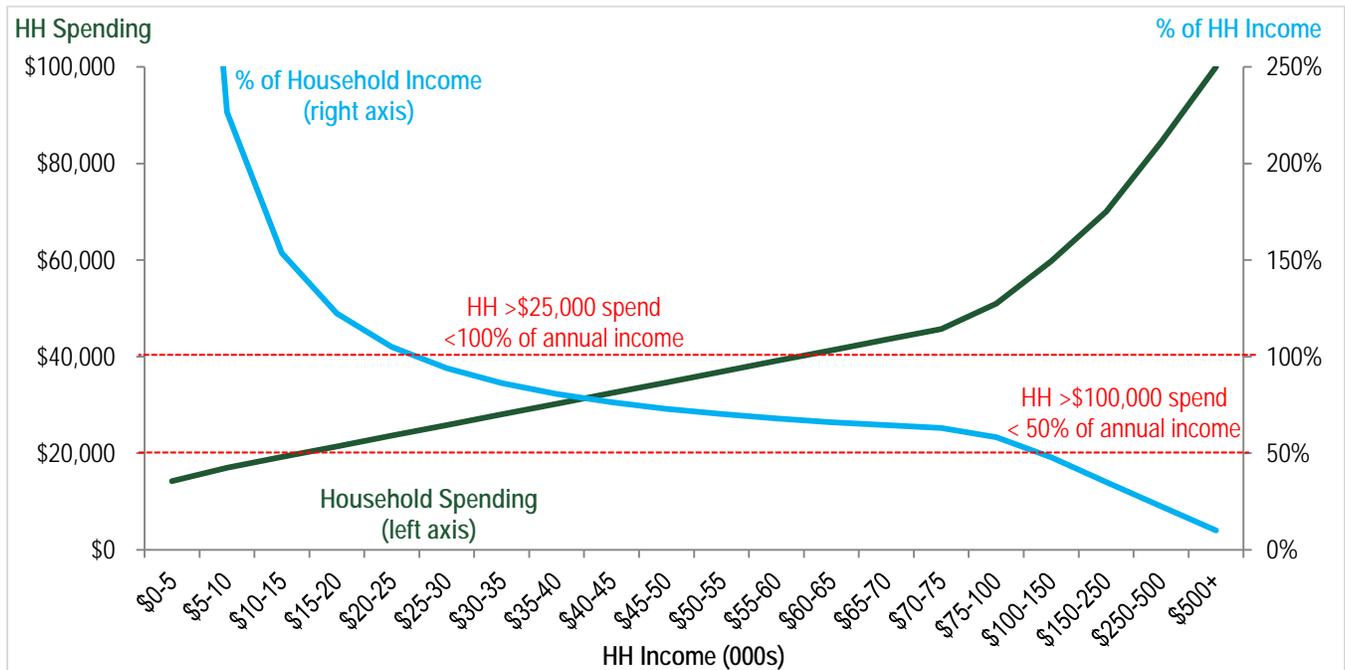
Next, this analysis is extended to households in the income bands above \$75,000 by modeling the proportion of household income dedicated to consumption based on observed data on income bands with a positive savings rate.¹³⁴ This exponential relationship is utilized to define the proportion of spending for households in income bands between \$75,000 and \$150,000, and the results it yields are adjusted with observed data to estimate spending proportions for households above \$150,000.

This exercise yields an estimate of total household spending in each of the 20 income bands. As shown in Figure C.2 below, while total spending (in green) grows as income increases, the proportion of household income dedicated to consumption decreases as income grows, with households above \$25,000 in annual income exhibiting a positive savings rate,¹³⁵ and households above \$100,000 in annual income saving (rather than spending) more than 50 percent of their annual income.

¹³⁴ This sample excludes those households in the lowest income bands for which consumption exceeds savings, since these households do not exhibit a similar relationship between income and consumption to higher income households. Note that while savings rates appear to be accelerating in Figure C.2 at higher income levels, this visual effect is due to the discontinuous size of the income bands, which grow materially larger beyond \$75,000.

¹³⁵ On average, elderly households in the income bands below \$25,000 spend in excess of their annual income. This divergence illustrates that while annual income is correlated with annual expenditures, it does not represent the only source of spending power. For instance, households may have pre-existing assets that do not qualify or are not reported as income, may borrow or purchase via credit in excess of their income, or may support their augment spending through government support that is not reflected as income. As discussed in Appendix A.1, there are valid concerns about the comprehensiveness of CPS data in capturing annual income sources. By utilizing observed spending patterns at lower income levels (rather than constraining spending to income levels), this analysis avoids overstating the impact of income reductions on spending.

FIGURE C.2 – HOUSEHOLD SPENDING BY INCOME FOR ELDERLY HOUSEHOLDS



Source: ESI Analysis of CAMS data

C.2 CATEGORIZATION OF GOODS BY CONSUMPTION TYPE

The aggregate relationship between income and spending defined above is comprised of individualized relationships between income and spending for various types of goods and services. The next step in the analysis is to divide the twelve selected goods and services into three consumption categories, reflective of these varying consumption patterns.¹³⁶

- Goods for which spending rises slowly with income are defined as **fixed** goods. These are items for which returns are diminishing as spending increases, leading to a limited amount of additional consumption as incomes increase.¹³⁷ Examples include healthcare, food and utilities.
- Goods for which spending rises at a similar rate to total spending are defined as **variable** goods.¹³⁸ Examples include housing and automotive costs.

¹³⁶ These patterns are referred to in economic terms as “elasticities”, and describe relative changes in consumption as income changes. The greater the elasticity of a consumption category, the greater the change in consumption (positive or negative) when available income or the price of that good changes.

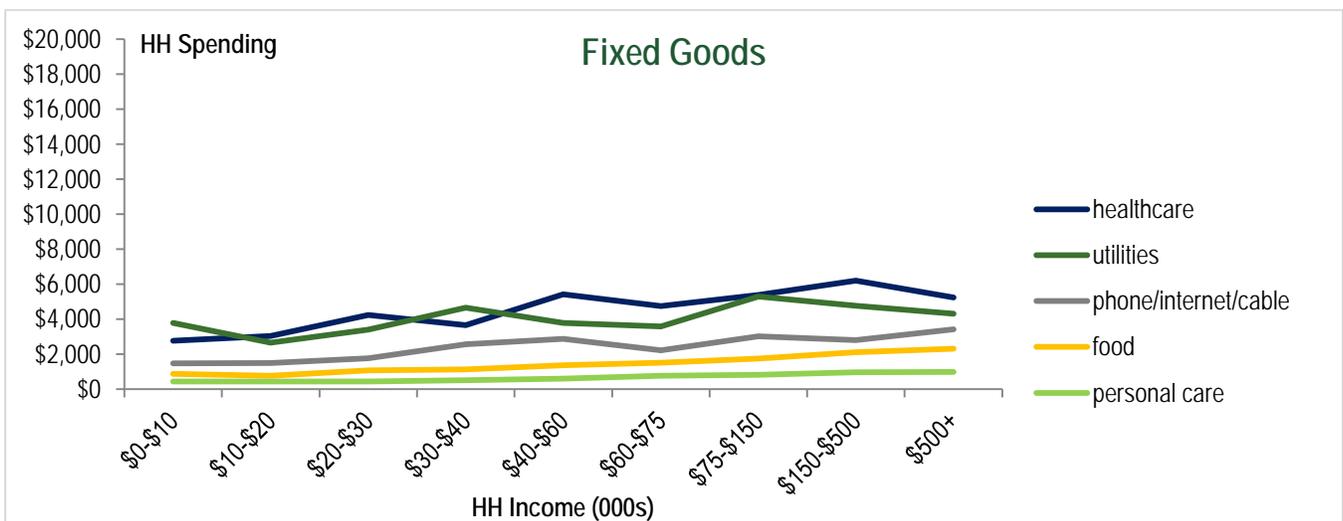
¹³⁷ Notably, consumption of these goods is not flat across income bands, but rather grows slower than income. Many economic models utilize the term “fixed cost” to denote an expenditure that is the same regardless of the level of activity (for example, a factory may pay a fixed amount of rent in a given month regardless of the volume of items that it produces). Here, the descriptor “fixed” is utilized in a relative sense (denoting slower than average increases as income grows) rather than in an absolute sense.

¹³⁸ Notably, as discussed above, the proportion of income dedicated to consumption falls as income increases. Thus, while these goods remain relatively constant as a proportion of spending as incomes increase, they do fall somewhat as a proportion of total income.

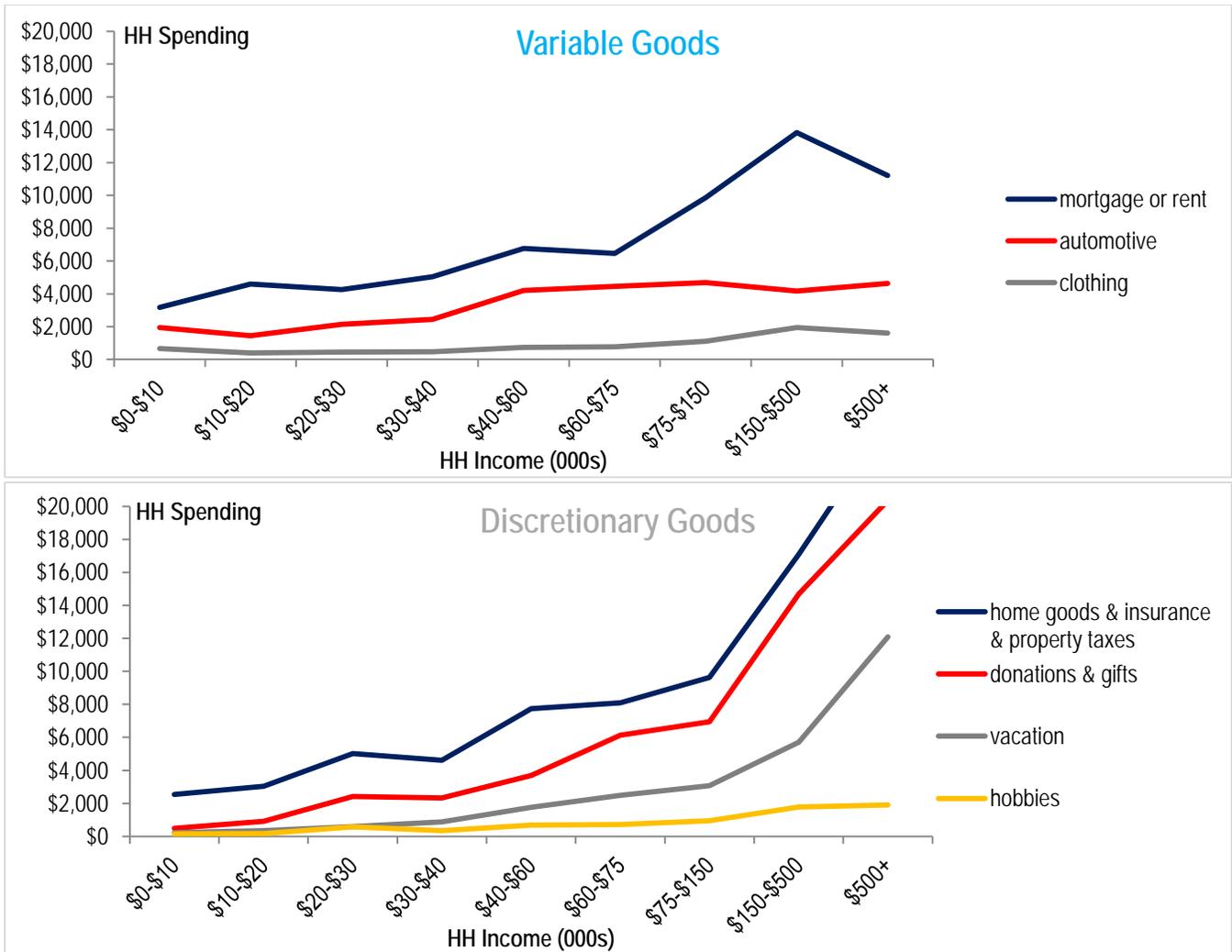
- Goods for which spending increases rapidly with income are defined as **discretionary** goods. Spending on these items is concentrated among higher income households, which have a greater level of discretionary income after accounting for necessities.¹³⁹ Examples include donations, vacations and hobbies.

The categorization of these goods is determined by grouping reported spending into nine income bands (increasing the observations per good and income band from the initial grouping) and observing the relationship between expenditures and incomes. The observed visual relationship aligns with statistical analysis comparing upper and lower income brackets to define whether spending for each good increases more slowly than overall spending (fixed), in line with overall spending (variable) or more rapidly than overall spending (discretionary). These relationships are shown in Figure C.3 below.

FIGURE C.3 – EXPENDITURE PATTERN BY GOODS



¹³⁹ Note that this categorization does not imply that spending on these items is strictly optional for any household. In particular, expenditures on property taxes and insurance may be required for many households. However, these categories of spending rise exponentially with income, implying that lower-income households mitigate these costs either through the assets they maintain or through participation in various government programs.

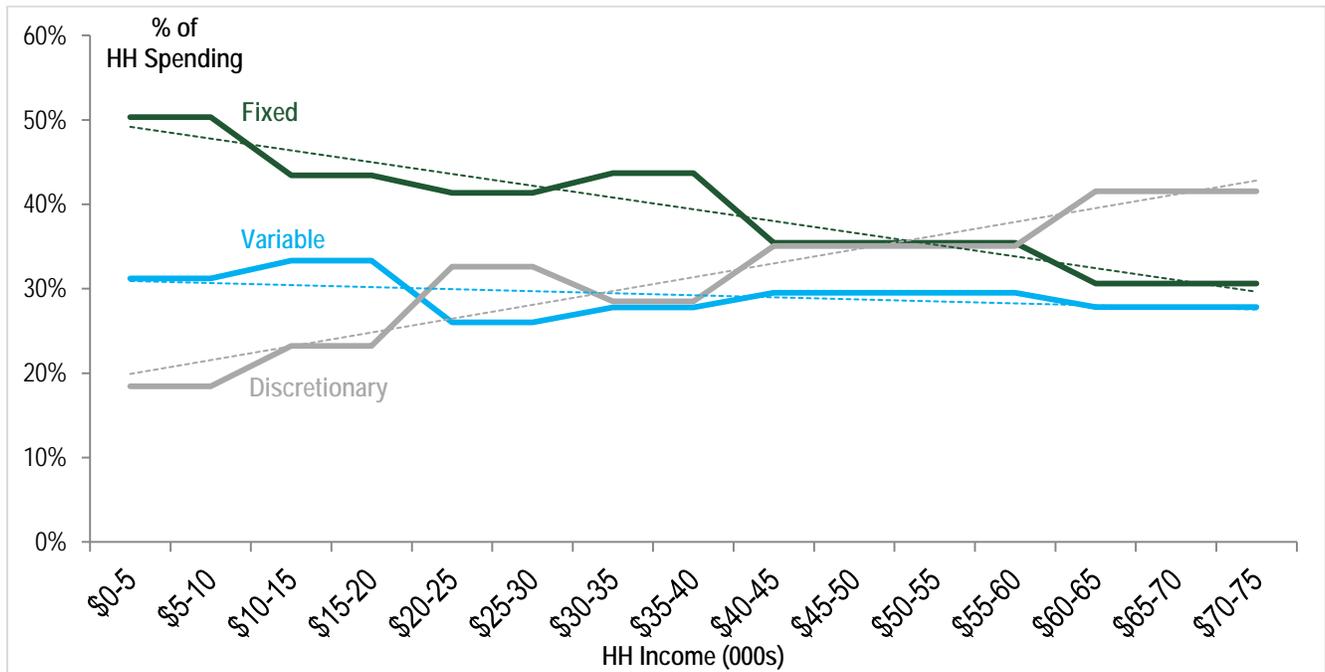


Source: ESI Analysis of CAMS data

C.3 PROPORTION OF SPENDING BY CONSUMPTION TYPE

Next, the CAMS data is utilized to estimate the respective proportions of household spending dedicated to fixed, variable and discretionary goods within each income band. Expenditures by good as a proportion of total spending for the nine income bands described above are applied to the fifteen continuous income bands from \$0 - \$75,000. These relationships are plotted, and the linear trendline is defined to estimate the proportion of spending in each category for each income band. As anticipated, expenditures on fixed goods decline as a proportion of total spending as income increases, expenditures on variable goods are relatively steady (falling slightly as a proportion of total spending as income increases), and expenditures on discretionary goods grow sharply as a proportion of total spending as income increases (see Figure C.4).

FIGURE C.4 – OBSERVED AND MODELED HOUSEHOLD SPENDING BY CATEGORY TYPE BY INCOME BAND

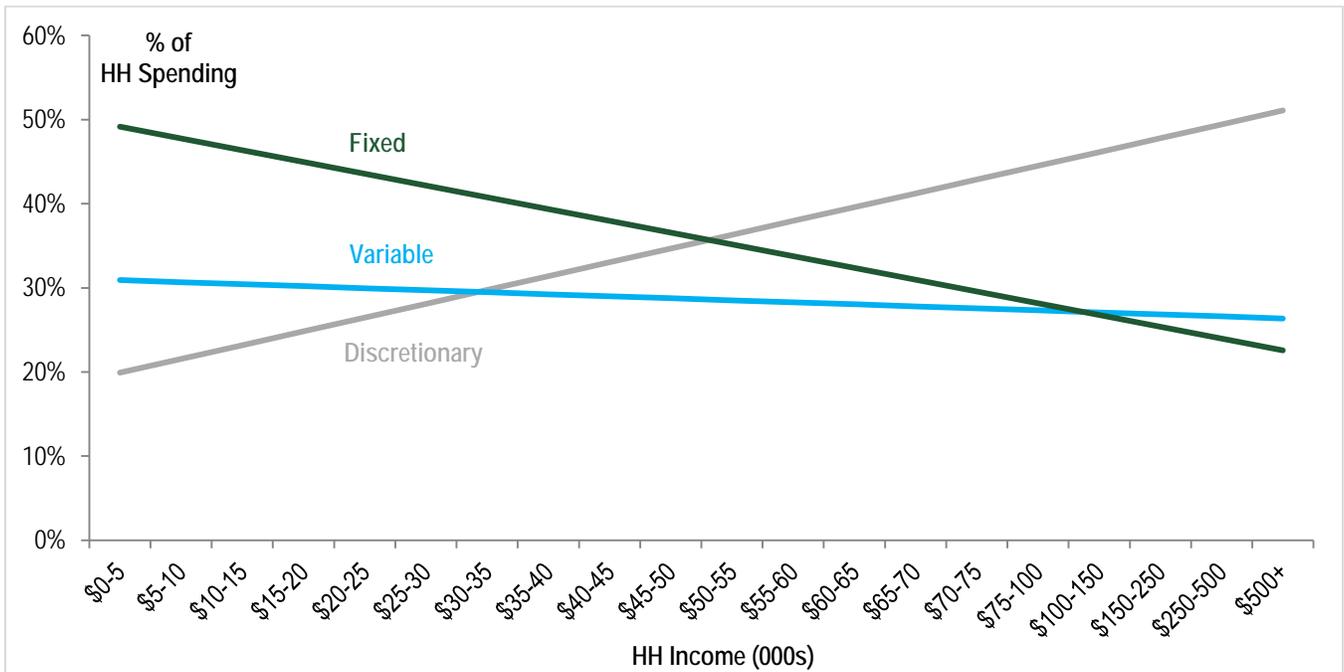


Source: ESI Analysis of CAMS data

Smoothed spending estimates are drawn from the linear extrapolation and used to define proportional spending estimates are then extended out to the remaining income bands above \$75,000.¹⁴⁰ These proportions are then applied to the total household spending estimates by income band (shown in Figure C.4 above) to yield spending estimates by category for each income band. While lower income households spend the largest proportion of their income on fixed goods, discretionary goods represent the largest spending category for upper income households (see Figures C.5 and C.6).

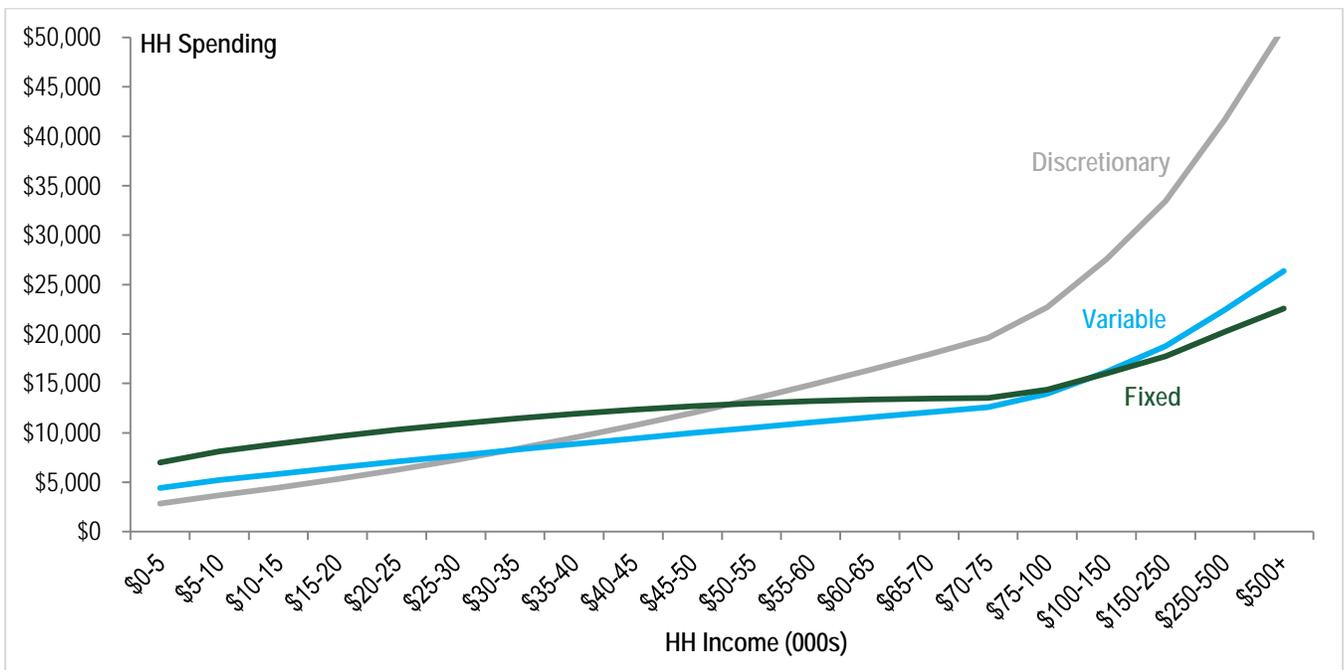
¹⁴⁰ As with savings rates by income band, the use of smoothed estimates based on survey data, rather than the use of the survey results directly, controls for statistical variance in the survey responses.

FIGURE C.5 – SPENDING BY CATEGORY TYPE BY ELDERLY HOUSEHOLDS (%)



Source: ESI Analysis of CAMS data

FIGURE C.6 – SPENDING BY CATEGORY TYPE BY ELDERLY HOUSEHOLDS (\$)



Source: ESI Analysis of CAMS data

C.4 SPENDING PROFILE BY INCOME BAND

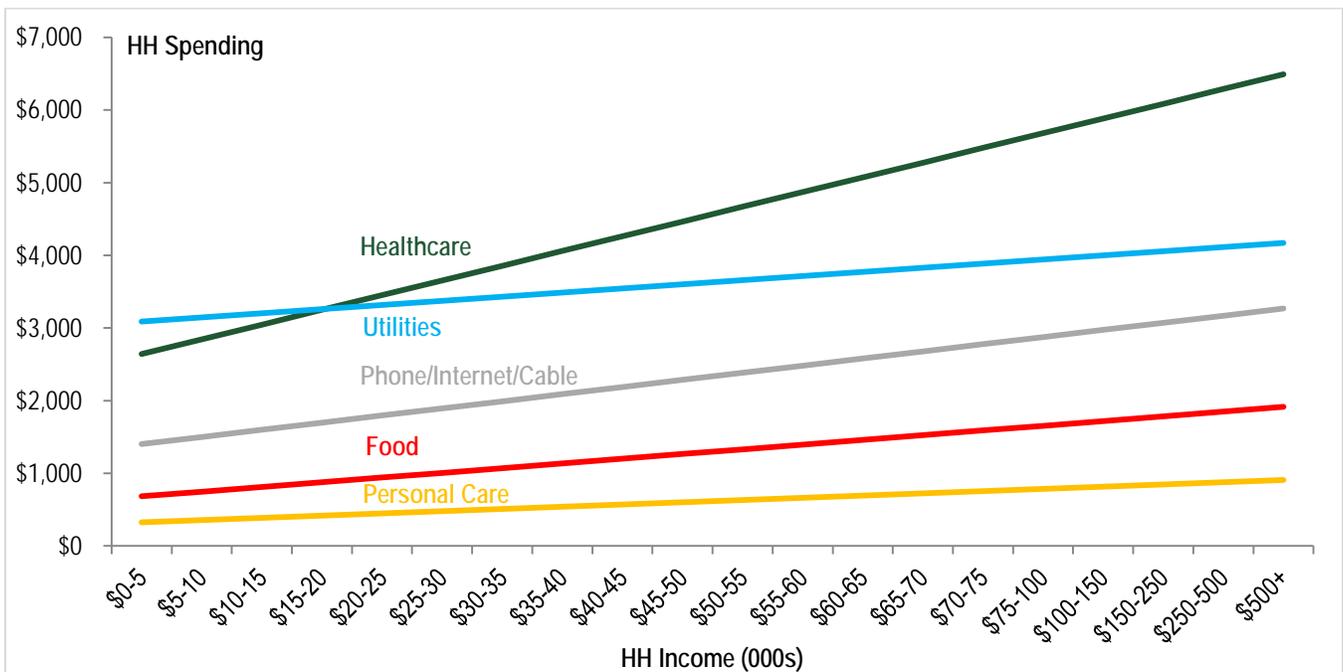
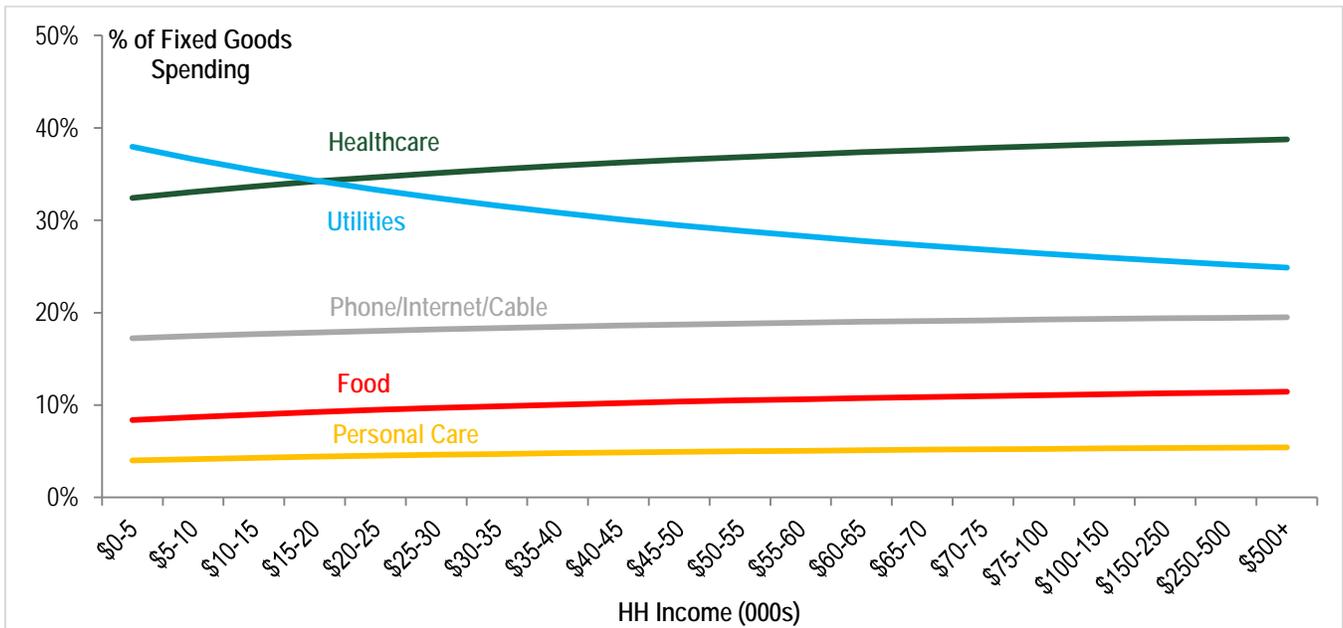
Finally, the proportion of spending on each individual good within the fixed, variable and discretionary categories is estimated by income band. This is paired with the dollar level of spending in each category estimated above to yield a unique spending profile by good for each of the 20 modeled income bands.

Figures C.7, C.8 and C.9 below express these spending profiles in both percentage and dollar terms. For many individual goods, the proportion of spending is relatively stable (within its category) across income bands, which indicates that the good exhibits a similar pattern to the other goods within its category.

Changes in spending amounts for these goods across income bands are a function of both changes in the proportion of category spending dedicated to the specific good and, more importantly, changes in the volume of spending in the category modeled above. For example, while the proportion of spending on each good in the discretionary category is relatively stable, the volume of spending on each of these goods accelerates sharply as income increases due to the overall increase in spending within the discretionary category at higher income levels (see Figure C.9).

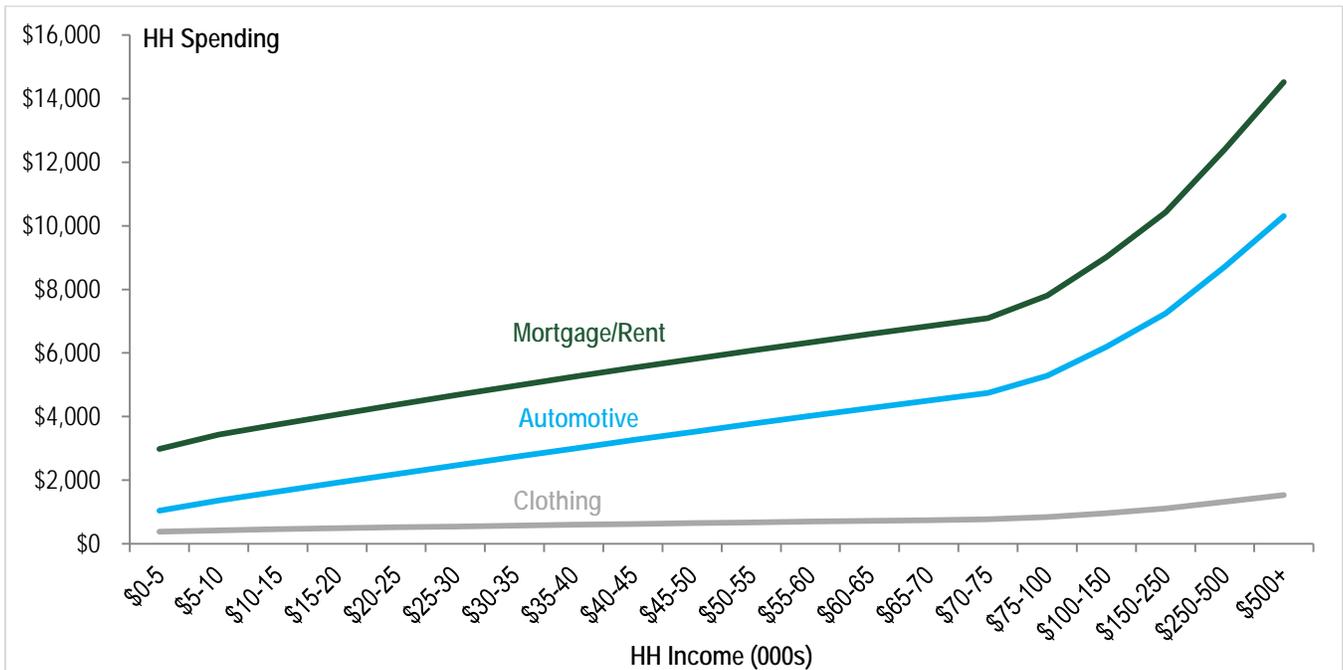
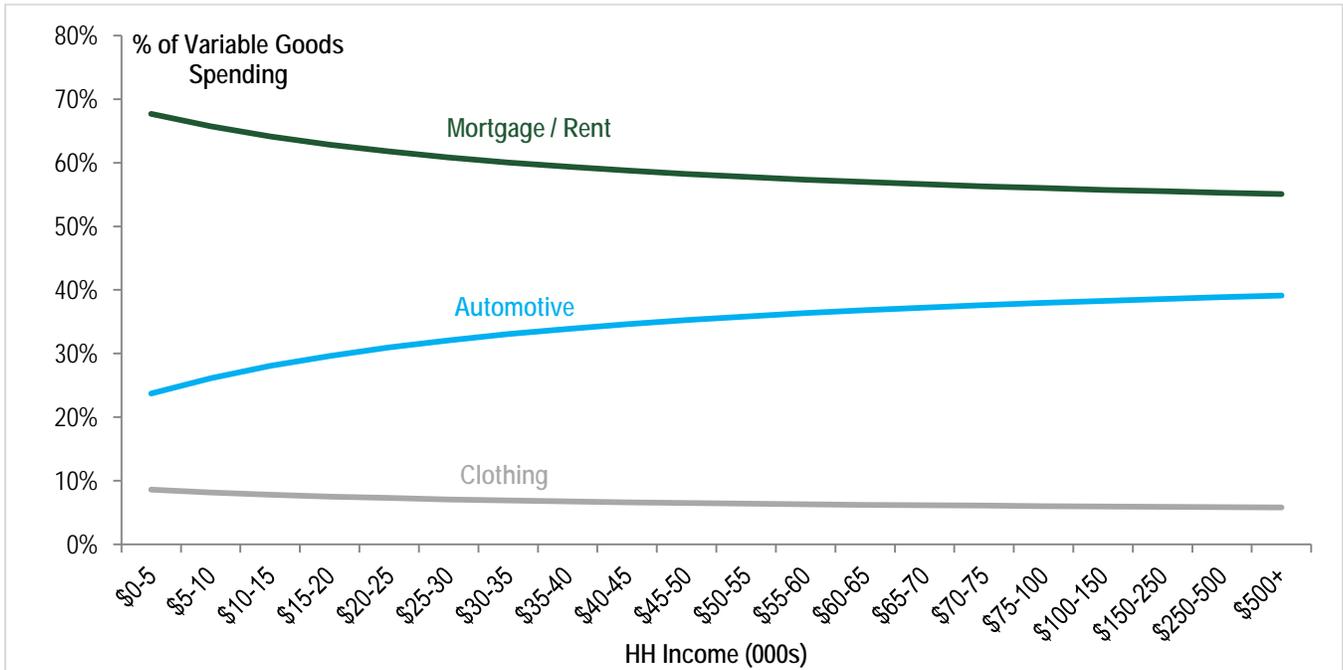


FIGURE C.7 – ELDERLY HOUSEHOLD SPENDING BY INCOME – FIXED GOODS



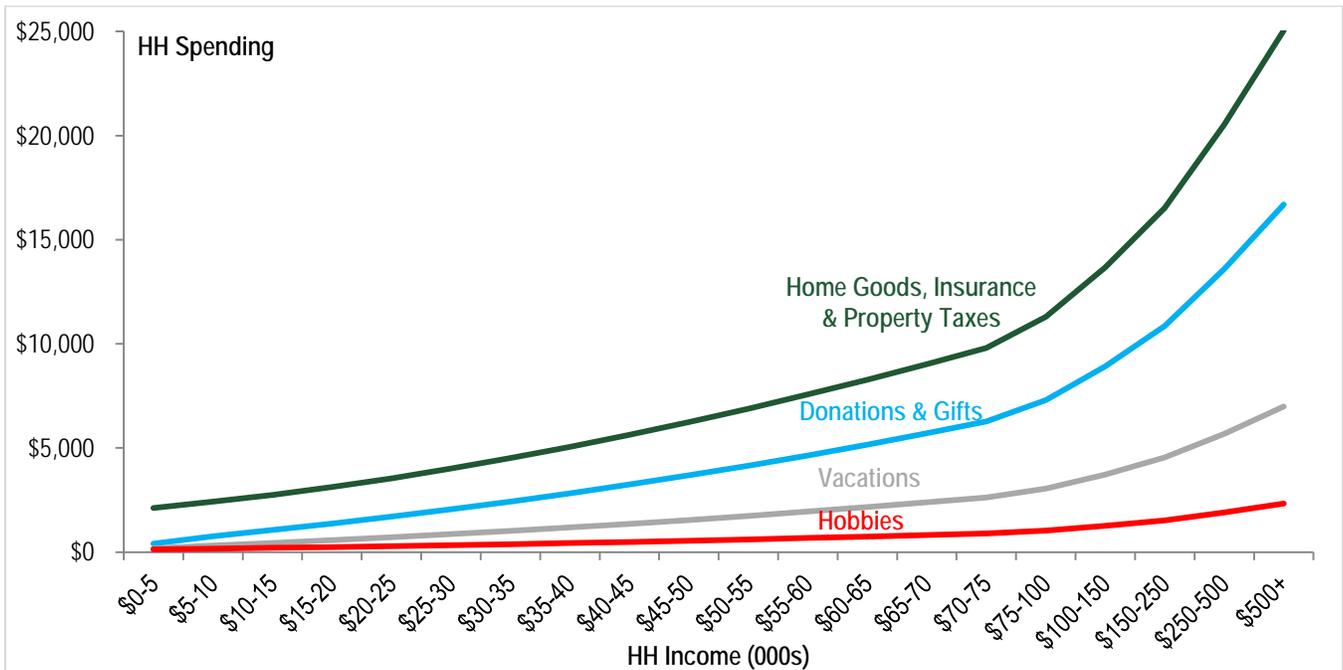
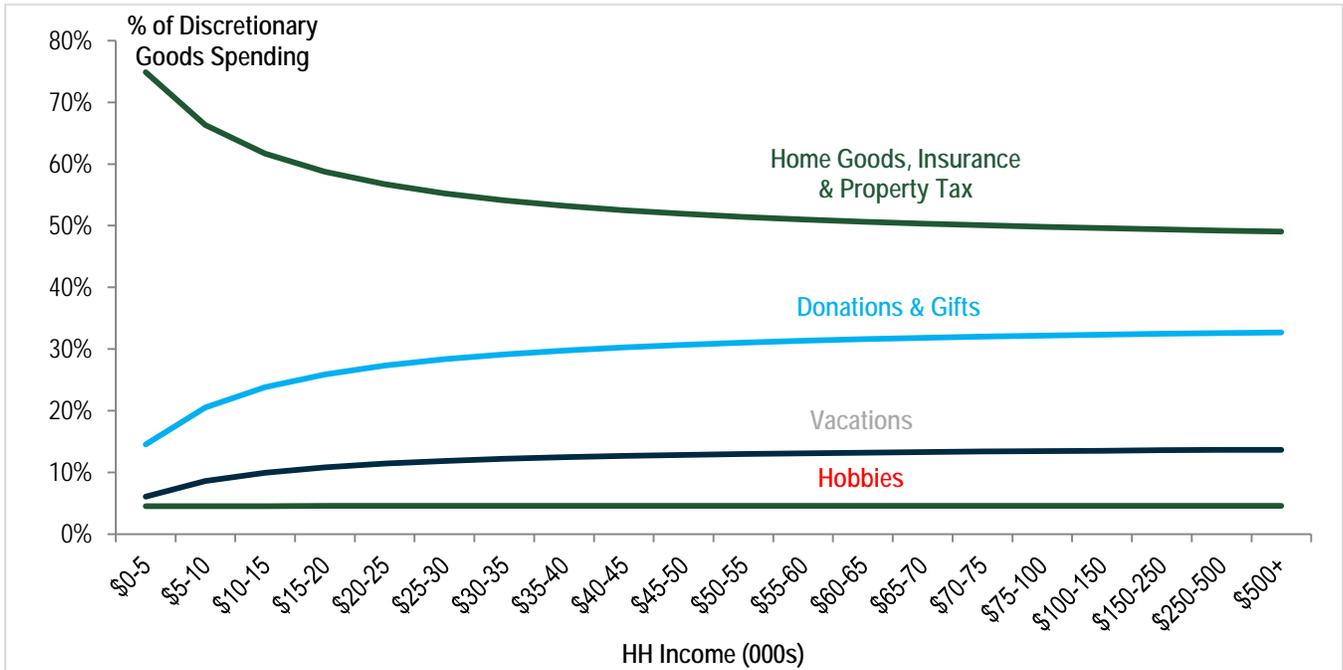
Source: ESI Analysis of CAMS data

FIGURE C.8 – ELDERLY HOUSEHOLD SPENDING BY INCOME – VARIABLE GOODS



Source: ESI Analysis of CAMS data

FIGURE C.9 – ELDERLY HOUSEHOLD SPENDING BY INCOME – DISCRETIONARY GOODS



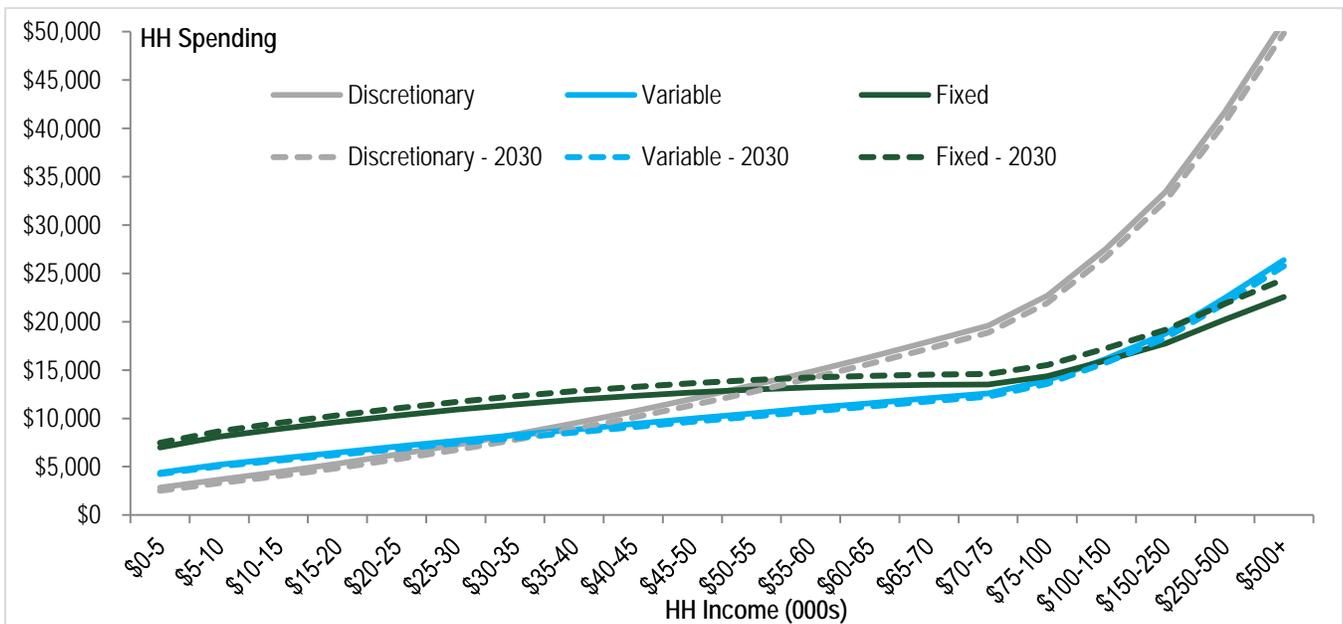
Source: ESI Analysis of CAMS data

C.5 ADJUSTMENT FOR ANTICIPATED MEDICAL INFLATION

As previously described, medical costs are projected to rise 21 percent faster than overall inflation over the 2015-2030 period.¹⁴¹ Since health care represents an important category of household spending, this change will impact household spending patterns in addition to state assistance costs.

By assumption, total expenditures are held constant for households within each income band from 2015 to 2030.¹⁴² The disproportionate increase in medical costs is accounted for by assuming offsetting decrease in other consumption categories. Thus the first step is to increase anticipated healthcare spending by 21 percent for each income band, and to calculate the magnitude of that increase in dollar terms. For each income band, 2/3 of this increase is assumed to be offset through reductions in total discretionary spending, while 1/3 is assumed to be offset through reductions in variable spending, with spending maintained in the remaining fixed categories. These reductions in variable and fixed spending are applied proportionally by good within each income band.¹⁴³ Figure C.10 illustrates the revised estimate of spending on fixed goods (which grows due to increased medical costs), variable and discretionary goods (which shrink to offset these increases) by income band for 2030.

FIGURE C.10 – HOUSEHOLD SPENDING ALLOCATION BY CATEGORY, 2015-2030 (IN \$2015)



Source: ESI Analysis of CAMS data

¹⁴¹ See Appendix B.4 of this report for discussion of historical medical inflation trends and CBO projections of medical inflation relative to overall inflation for the 2015-2030 period.

¹⁴² Importantly, 2030 results are expressed in \$2015, meaning that expenditures by income band are held constant in real terms (though they are of course anticipated to increase in nominal terms due to inflation). For this reason, the adjustment for anticipated medical inflation includes only the projected excess medical inflation above and beyond projected overall inflation.

¹⁴³ This allocation is informed by the relationship of each expenditure category with household income, as detailed above. Increases in medical costs will reduce discretionary spending, in effect making households poorer in terms of their purchasing power for other items. Since discretionary goods show the greatest variance with income, they are assumed to be the most easily adjusted as discretionary income declines, followed by variable goods. This approach maintains the same distribution of spending within each category and income band, while shrinking the level of variable and discretionary spending to maintain the same total budget with increased medical cost.

C.6 AGGREGATE HOUSEHOLD SPENDING

The unique spending profiles by income band for 2015 and 2030 are then matched with the volume of households in each band within each of the income distribution scenarios modeled in Appendix A.3 to generate an estimate of the aggregate spending for each good. The sum of these goods represents the statewide spending by elderly households in each scenario.

This approach uses the spending profile of households within each income band as a constant between baseline and sufficient income scenarios.¹⁴⁴ Differences in aggregate spending therefore arise due to differences in the income distribution of the state's households between scenarios, allowing the analysis to isolate the difference in spending estimated to be attributable to insufficient savings.

Consistent with its focus on the elderly population, this analysis does not make any adjustment for household spending that may be lost due to changes in savings behavior for working-age residents. No specific policy intervention or behavioral change is assumed in the report to generate the additional income available to retirees under the sufficient savings scenario. In practice, changes that result in greater rates of saving during working years (enabling higher income levels in retirement years) may negatively impact consumption for working age households, offsetting some of the gains in consumption among retirees. In the absence of any proposed intervention, any estimate of the magnitude of these changes would be speculative. It is important to note, however, that the compounding effects of investment returns imply that savings do not simply represent a shift in income across a lifespan but rather a net gain in lifetime wealth (with a dollar saved in working years yielding more than a dollar in disposable income in retirement). In addition, increases in savings levels do not necessarily imply an offsetting reduction in expenditures within the state economy, as working age residents could alternatively work more (or another member of their household could do so) in order to increase their incomes by a corresponding amount, or could reduce out of state expenditures like vacations.

The spending profiles developed in this section apply to households rather than to individuals. Therefore, the elderly population for 2015 and projected elderly population for 2030 must be translated into an estimated number of elderly households by estimating a headship rate. The headship rate represents the proportion of the population that is classified by the Census Bureau as a head of household (or householder). Multiplying the headship rate by the population therefore yields the number of households associated with that population.¹⁴⁵

Estimated headship rates for this analysis are drawn from the 2010 decennial Census by age band.¹⁴⁶ These rates are multiplied by the estimated population in each age band to yield the estimated number of households in

¹⁴⁴ Said another way, the spending profile of a given income band (for example, \$50,000 - \$55,000) is the same in the baseline and sufficient savings scenarios. While average spending within a given band remains constant, aggregate spending for each band will differ to the extent that the number of people in each band changes with changes in the modeled population distribution. These changes in the distribution of the population, rather than any changes in household behavior at a given income level, drive changes in aggregate spending. This matches the approach utilized to calculate net state assistance costs between scenarios.

¹⁴⁵ Mathematically, this equation ($\text{headship rate} = \text{households} / \text{population}$) means that the headship rate also represents the inverse of the average household size. For example in a population with 25 households and 100 people, the average household size would be 4 ($100 / 25$) and the headship rate would be 25% ($25 / 100$).

¹⁴⁶ Notably for this purpose, estimates of occupied housing units, and therefore households, differ somewhat from the decennial Census and the 1 Year ACS for 2010, the only common year for which both sets data sources are available. Analysis of this differential identifies sampling differences in determining as the potential cause, and researchers generally consider the more robust decennial census estimates to be more accurate. See:

Pennsylvania with an elderly householder in both 2015 and 2030. Although the same estimated headship rate is applied by age band in 2015 and 2030, the population distribution by age varies somewhat between the two years, leading to slight variation in the total headship rate. The headship rate for elderly residents in 2015 is estimated to be 64.3 percent, yielding an estimated 1.40 million elderly households out of an elderly population of 2.18 million, while the headship rate for 2030 is projected to be 64.5 percent, yielding an estimated 2.00 million households out of a projected population of 3.09 million (see Table C.1).

TABLE C.1 – HEADSHIP RATE AND VOLUME OF ELDERLY HOUSEHOLDS IN PENNSYLVANIA, 2015 AND 2030

Age Band	2015			2030		
	Population	Headship Rate	Households	Population	Headship Rate	Households
65-74	1,195,586	62.4%	746,597	1,595,613	62.4%	996,398
75-84	649,931	67.5%	438,613	1,090,266	67.5%	735,778
85+	333,835	64.6%	215,787	406,784	64.6%	262,940
65+ Total	2,179,352	64.3%	1,400,997	3,092,663	64.5%	1,995,117

Source: ESI Estimates based on Census 2010 (headship rate) and IFO (population) data.
Rows and columns may not sum due to rounding.

The proportional distributions of incomes developed in Appendix A.3 are applied to this base of statewide elderly households to estimate the volume of households in each income band in each scenario.¹⁴⁷ The per household spending for each good is then multiplied by the volume of households to yield an estimate of aggregate spending by good for each income band, which are summed to statewide total spending by elderly households.

Table C.2 below shows estimated expenditures by good for Pennsylvania's elderly households under the baseline and sufficient savings scenarios. Insufficient retirement savings are estimated to reduce aggregate spending by elderly households by more than \$2 billion in 2015 and \$3.1 billion in 2030. Notably, the distribution of lost spending by good varies somewhat from the distribution of baseline spending because of the varying elasticity of different goods (as detailed above).

Arthur R. Cresce (2012). "Evaluation of Gross Vacancy Rates from the 2010 Census versus Current Surveys: Early Findings from Comparison with the 2010 Census and the 2010 ACS 1-Year Estimates." *US Census Bureau Working Paper*. < <https://www.census.gov/housing/files/FCSM%20paper.pdf>>

Lawrence Bates (2012). "Memorandum: Understanding Differences in ACS and 2010 Census Information on Occupancy Status – Sampling Frame." *American Community Survey Research and Evaluation Report Memorandum*. < https://www.census.gov/content/dam/Census/library/working-papers/2012/acs/2012_Bates_02.pdf>

Accordingly, headship rates by age from the decennial Census are utilized for this analysis, sacrificing the recency provided by 2015 ACS data for the greater accuracy of 2010 Census data. Fortunately, the ratio observed between 2010 Census and ACS households estimates for elderly households in Pennsylvania (1.03) is very similar to the ratio between elderly households in 2015 developed through this method and reported in the 2015 ACS (1.04). Ratio observed between 2010 Census and ACS (1.03) is similar to the ratio of estimate to 2015 HH count (1.04)

¹⁴⁷ Note that income distribution of households within a population is not by definition the same as the income distribution of the full population, even if members of the population are reporting income for their full household, because it is possible that household income could be strongly correlated with household size, in which case upper or lower income households might be disproportionately represented in the full population. However, 1 Year Estimates from the American Community Survey (ACS) of income of elderly households in Pennsylvania yields a household distribution that matches very closely to the income 2015 income distribution yielded by CPS data on the full population when mapped onto the same income bands. The income distribution from the full population is therefore applied unadjusted to the household population in all four scenarios modeled in Appendix A.3.

TABLE C.2 – NET HOUSEHOLD EXPENDITURE LOSS DUE TO INSUFFICIENT SAVINGS, 2015 & 2030 (\$2015 M)

Sector	2015			2030		
	Baseline	Sufficient Savings	Net Difference	Baseline	Sufficient Savings	Net Difference
Healthcare	\$6,279	\$6,475	\$196	\$11,201	\$11,536	\$335
Utilities	\$5,119	\$5,187	\$68	\$7,332	\$7,428	\$96
Phone/internet/cable	\$3,218	\$3,313	\$95	\$4,739	\$4,874	\$135
Food	\$1,776	\$1,838	\$62	\$2,638	\$2,726	\$87
Personal care	\$845	\$874	\$29	\$1,254	\$1,296	\$41
Mortgage or rent	\$7,895	\$8,152	\$257	\$12,230	\$12,622	\$392
Automotive	\$4,726	\$4,962	\$236	\$7,585	\$7,934	\$349
Clothing	\$886	\$910	\$24	\$1,356	\$1,394	\$37
Home goods & insurance & property taxes	\$9,865	\$10,345	\$480	\$15,029	\$15,766	\$737
Donations & gifts	\$5,885	\$6,249	\$364	\$9,184	\$9,731	\$548
Vacation	\$2,461	\$2,614	\$152	\$3,842	\$4,071	\$229
Hobbies	\$871	\$918	\$48	\$1,341	\$1,414	\$72
Total	\$49,826	\$51,837	\$2,011	\$77,731	\$80,789	\$3,057

Source: ESI Calculations. Rows and columns may not sum due to rounding.

Next, this aggregate estimate must be adjusted to account for the fact that some portion of the total spending by Pennsylvania's elderly households occurs outside of the Pennsylvania economy. This leakage can take the form of transactions physically made in another state (whether on vacation or in a neighboring state in the normal course of activity) or transactions that take place electronically to an out of state recipient (such as online retailers, or the recipients of some gifts and donations). The degree of leakage is estimated to be larger for certain goods like vacations which lend themselves to a greater degree of out of state spending.

Proportions of out of state spending are applied to the net difference between aggregate spending for each good in baseline and sufficient savings scenarios to yield an adjusted estimate of net spending losses to the Pennsylvania economy from insufficient savings in 2015 and 2030. Net expenditures losses in Pennsylvania due to insufficient savings are estimated to be \$1.67 billion (out of a total expenditure loss of \$2.01 billion) in 2015, and \$2.54 billion (out of a total expenditure loss of \$3.06 billion) in 2030 (see Table C.3).

TABLE C.3 – NET EXPENDITURES LOSS IN PENNSYLVANIA DUE TO INSUFFICIENT SAVINGS, 2015 & 2030 (\$2015 M)

Sector	Net Expend	% in Pa	Net Expend in PA	Net Expend	% in Pa	Net Expend in PA
Healthcare	\$196	95%	\$186	\$335	95%	\$318
Utilities	\$68	100%	\$68	\$96	100%	\$96
Phone/internet/cable	\$95	95%	\$91	\$135	95%	\$128
Food	\$62	95%	\$59	\$87	95%	\$83
Personal care	\$29	95%	\$28	\$41	95%	\$39
Mortgage or rent	\$257	100%	\$257	\$392	100%	\$392
Automotive	\$236	95%	\$224	\$349	95%	\$331
Clothing	\$24	50%	\$12	\$37	50%	\$19
Home goods & insurance & property taxes	\$480	100%	\$480	\$737	100%	\$737
Donations & gifts	\$364	50%	\$182	\$548	50%	\$274
Vacation	\$152	25%	\$38	\$229	25%	\$57
Hobbies	\$48	95%	\$45	\$72	95%	\$69
Total	\$2,011	83%	\$1,669	\$3,057	83%	\$2,542

Source: ESI Calculations. Rows and columns may not sum due to rounding.

ECONOMIC AND TAX REVENUE MODELING

The net loss in expenditures calculated above represents the estimated loss in direct household spending within Pennsylvania due to insufficient retirement savings in 2015 and 2030. These direct expenditures do not represent the full extent of reduced economic activity associated with this reduction in spending. Expenditures within a given geography give rise to spillover impacts when those dollars are recirculated to suppliers and to employees within the state economy. In so doing, they also support additional employment and earnings, and generate tax revenue for the state and local government. The absence of these expenditures therefore has a greater economic impact than the direct expenditure loss alone.¹⁴⁸

ESI has constructed an input-output model of the Pennsylvania economy using IMPLAN software to estimate the total impact of these net expenditures on the state's economy. The detail that follows explains briefly the theory behind input-output modeling, the mechanics of utilizing it to estimate economic and employment impacts, and the model utilized to estimate tax revenue impacts to the Commonwealth government from this total change in economic activity.

¹⁴⁸ Note that the spillover impacts calculated from lost expenditures are estimated by modeling the impacts of adding the same volume of spending to the state economy (through the methodology described throughout this chapter). Since economic models are constructed based on the current economic relationship between sectors, results from adding or subtracting an identical volume of spending are symmetrical (provided that the incremental amount is smaller than the size of the sector itself).

C.7 INPUT-OUTPUT MODELING: OVERVIEW

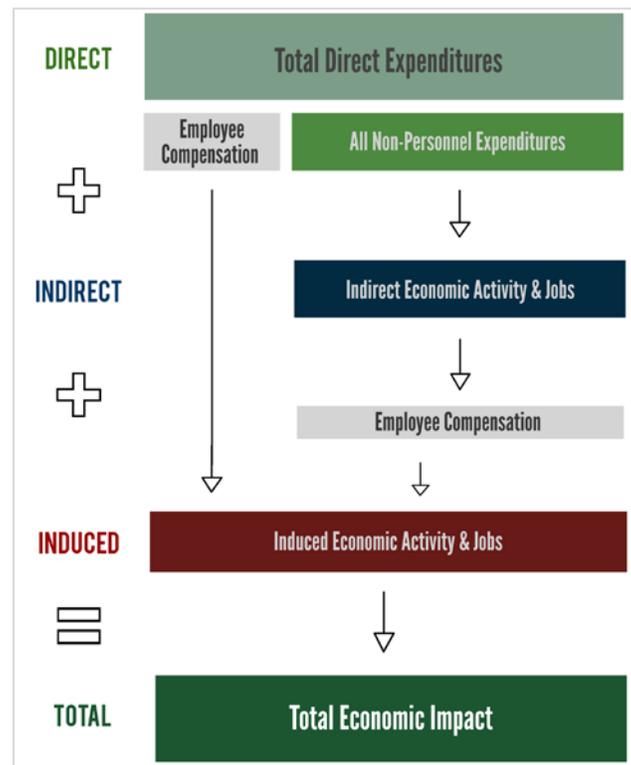
Economic impact estimates for net household expenditures are generated by utilizing input-output models to translate an initial amount of direct economic activity into the total amount of economic activity that it supports. This includes multiple waves of spillover impacts generated by spending on goods and services and by spending of labor income by employees.

In an inter-connected economy, every dollar spent generates two spillover impacts:

- First, some amount of the proportion of that expenditure that goes to the purchase of goods and services gets circulated back into an economy when those goods and services are purchased from local vendors. This represents what is called the indirect effect, and reflects the fact that local purchases of goods and services support local vendors, who in turn require additional purchasing with their own set of vendors.
- Second, some amount of the proportion of that expenditure that goes to labor income gets circulated back into an economy when those employees spend some of their earnings on various goods and services. This represents what is called the induced effect, and reflects the fact that some of those goods and services will be purchased from local vendors, further stimulating a local economy.

The role of input-output models is to determine the linkages across industries in order to model out the magnitude and composition of the spillover impacts to all industries of a dollar spent in any one industry. Thus, the total economic impact of a set of expenditures within the state economy is the sum of the direct economic footprint, plus the indirect and induced effects generated by that direct footprint (see Figure C.11).

FIGURE C.11 – ILLUSTRATION OF DIRECT, INDIRECT AND INDUCED OUTPUT



C.8 INPUT-OUTPUT MODEL MECHANICS

To model the impacts resulting from the direct expenditures, ESI developed a customized economic impact model using the IMPLAN input/output modeling system. IMPLAN represents an industry standard approach to assess the economic and job creation impacts of economic development projects, the creation of new businesses, and public policy changes within a county its surrounding area

IMPLAN has developed a social accounting matrix (SAM) that accounts for the flow of commodities through economics. From this matrix, IMPLAN also determines the regional purchase coefficient (RPC), the proportion of local supply that satisfies local demand. These values not only establish the types of goods and services supported by an industry or institution, but also the level in which they are acquired locally. This assessment determines the multiplier basis for the local and regional models created in the IMPLAN modeling system. IMPLAN takes the multipliers and divides them into 536 industry categories in accordance to the North American Industrial Classification System (NAICS) codes.

In addition to indirect and induced economic output (which are summed with direct expenditures to produce total output), IMPLAN modeling estimates the direct, indirect and induced employment associated with this activity, as well as the earnings (including wages and benefits) associated with that employment. IMPLAN job estimates are adjusted to Full-Time Equivalent (FTE) employment by applying the ratio of total to FTE jobs proportionally in each of the sectors in which employment is estimated to occur. No adjustment is necessary for earnings, which already reflect the differential employment patterns by industry in full-time and part-time employment in estimating total earnings.

C.9 TAX REVENUE IMPACTS

This direct, indirect and induced economic activity also produces increases in various tax bases, which in turn leads to increased tax revenue collection for state and local governments. While IMPLAN produces estimates of these tax revenue amounts, ESI's does not utilize these results directly. Instead, we utilize a custom model that relies on the known relationships between various types of economic activity and tax collections (i.e. effective tax rates) to translate the increases in activity estimates by IMPLAN into attendant tax revenue results. In the case of direct household expenditures, an analysis is undertaken for each category to determine the applicable of Pennsylvania's sales tax, which has broad categories of exemptions from the standard 6 percent rate. The effective sales tax rate on direct household expenditures is estimated based on the weighted proportion of modeled expenditures that are subject to this tax.

These calculations are undertaken for the Commonwealth of Pennsylvania based on recent budget data from the state. While local municipalities and counties are subsumed within the state's economy, local governments have separate and distinct tax bases and revenues from the Commonwealth government, and therefore tax revenues generated to local governments are additive to state tax revenues generated by this activity. However, local tax codes vary widely in both the type and rate of assessments, and estimating the magnitude of local revenues across the state is outside of the scope of this report.



APPENDIX D – ABOUT ECONSULT SOLUTIONS, INC. (ESI)

This report was produced by Econsult Solutions, Inc. (“ESI”). ESI is a Philadelphia-based economic consulting firm that provides businesses and public policy makers with economic consulting services in urban economics, real estate economics, transportation, public infrastructure, development, public policy and finance, community and neighborhood development, planning, as well as expert witness services for litigation support. Its principals are nationally recognized experts in urban development, real estate, government and public policy, planning, transportation, non-profit management, business strategy and administration, as well as litigation and commercial damages. Staff members have outstanding professional and academic credentials, including active positions at the university level, wide experience at the highest levels of the public policy process and extensive consulting experience.

