Population Aging and State Taxes

Financial Modernization & Risk Analysis Study Committee
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Download at *github donboyd5*:   github.com/donboyd5/slides

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Outline

- Demographics and population aging
    - Population aging
    - Economic effects
    - Potential fiscal effects of population aging – income taxes, sales taxes, other issues
    - Potential impacts in case-study states
- Technology & autonomous vehicles – based on work of William Fox, University of Tennessee
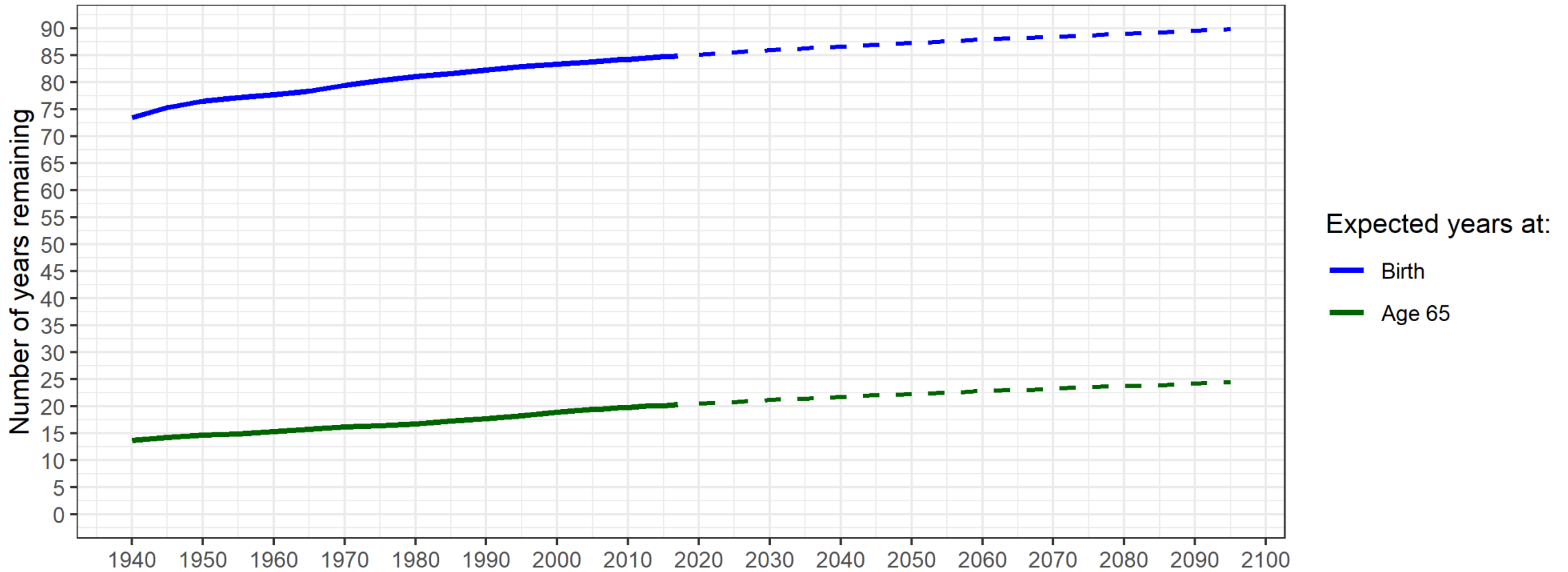- Conclusions and lessons

Population aging

Population aging

- Two main causes of population aging
    - Improved longevity
    - Low fertility

- Age groups
    - Elderly population will grow rapidly
    - Working-age population growth will slow
    - Younger, school-aged population will grow slowly.

- "Old-age dependency" ratio will rise

- Population aging will be more-rapid in 2020 to 2030 than in 2030 to 2040

- Great variation around the country

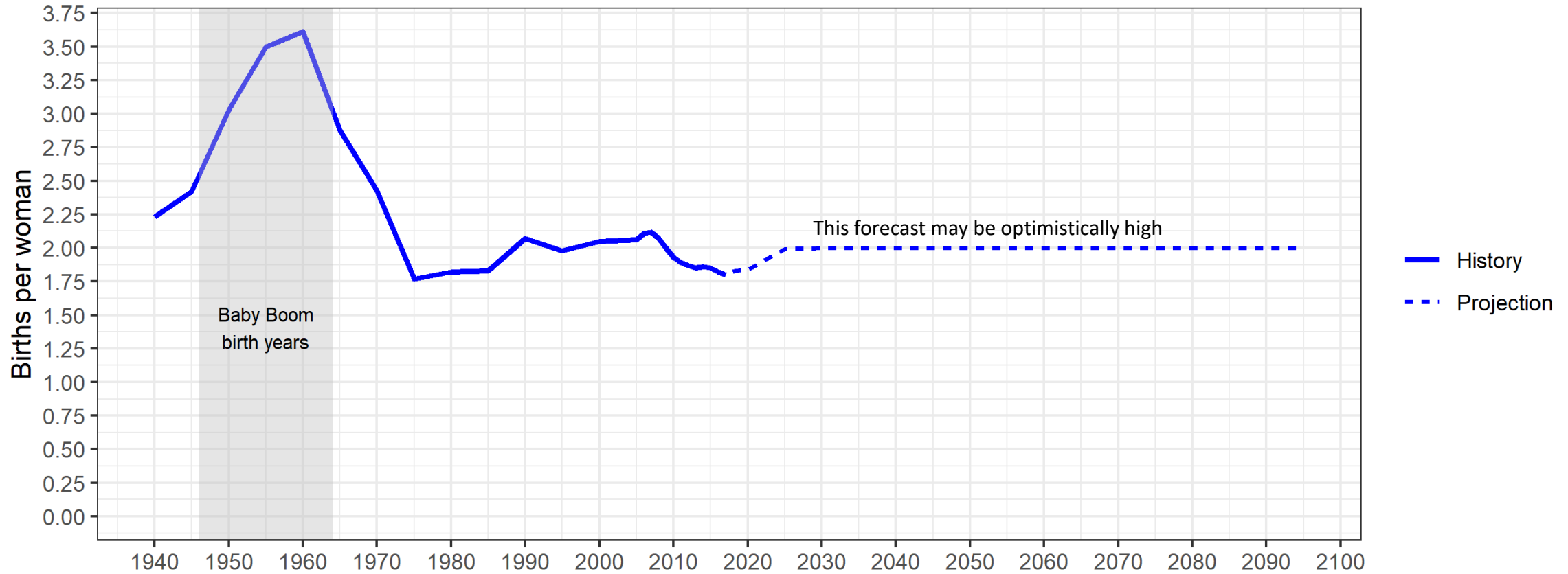# Life expectancy has been increasing and is projected to rise further

Life expectancy in the United States, Simple average of males and females

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Fertility rates rose dramatically during the baby boom but have fallen and stayed low
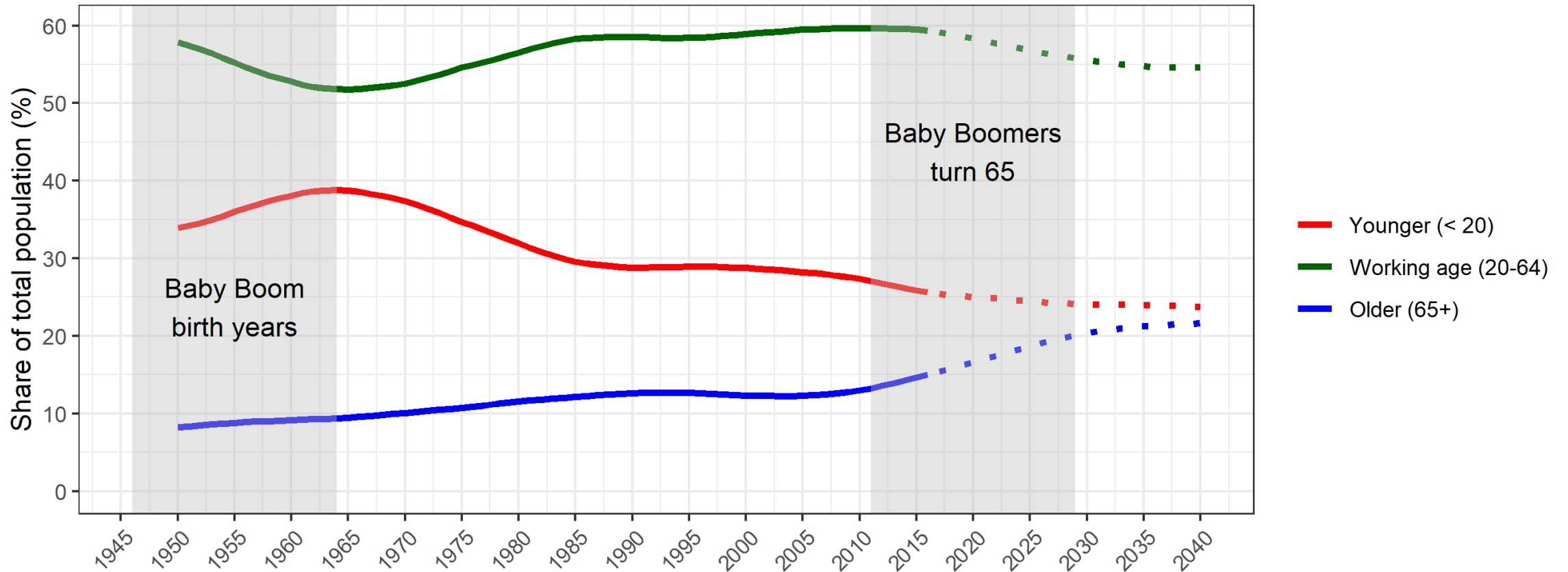
Total fertility rate for the United States

Source: The 2018 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds, Table V.A1 (https://www.ssa.gov/oact/tr/2018/tr2018.pdf)

Combined impact of longer lives and low fertility: Rapidly rising age 65+ share

Percentage of total U.S. population, by age group

Another perspective: Slower growth in total and working age population

U.S. Population growth rates by age group
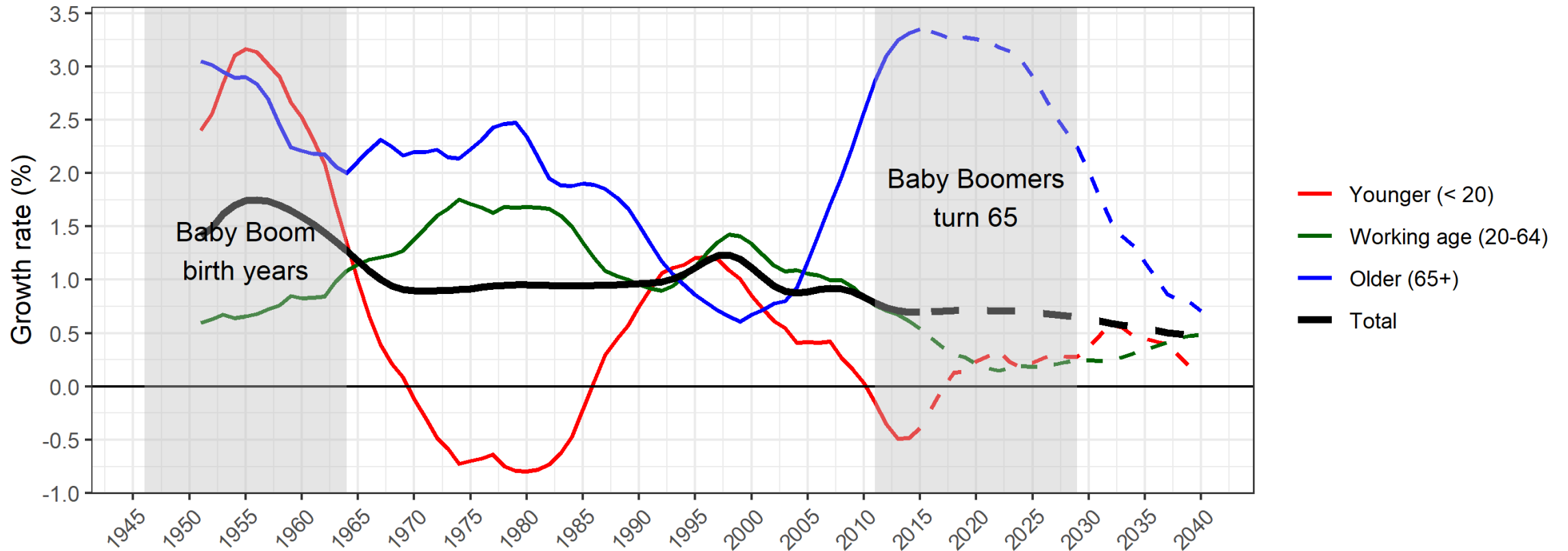

Source: Data underlying 2017 Revision of World Population Prospects, The United Nations, https://population.un.org/wpp/,
(https://population.un.org/wpp/DVD/Files/1_Indicators%20(Standard)/CSV_FILES/WPP2017_PopulationBySingleAgeSex.csv)
Notes: Growth rate is 3-year centered moving average to avoid focus on spurious movements.
Projections begin in 2016, marked by dashed lines.

Old-age dependency ratio will rise sharply (Older pop relative to working-age pop)

Old age dependency ratio: Older population per 100 working age population

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Economic effects

Effects on economic growth

- Economic growth often decomposed:

  Growth in workforce
  + Growth in productivity of workforce
  ―――――――――――――――――――――――――――――
  = Growth in potential productive output (e.g., GDP)

- Workforce
  - Working-age population growth will slow
  - Labor force participation:
    - Traditional working-age population - modest declines in participation
    - Older population - potential increased participation

- Productivity: some forecasters expect slower growth. No consensus.

- On balance, economic growth expected to slow & has been slowing

Potential fiscal effects

Population aging and state income taxes

- Income tends to be lower for people over age 50
- State and local income taxes fall even more sharply
- Composition changes:
  - Wages fall
  - Social Security, pensions, IRA withdrawals, interest and dividends rise
- State tax policies exacerbate these impacts
- Meanwhile, working-age population and wage growth likely to slow

States tax retirement income lightly

- Social Security
  - Federal government taxes up to 85%
  - 28 of 41 states w/broad-based PIT do not tax it at all (2014)
- Private pensions
  - 4 states exclude entirely
  - 23 exclude partially
- State & local pensions
  - 8 states exclude entirely
  - 26 exclude partially
- Federal civilian pensions
  - 11 states exclude entirely
  - 23 exclude partially
- Some states have special deductions and credits for older taxpayers
- Illinois, struggling to pay public pensions, exempts virtually all retirement income!

Income falls. Income taxes fall more sharply.

Total income and state and local income taxes in the United States
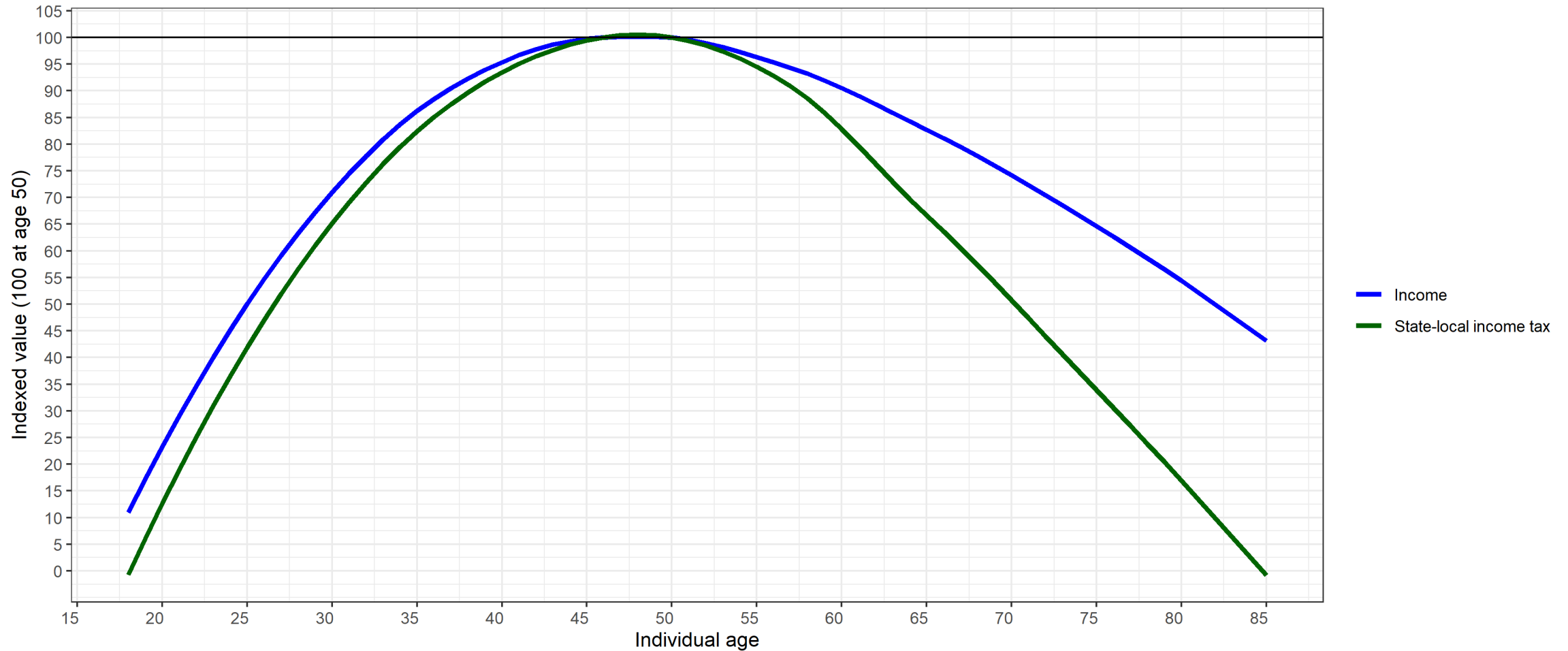
Indexed to age=50

Source: Author's analysis of Source: Annual Social and Economic (ASEC) supplement to the Current Population Survey, pooled 2017 and 2018. Values are weighted means by age, smoothed with local regression.

MT: Income falls. Income taxes fall more sharply.
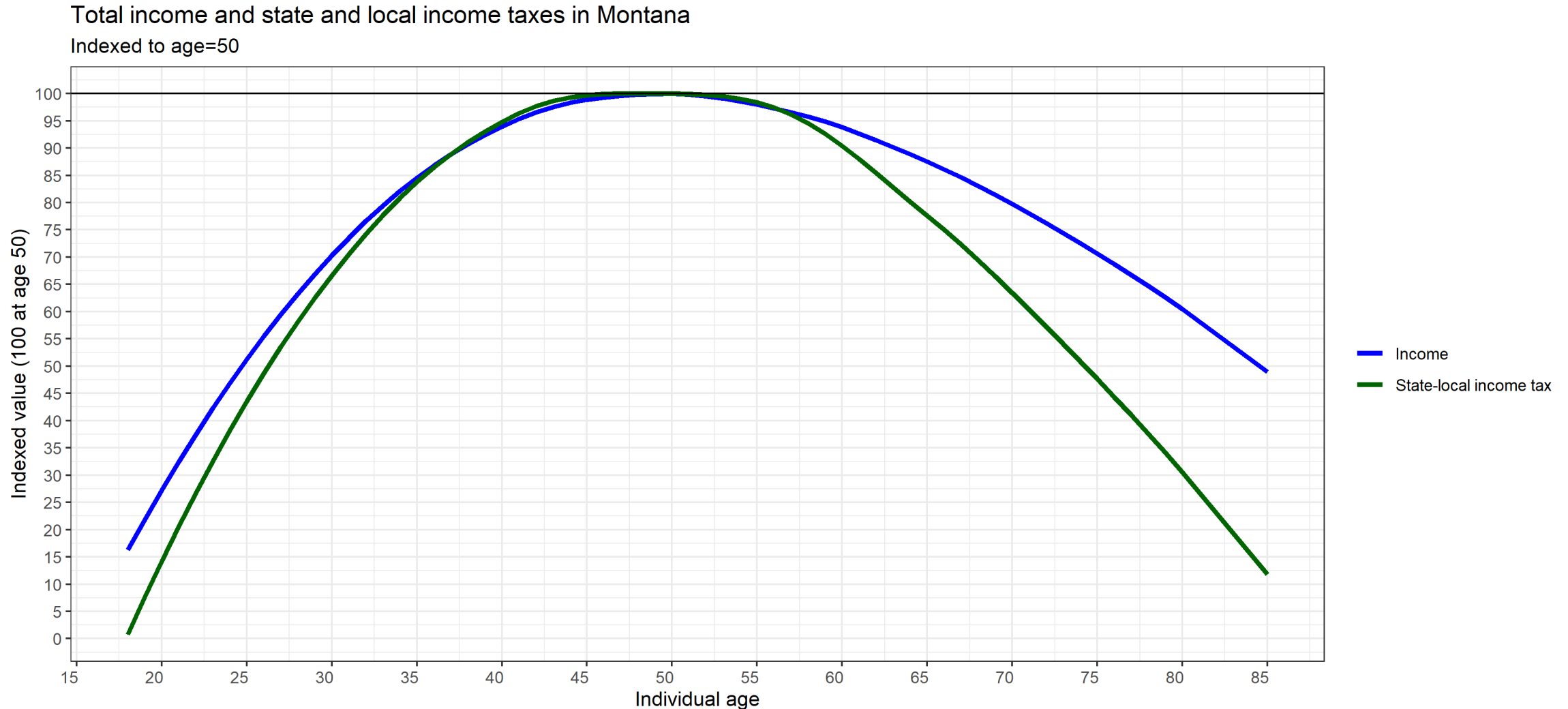
Total income and state and local income taxes in Montana

Indexed to age=50

Source: Author's analysis of Source: Annual Social and Economic (ASEC)
supplement to the Current Population Survey, pooled 2017 and 2018. Values are
weighted means by age, smoothed with local regression.

Retirement income growing rapidly

Retirement Income in Federal Adjusted Gross Income
Billions of dollars

| | 2009 | 2016 | % share of AGI in 2016 | Change from 2009 to 2016 | | Montana |
				Dollar change	Percent change	
Adjusted gross income	$ 7,801.0	$ 10,200.1	100.0%	$2,399.1	30.8%	31.7%
Salaries and wages	5,710.9	7,187.7	70.5%	1,476.8	25.9%	28.4%
Net capital gains less loss	224.1	618.9	6.1%	394.9	176.2%	90.5%
Taxable pensions	516.5	695.1	6.8%	178.6	34.6%	43.0%
Taxable Social Security	171.3	285.0	2.8%	113.7	66.4%	82.8%
Taxable IRA distributions	133.9	255.0	2.5%	121.2	90.5%	96.8%
Retirement income	821.7	1,235.2	12.1%	413.5	50.3%	60.0%
All other non-retirement income	1,044.4	1,158.3	11.4%	113.8	10.9%	7.0%

Source: IRS Statistics of Income, Historical Table 2

Population aging and state sales taxes

- Expenditures on goods & services is lower among older households than slightly-younger cohorts

- Expenditure falloff not as sharp as income falloff. Consistent with some household smoothing of consumption over lifetimes

- Research suggests households do cut expenditures as they age. (It is not just that *current* older cohort has different preferences from *current* younger cohort.)

- Sales taxes tend to tax necessities lightly, but sales tax preferences that explicitly target the elderly are rare

Spending falls among older households, but not as sharply as income falls

Income and expenditures by age of householder

Consumer Expenditure Survey, 2017
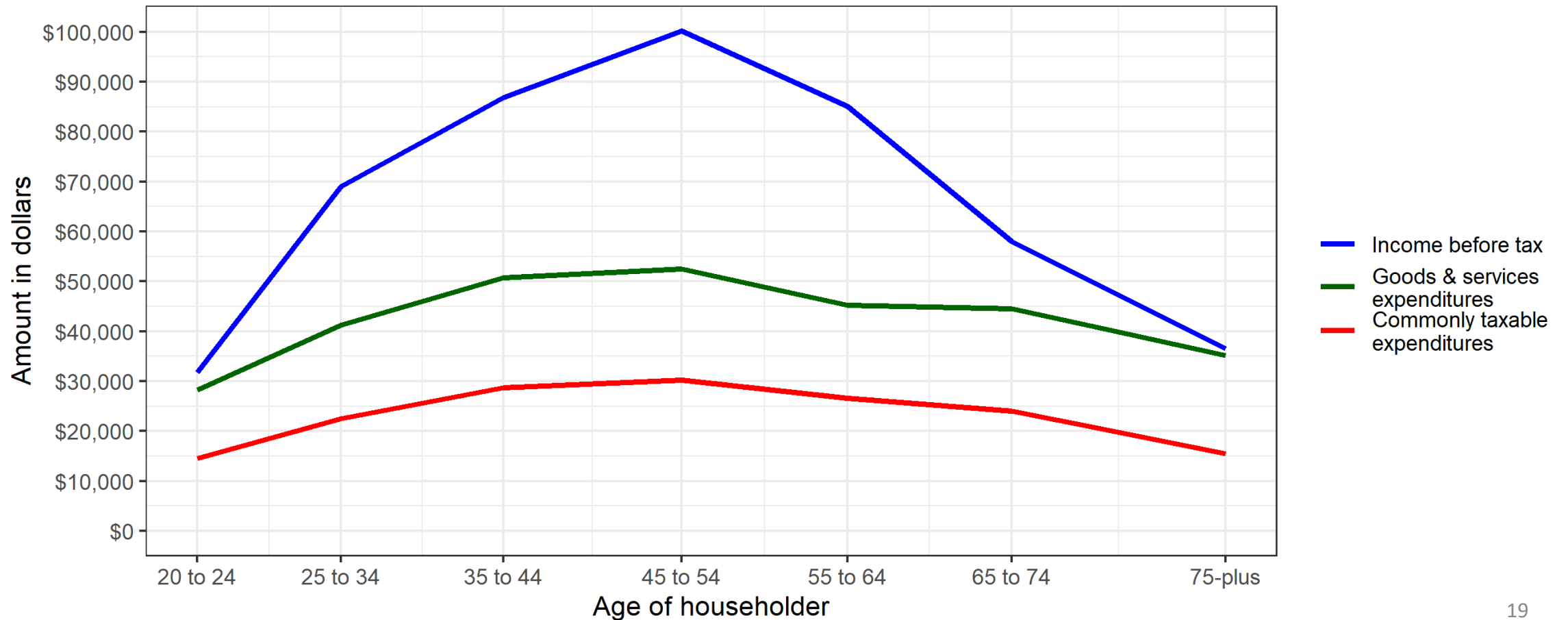
Population aging – other issues

- Other taxes – not much research. Local property taxes could be affected:
    - Home values tend to be lower among household heads older than 50, and property taxes are lower still.
    - Many property tax preferences for older households. Special property tax provisions also can benefit the elderly.
    - Could cause some pressure on state finances.
- Medicaid costs far higher for older households, likely to grow as the population ages.
- Slow growth in school-age population could provide fiscal savings.
- Population aging *could* be a risk to state and local pensions
- Voting behavior and the "gray peril" – will older voters support taxes for services that do not benefit them directly?

Home values are lower among older households, property taxes lower still

Home values and property taxes in the United States, indexed to age=50
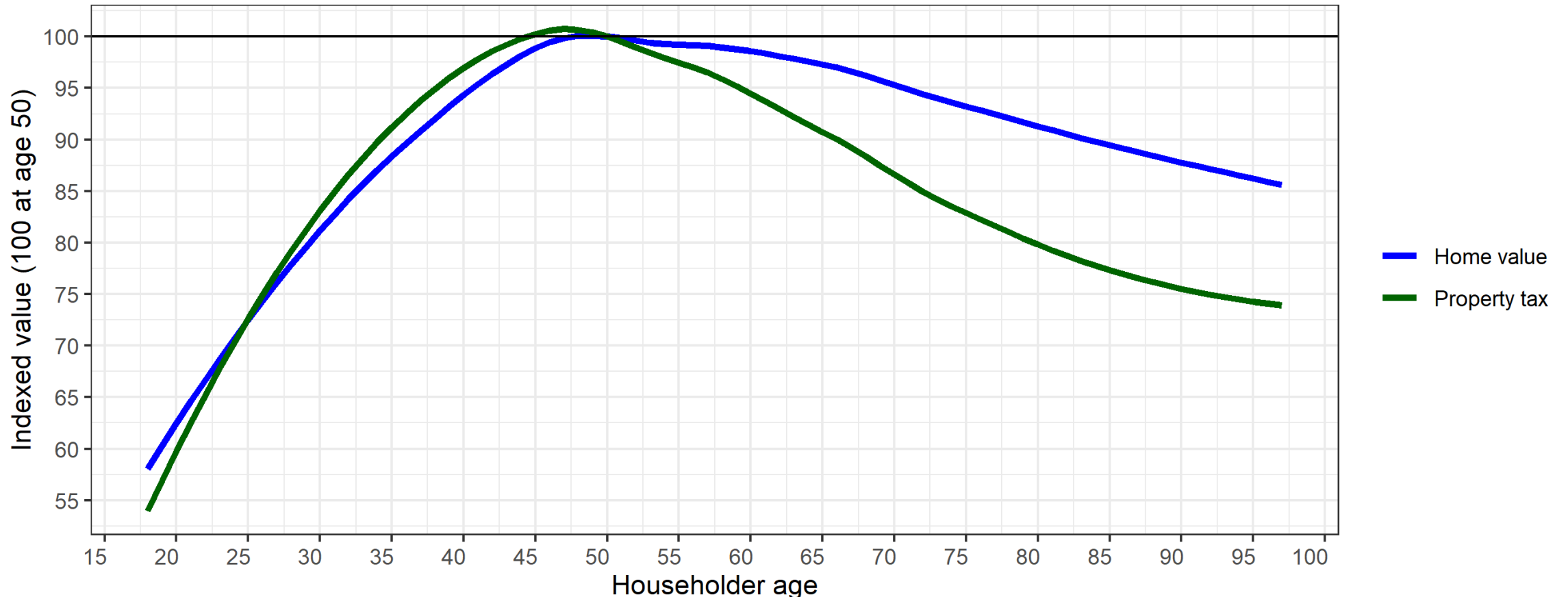
Source: Author's analysis of American Community Survey PUMS data, 2013-2017
Values are weighted means by age, smoothed with local regression

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Voting behavior: The gray peril?

Will older voters support taxes for services that do not benefit them directly? Research suggests this is a nuanced issue.

- Research has taken the form of:
  - Statistical analyses of older vs. younger communities
  - Statistical analyses of voter referenda
  - Opinion surveys

- The issue appears to be real, but:
  - Not generally large, not the same everywhere
  - Appears to vary between longstanding residents and newcomers
    - Longstanding older residents may be a source of support
    - Older newcomers may not be
  - Tax policies such as state-financed property tax relief may offset the effect

Quantifying impacts with illustrations from case-study states

General approach (see appendix)

- State population projections – Weldon Cooper Center, UVA

- Income tax
  - How much lower would state income tax be with expected 2040 age-distribution than with 2020 distribution, all else equal including pop. size?
  - How fast would income tax grow between 2020 and 2040?

- Sales tax
  - How much lower would state sales tax be with 2040 age-distribution than with 2020 distribution, all else equal including pop. size?
  - How fast would the sales tax grow?

- How large are combined income and sales tax impacts relative to own-source revenue?

Great variation across states

Projected percent of population age 65 or older in 2020, and change to 2040

Horizontal and vertical lines show United States average
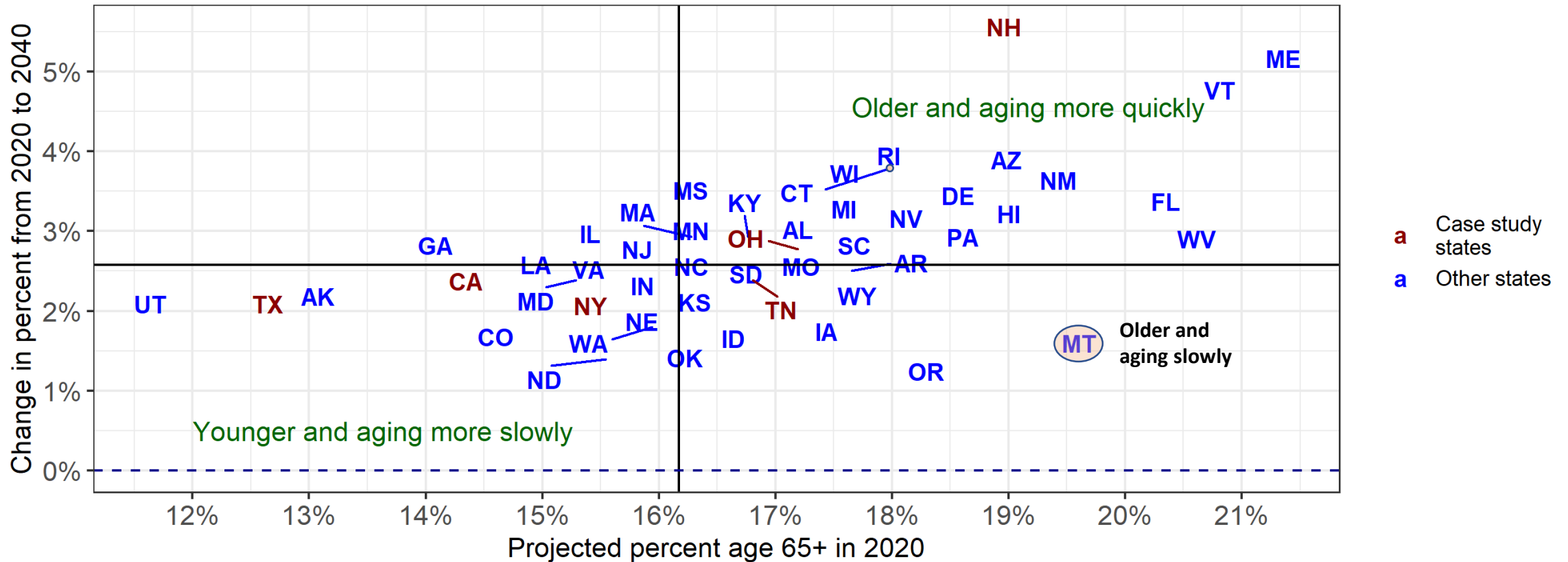
Source: Author's analysis of projections from University of Virginia, Weldon Cooper Center
for Public Service, Updated December 2018, www.coopercenter.org/demographics

Projected population growth rates by age group, 2020 to 2040

	Younger (< 20)	Working age (20-64)	Older (65+)	Older minus Working age
United States	13.3	9.4	32.3	22.9
California	15.8	9.6	35.3	25.7
New Hampshire	1.7	(6.2)	33.2	39.4
New York	5.1	0.2	18.0	17.7
Ohio	(0.5)	(4.1)	16.6	20.7
Tennessee	12.5	10.0	30.2	20.2
Texas	33.3	31.2	57.7	26.5
Montana	**11.8**	**13.2**	**24.4**	**11.2**

Note the outright declines in working-age population in NH and OH.

Source: Author's analysis of projections from University of Virginia, Weldon Cooper Center for Public Service, Updated December 2018, www.coopercenter.org/demographics

Old age dependency ratio

	2010	2020	2030	2040	Change from 2020 to 2040
United States	21.7	27.9	34.1	33.7	5.8
California	18.8	24.1	29.6	29.7	5.7
New Hampshire	21.9	32.2	45.5	45.8	13.6
New York	22.1	26.0	31.2	30.6	4.6
Ohio	23.7	29.9	36.9	36.3	6.4
Tennessee	22.4	29.0	34.5	34.4	5.3
Texas	17.4	22.0	26.3	26.5	4.5
Montana	**24.8**	**35.0**	**42.7**	**38.5**	**3.5**

Source: Author's analysis of projections from University of Virginia, Weldon Cooper Center for Public Service, Updated December 2018, www.coopercenter.org/demographics

Widely varying revenue structures

State government revenue sources as a percentage of own-source revenue, 2016

	Own-source revenue total	Total non-tax own-source revenue	Total tax revenue	Selected tax revenue components				
				Individual income tax	General sales tax	Selective sales taxes	Property tax	Other tax revenue
United States	100.0	27.5	72.5	27.0	22.9	11.8	1.3	9.6
California	100.0	17.7	82.3	42.8	20.8	7.5	1.3	9.9
New Hampshire	100.0	39.8	60.2	2.0	-	22.4	9.3	26.5
New York	100.0	24.4	75.6	43.2	12.6	10.5	-	9.3
Ohio	100.0	33.6	66.4	18.9	28.3	13.9	-	5.3
Tennessee	100.0	24.6	75.4	1.8	39.5	15.2	-	18.9
Texas	100.0	34.0	66.0	-	40.6	18.0	-	7.3

Source: Census Bureau Annual Survey of State and Local Government Finances, 2016

Example: PIT results for Ohio

Population and income tax changes for Ohio

Amounts are in 2017 dollars

Population group	Per-capita income tax in 2020	% change, 2020 to 2040		
		Population	Per-capita income tax	Total income tax
< 65 years old	44% diff { $ 852	(3.0)	(1.1)	(4.0)
Age 65+	473	16.6	(10.5)	4.4
Total	$ 787	0.4	(3.5)	(3.1)

Source: Author's analysis of (1) data from the Annual Social and Economic (ASEC) supplement to the Current Population Survey, pooled 2017 and 2018, and (2) projections from the Weldon Cooper Center for Public Service, University of Virginia, Updated December 2018, ww.coopercenter.org/demographics

Example: Sales results for Ohio

Household and taxable sales changes for Ohio

Amounts are in 2017 dollars

Age group	Per-household taxable sales in 2020		% change, 2020 to 2040		
			# of Households	Per-household taxable sales	Total taxable sales
< 65 years old	20% drop	$ 23,026	(5.2)	0.2	(5.1)
Age 65+		18,459	19.7	(5.1)	13.6
Total		$ 21,717	1.9	(2.4)	(0.5)

Income tax summary

Percentage change from 2020 to 2040 in projected population, per-capita income tax, and total income tax, 2017 dollars

	Percentage changes		
	Population	Per-capita income tax	Total income tax
California	14.9%	-3.2%	11.2%
New Hampshire	3.0%	-2.2%	0.8%
New York	4.2%	-2.9%	1.2%
Ohio	0.4%	-3.5%	-3.1%
Tennessee	14.0%	n/a	n/a
Texas	35.2%	n/a	n/a

Source: Author's analysis of (1) data from the Annual Social and Economic (ASEC) supplement to the Current Population Survey, pooled 2017 and 2018, and (2) projections from the Weldon Cooper Center for Public Service, University of Virginia, Updated December 2018, www.coopercenter.org/demographics.

Sales tax summary

Percentage change from 2020 to 2040 in projected # households, per-household taxable sales, and total taxable sales, 2017 dollars

	Percentage changes		
	# of Households	Per-household taxable sales	Total taxable sales
California	19.6%	-2.1%	17.1%
New Hampshire	4.1%	n/a	n/a
New York	7.4%	-1.7%	5.6%
Ohio	1.9%	-2.4%	-0.5%
Tennessee	14.9%	-1.9%	12.7%
Texas	38.4%	-1.6%	36.2%

Source: Author's analysis of Consumer Expenditure Survey data on purchases, Weldon Cooper population projections (Updated December 2018), and state tax laws.

Income and sales tax per-capita effects vs own-source revenue

Summary of potential revenue impact, per capita

	Percentage change in per-capita tax due to moving from 2020 to 2040 age composition		Combined income and sales tax impact as % of own-source revenue
	Personal income tax	General sales tax	
California	-3.2%	-2.1%	-1.8%
New Hampshire	-2.2%	n/a	0.0%
New York	-2.9%	-1.7%	-1.4%
Ohio	-3.5%	-2.4%	-1.3%
Tennessee	n/a	-1.9%	-0.7%
Texas	n/a	-1.6%	-0.7%

Source: Author's analysis of multiple data sources. See text for details.

Aging fiscal impacts - conclusions

- Negative impacts on major state tax revenue sources:
  - Income and sales taxes both lower than otherwise would be
  - Income tax impact larger than sales tax impact
  - States with slow-growing or declining populations could face outright declines in tax revenue (e.g., Ohio).
- But changes seem small compared to sharp-sudden recessionary changes
  - E.g., CA single-year recessionary income tax decline in 2009 was 20.4%; OH was 15.5%; sales tax declines more modest but still significant
  - Aging-driven declines of 3 to 3.5% over 20 years seem small in comparison
- Still, aging-related weakness comes on top of other state challenges, and states should monitor and plan
- Aging-related spending pressures (e.g., Medicaid, services for elderly), and potential relief in the case of K-12 education, could be as large or larger than tax impacts, and merit monitoring and planning as well.

Autonomous Vehicles

William Fox of UTN examined potential impacts of autonomous vehicles

- In a project for Pew Charitable Trusts:
  - I looked at population aging
  - Bill looked at autonomous vehicles *as an example of how to think about technological change more generally*.
  - Unlike demographics, where it is possible to make reasonable forecasts, technology development and adoption is far less certain, and alternative scenarios are crucial.
- We examined the same case-study states
- Slides that follow are based on his work, with permission. For additional details, please contact Bill.

Autonomous vehicles – key questions

- What technology will be used in AVs?

- How rapidly will they be adopted?

- How many are necessary to replace internal combustion engines?

- How will vehicle miles traveled (VMT) be affected?

Analysis assumes AVs will convert the U.S. to a regime of electric, shared fleet-owned vehicles

- Beginning in the 2020s

- Over a period of 3-4 decades

Potentially affected employment

- Vehicle manufacturing
  - E.g., vehicle assembly, parts manufacturing
  - Currently 0.7% of U.S. employment
  - Shared fleet-owned AVs will require fewer vehicles, but VMT may rise
  - More electric; more software relative to hardware than traditional vehicles
  - Likely to lower manufacturing employment & alter its location

- Vehicle support
  - E.g., repair, sales, financing, insurance, …
  - Nearly 4% of U.S. employment

- Motor-vehicle-using occupations
  - E.g., MV operators such as truck drivers, taxi, first responders, delivery drivers
  - 11.5% of U.S. employment
  - Tasks needed will change; some changes could increase employment, some could lower employment

Vehicle-related transportation employment is 1/6th of U.S. total

Table 1: Vehicle Related Transportation Employment, U.S.		
	U.S. Employment	Share
Total Employment	143,859,855	100.00%
Vehicle Manufacturing	1,023,674	0.71%
Vehicle Support	5,425,489	3.77%
Motor Vehicle Operators & Other On-the-Job Drivers	16,571,180	11.52%
Total, Vehicle-Related	23,020,343	16.00%

Sources: Quarterly Census of Employment and Wages, Occupational Employment Statistics, U.S. Bureau of Labor Statistics

Linkages to tax revenue

- Taxes *directly* imposed on transportation, such as taxes on:
    - Motor fuel
    - Road use
    - Vehicle purchase, registration, or ownership
    - Drivers
    - Vehicle support services
- Taxes *indirectly* linked with transportation-related industries, such as income, sales, and corporate taxes associated with earnings and production in vehicle-related industries & occupations (not estimated in the analysis)

Simulated potential impacts in 6 states, under alternative scenarios

- Most direct transportation taxes are inelastic relative to economy even before considering tech changes, and shrinking as a share in baseline

- Direct taxes generally will be reduced vs. baseline because many transport taxes are designed around internal consumption and personal ownership.

- Impacts vary depending on AV scenario and state tax structures. Fuel tax revenue erodes more than vehicle-based tax revenue.

- "Aggressive" scenario (electric vehicles fully replace internal combustion, & only half as many are needed): simulated reductions in total revenue by 2040 of 2% vs. baseline (NY) to 9% (TX).

- Reductions were ~60-75% of transportation revenue – important given dedicated funding.

Potential reform options

- Expanding sales taxes to all forms of mobility (include in general sales tax or tax at a selected rate)

- Levying VMT taxes

- Imposing congestion charges

- Combinations of options and the current tax system

Conclusions and lessons

Conclusions and lessons

- Population aging and AV adoption likely will reduce state & local tax revenue, and may create spending pressures
  - Impacts likely non-trivial but not as large as sudden impacts of recessions
  - Demographic impacts easier to predict than technological shifts
  - Scenario analysis & monitoring especially important for technological shifts
  - Effects will roll out over time, allowing some time for planning and adjusting
- Tax structures NOT well-designed to adapt to these changes. Policy changes will be needed if avoiding revenue loss is important.
- Opposition to reforms may have built-in growth – as time or tech adoption advances, relatively more older voters, relatively more businesses engaged in AVs
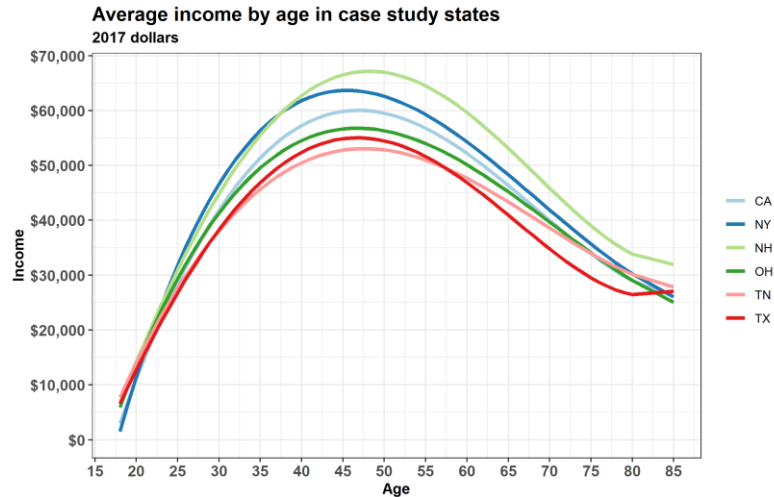
Appendix

State population projections

- Census Bureau last released state projections by age group in 2005. Private forecasts (e.g., Moody's), if available, are expensive.

- I used December 2018 50-state population projections, by age group, from the Weldon Cooper Center, University of Virginia. They are widely used.

- Methodology is the Hamilton-Perry approach. Low data demands. Does not consider migration explicitly. Tends to do quite well in 10-year forecasts.

- States' own forecasters tend to use the cohort-component method – more detailed, greater data demands, considers migration explicitly. (OTOH, very hard to predict migration patterns, and states' current projections may not be keeping up with policy changes….)

- I have now acquired states' own projections for all 6 case-study states. They appear to show somewhat faster aging, primarily in CA, NY, NH. I should be able to update numbers to reflect these forecasts. I don't think they will have a meaningful impact on conclusions.

Income tax methodology

- Estimate average state income tax by age group, CPS (2017-2018)
- Using these averages, calculate total income tax by age group and in total, using 2020 expectations and 2040 projections of age distribution.
- Calculate % change in tax revenue due solely to the change in age distribution, keeping the total population fixed.
- This is based upon the methodology in Felix, Alison, and Kate Watkins. "The Impact of an Aging U.S. Population on State Tax Revenues," 2013, 34.
- Also compute % change in income tax from 2020 to 2040, taking into account the projected change in population, but not changes in prices (i.e., growth is in real dollars).

Income tax – underlying data

Average income by age in case study states
2017 dollars

Income (y-axis): $0, $10,000, $20,000, $30,000, $40,000, $50,000, $60,000, $70,000
Age (x-axis): 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85

Legend: CA, NY, NH, OH, TN, TX

Source: Annual Social and Economic (ASEC) supplement to the Current Population Survey, pooled 2017 and 2018
Smoothed values estimated as a 4th degree polynomial of age

Average state income tax by age in case study states
2017 dollars

State income tax (y-axis): $0, $200, $400, $600, $800, $1,000, $1,200, $1,400, $1,600, $1,800, $2,000, $2,200, $2,400, $2,600, $2,800, $3,000, $3,200, $3,400, $3,600
Age (x-axis): 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85

Legend: CA, NY, NH, OH, TN, TX
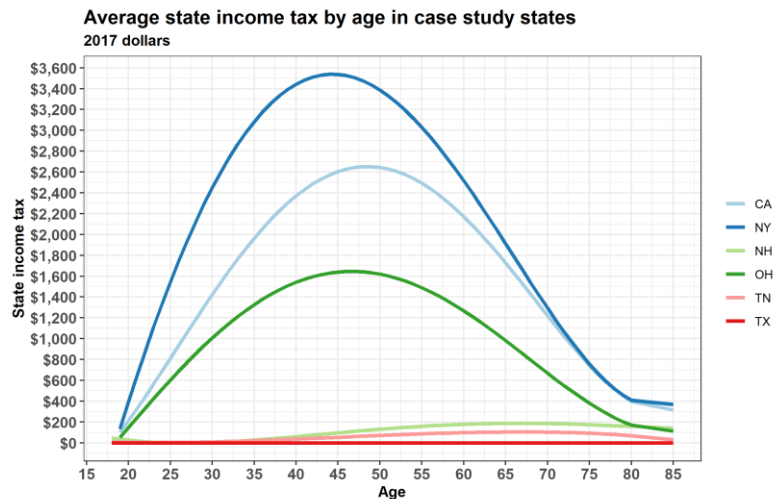
Source: Annual Social and Economic (ASEC) supplement to the Current Population Survey, pooled 2017 and 2018
Smoothed values estimated as a 4th degree polynomial of age

- These graphs show the key source data in the income tax analysis, for 2017. Top panel is income by age, bottom panel is income tax.

- Income taxes are large and fall off significantly with age in NY, CA, and OH. They are trivial in NH, TN, TX . (In TN the tax is being phased out.)

- The methodology combines these data with projected population changes.

Example: PIT results for California

Population and income tax changes for California

Amounts are in 2017 dollars

Population group	Per-capita income tax in 2020	% change, 2020 to 2040		
		Population	Per-capita income tax	Total income tax
< 65 years old	$ 1,381	11.5	(1.4)	10.0
Age 65+	1,172	35.3	(11.4)	19.9
Total	$ 1,351	14.9	(3.2)	11.2

15% diff

Source: Author's analysis of (1) data from the Annual Social and Economic (ASEC) supplement to the Current Population Survey, pooled 2017 and 2018, and (2) projections from the Weldon Cooper Center for Public Service, University of Virginia, Updated December 2018, ww.coopercenter.org/demographics

Example: Sales results for Texas

Household and taxable sales changes for Texas

Amounts are in 2017 dollars

| Age group | Per-household taxable sales in 2020 | % change, 2020 to 2040 | | |
		# of Households	Per-household taxable sales	Total taxable sales
< 65 years old	$ 22,724	32.1	(0.1)	32.0
Age 65+	18,595	60.2	(4.0)	53.8
Total	$ 21,799	38.4	(1.6)	36.2

18% drop

Source: Author's analysis of (1) data from the Annual Social and Economic (ASEC) supplement to the Current Population Survey, pooled 2017 and 2018, and (2) projections from the Weldon Cooper Center for Public Service, University of Virginia (Updated 2018), www.coopercenter.org/demographics

Sales tax methodology

- Estimate average state-taxable sales by household-head age groups (CEX 2017) using state-specific estimates of which items are taxed and which are not (multiple sources, including Federation of Tax Administrators 2017 Sales Taxation of Services and analysis by the Tax Foundation).

- Using these averages, calculate taxable sales by age group and in total, using 2020 expectations and 2040 projections of age distribution, after adjusting for the fact that the CEX age groups are by age of household head, and population projections are by age of person.

- Calculate % change in taxable sales due solely to the change in age distribution, keeping the total # of households fixed. ASSUME that the full sales tax is affected in this way (in other words, sales tax on business purchases is passed through to consumers).

- This also is based upon the methodology in Felix & Watkins (2013).

- Also compute % change in taxable sales from 2020 to 2040, taking into account the projected change in population and households, but not changes in prices (i.e., growth is in real dollars).