

Thinking About Retirement

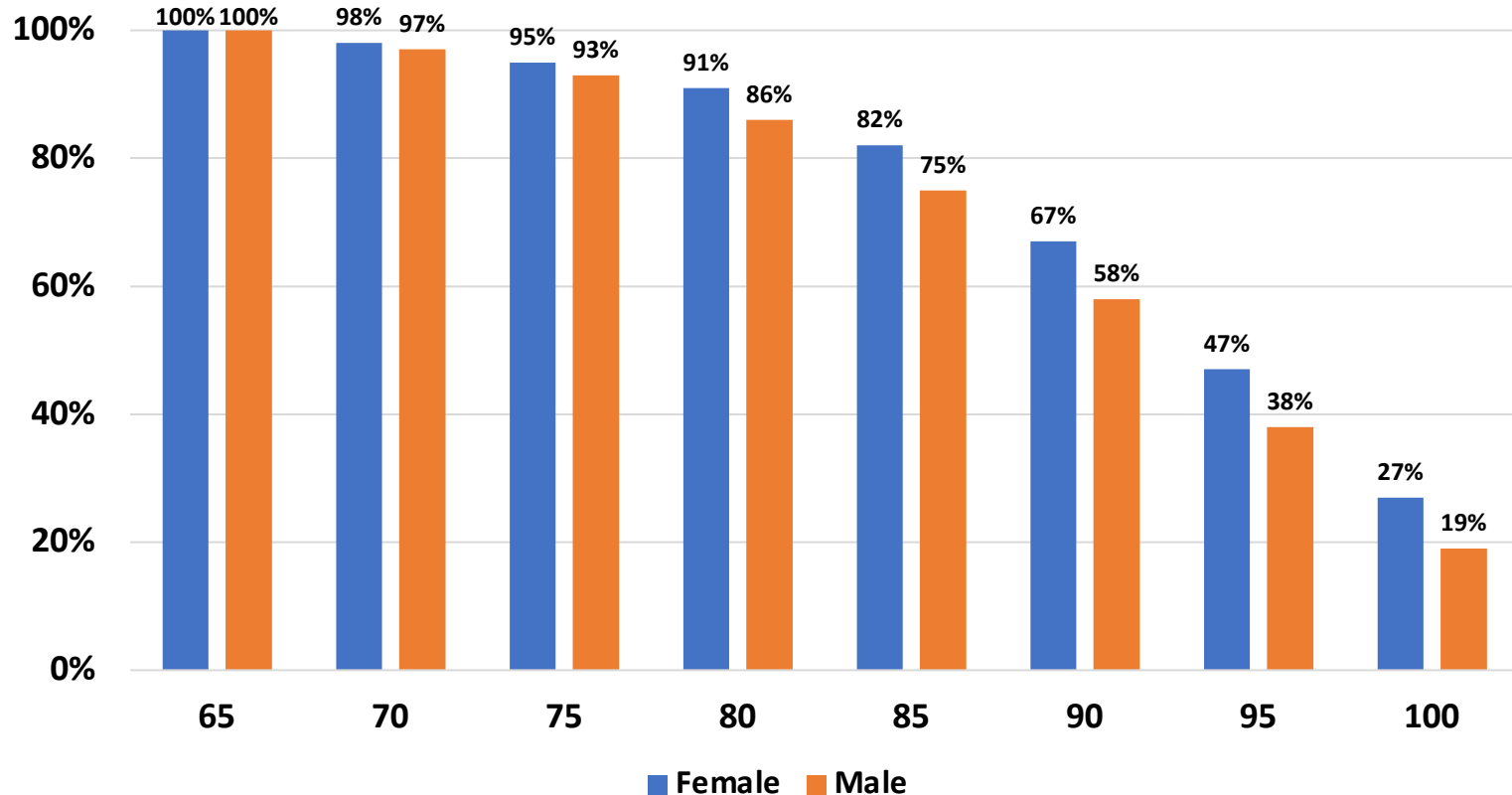
- Some typical saving recommendations
 - Kobliner: 15% of your income
 - Warren: 20% of your income
- Why are retirement savings needs so high?
 - Retirement is far in the future
 - But it will likely last for a long time
 - And cost more than you think
- Some key mistakes to avoid
 - Retiring too early
 - Saving too little and too late
 - Investing inefficiently

How Long Will You Be Retired?

- Life expectancy in US is about 80 years
- But this number has limited use for retirement planning
 - Life expectancy is only a median number
 - And it includes other generations & people who die young
 - Result, your retirement horizon exceeds 15 years if you retire at 65
 - And you risk running out of money if you live longer than expected
- Real issue is your potential longevity once you reach retirement age

Your Survivorship Probabilities

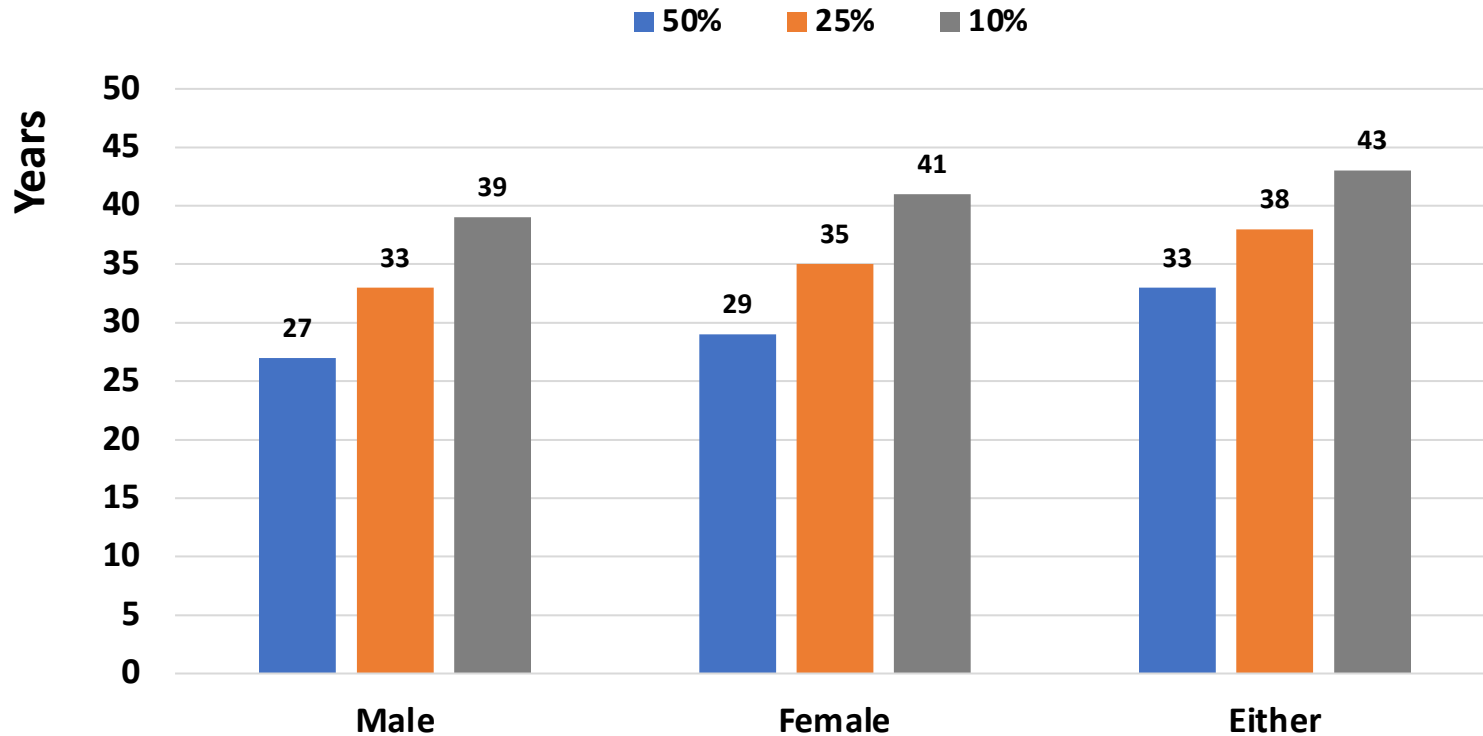
Assumptions: Born 1/1/00, nonsmoker, retire at age 65 with excellent health



*Source: Actuaries Longevity Illustrator, Web tool provided by
Academy of Actuaries and Society of Actuaries and used on Feb 2022*

Implied Retirement Planning Horizon

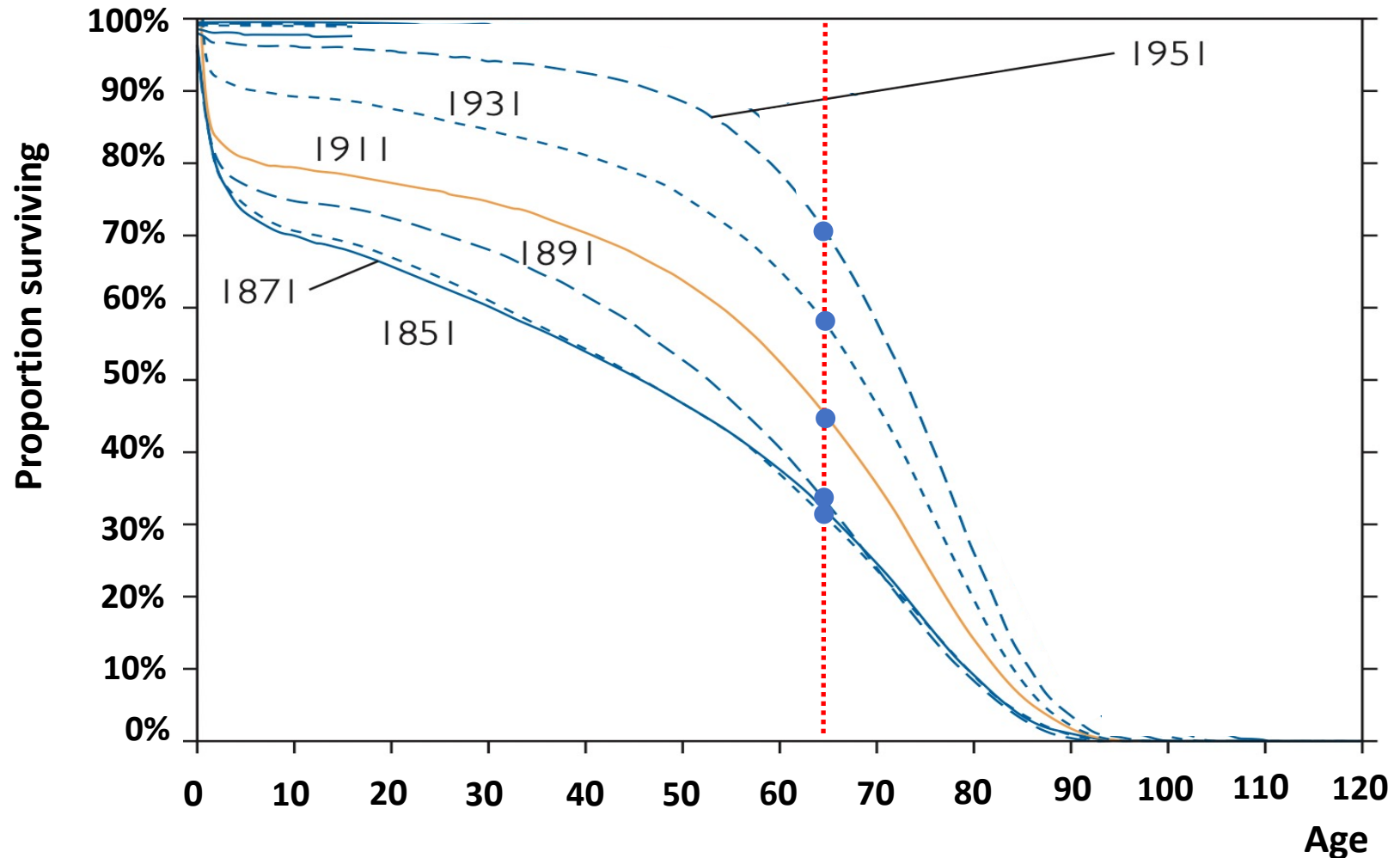
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Projected Survivorship for England and Wales

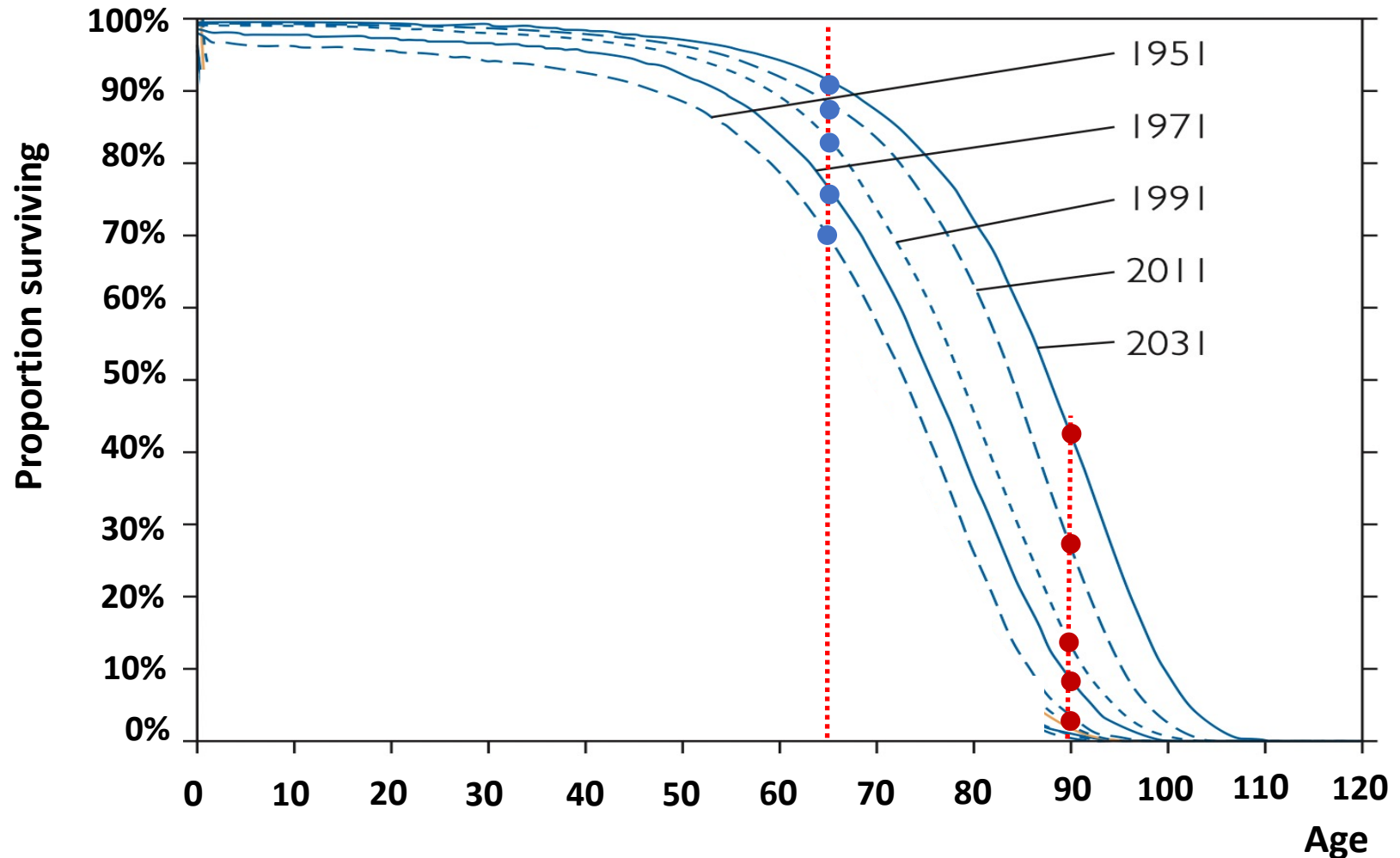
By birth year



Source: UK Office of National Statistics, Mayo Clinic (January 2019)

Projected Survivorship for England and Wales

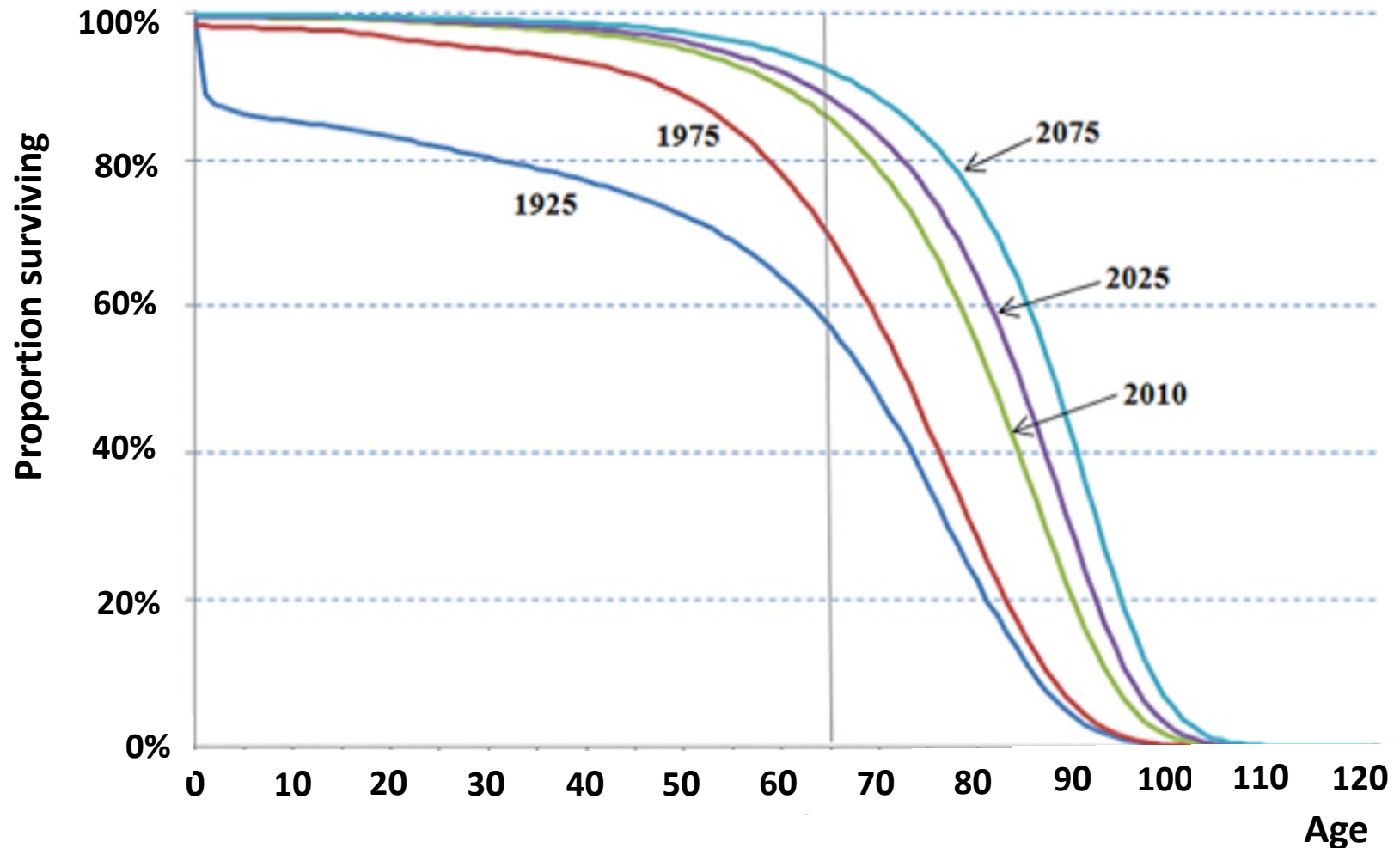
By birth year



Source: UK Office of National Statistics, Mayo Clinic (2019)

Projected Survivorship for Canada

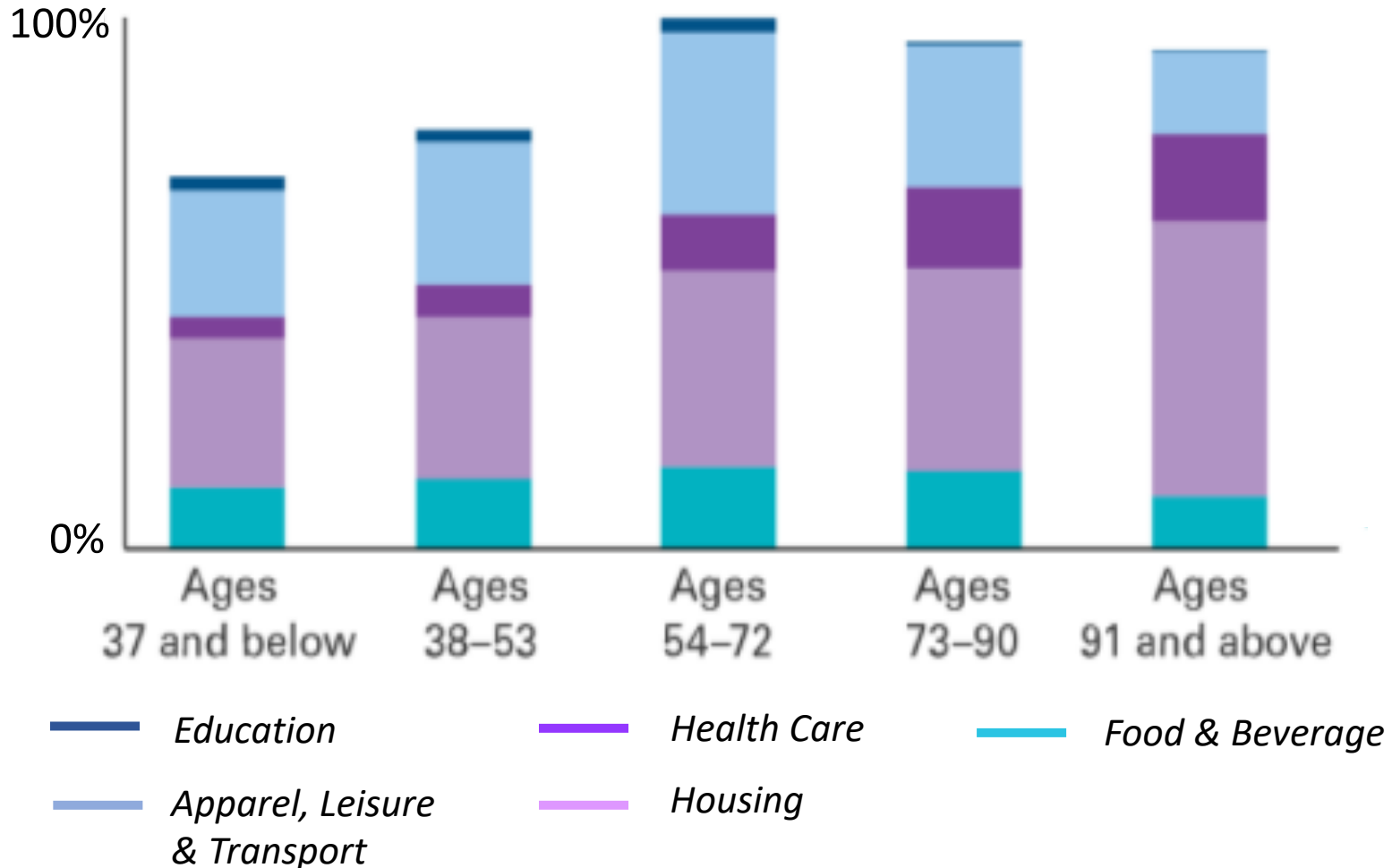
By birth year



Source: *Maturity Projections for Social Security Programs in Canada*, & Brookings Institution (2014)

How Much Will You Spend in Retirement?

Spending by Age Cohort (as a % of peak consumption)



Source, Vanguard: "Growing older doesn't mean spending less." 6/24/19

Median Annual Costs for Long-Term Care

	2021 Cost
• Adult Day Care:	\$20,280
• Assisted Living:	\$54,000
• Homemaker Services:	\$59,488
• Home Health Aide:	\$61,776
• Nursing Home (semi-private)	\$94,900
• Nursing Home (private)	\$108,405

These costs will more than quadruple when you retire if they grow at 4%/year.

And trust me, memory care is much more expensive

Source, Genworth Cost of Care Survey (June 2021), Genworth Financial Inc.

Median Annual Costs for Long-Term Care

	2021 Cost	Expected 2065 Cost
• Adult Day Care:	\$20,280	\$74,457
• Assisted Living:	\$54,000	\$198,258
• Homemaker Services:	\$59,488	\$218,407
• Home Health Aide:	\$61,776	\$226,808
• Nursing Home (semi-private)	\$94,900	\$348,421
• Nursing Home (private)	\$108,405	\$398,004

These costs will more than quadruple when you retire if they grow at 4%/year.

And trust me, memory care is much more expensive

Source, Genworth Cost of Care Survey (June 2021), Genworth Financial Inc.

Key Retirement Assets

- Social Security
- Retirement savings
 - Corporate defined contribution plans
 - Other retirement saving
- Physical assets (house)
 - Challenges (TBD)
- What about defined benefit pensions?
 - Still exist in the public sector
 - But have largely disappeared in the private sector
 - 1981: 84% of employees at large corporations
 - 2020: 21% of employees at large corporations

I - Social Security

- A lifetime, inflation-protected annuity
- Potential beneficiaries
 - You
 - Spouses
 - 50% if you are alive
 - 100% if they survive you
 - Note 1: Can choose between their earned benefit & spousal benefit
 - Note 2: divorced spouses qualify if
 - You were married for at least 10 years
 - And they have not remarried
- But income replacement rates will be small
 - If you claim too early (try to wait until age 70)
 - Have a high income
 - Or if budget pressures result in trust fund being used up

Impact Of Claim Age On Social Security Benefit

For a hypothetical beneficiary born in 1960

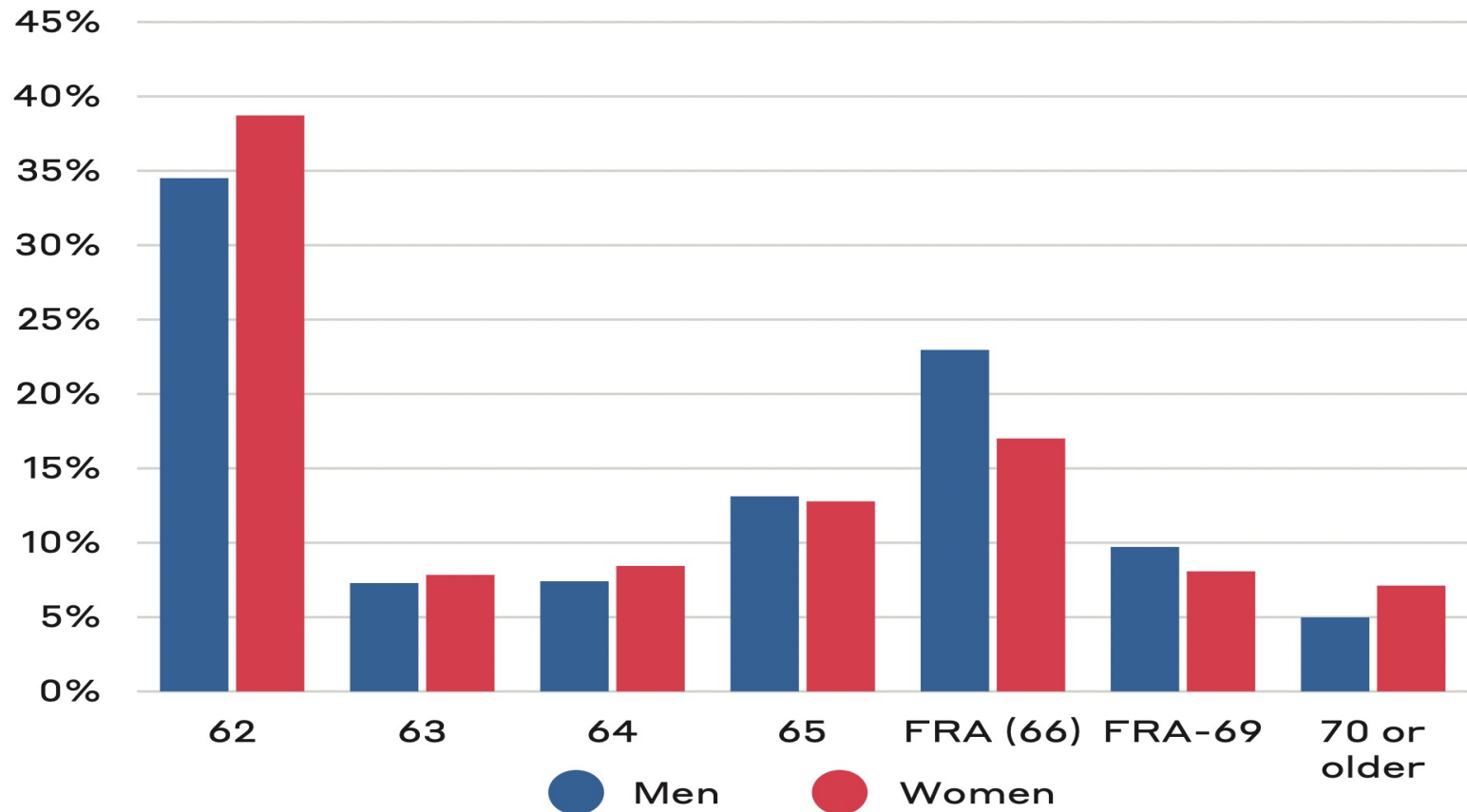
Age Person Claims Benefit	Monthly Payment
62	\$1,630
63	\$1,773
64	\$1,932
65	\$2,127
66	\$2,327
67*	\$2,529
68	\$2,770
69	\$3,000
70	\$3,221

Source: Social Security Website

* Replacement ratio calculation assumes person claims benefit at this age, their “full retirement age”

Share of Social Security Claims, By Age

Based on 2018 Data



Source: Bipartisan Policy Organization, "How to Help Americans Claim at the Right Age," August, 2020

Reported Social Security Replacement Ratios

Assumptions: You are born in 2000 and do not claim benefits until you are full career (currently age 67 for you).

Current Law Scheduled Benefits		
Earnings Category		Reported Replacement Ratio
Very Low	(\$13,384)	76.4%
Low	(\$24,941)	55.5%
Medium	(\$55,364)	41.2%
High	(\$88,582)	34.1%
Max Earnings	(\$136,710)	27.2%

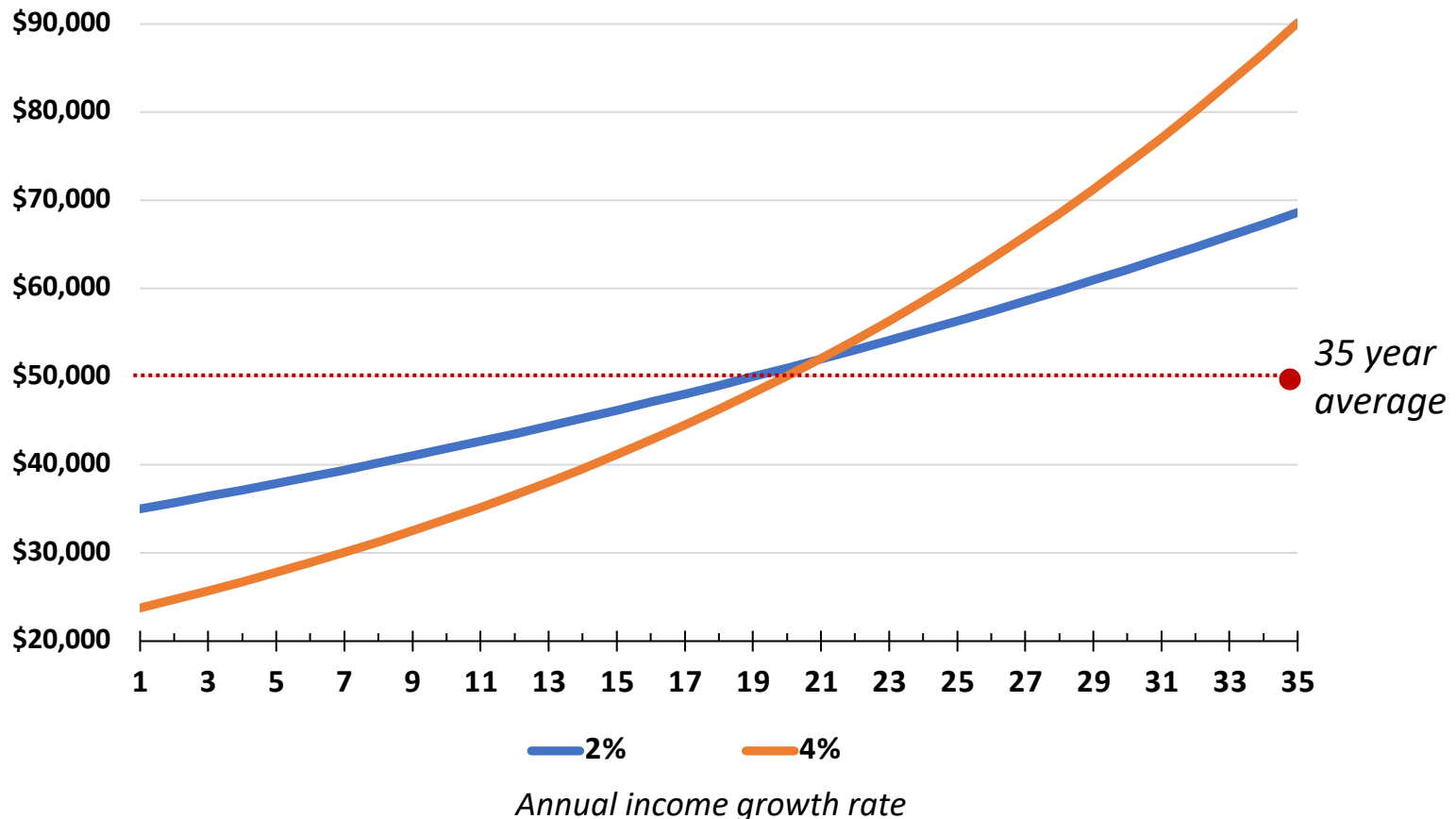
Source: Social Security Administration, August 2021

But True Replacement Ratios Will Likely Be Lower

- Most people get smaller benefits because they claim Social Security before they reach the official “full retirement age”
- Replacement ratios are based on the average of your last 35 years of Social Security earnings, not your final pay.
- Revenue sources for Social Security are not adequate to support benefit levels as currently scheduled.

What Income Is Being Replaced?

- *Social Security benefits are based average Social Security earnings over the last 35 years*
- *Both income paths below have an average income of \$50,000*
- *And the calculated replacement ratio is replacing the \$50,000, not your final income.*



Current Social Security Replacement Ratios

Assumptions: You are born in 2000 and do not draw any benefits until you are full career (currently age 67 for you).

Social Security Replacement Ratio Relative To Final Income

Current Law Scheduled Benefits			
Earnings Category	Annual Income Growth Rate Over Career		
	0%	2%	4%
Very Low	76.4%	55.7%	42.4%
Low	55.5%	40.4%	30.8%.
Medium	41.2%	30.0%	22.8%
High	34.1%	24.8%	18.9%
Max Earnings	27.2%	19.8%	15.1%

Source: Social Security Administration, August 2021

I have computed the numbers for constant 2% & 4% growth rates

Will We Get Paid This?

Assumptions: You are born in 2000 and do not draw any benefits until you are full career (currently age 67).

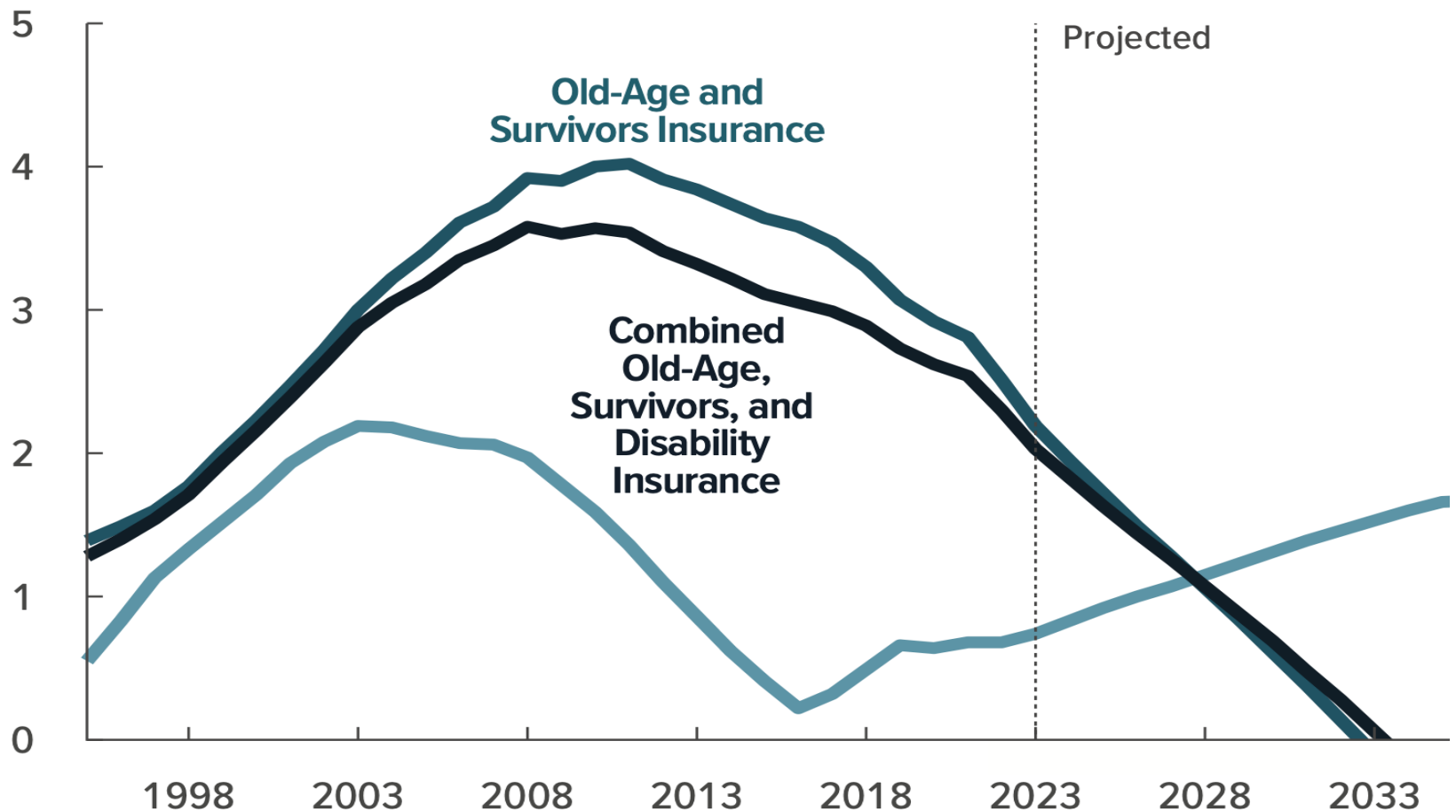
Reported Social Security Replacement Ratios

Earnings Category	Scheduled Benefits	Payable Benefits
Very Low	76.4%	55.9%
Low	55.5%	40.6%
Medium	41.2%	30.1%
High	34.1%	24.9%
Max Earnings	27.2%	19.9%

Source: Social Security Administration, August 2021

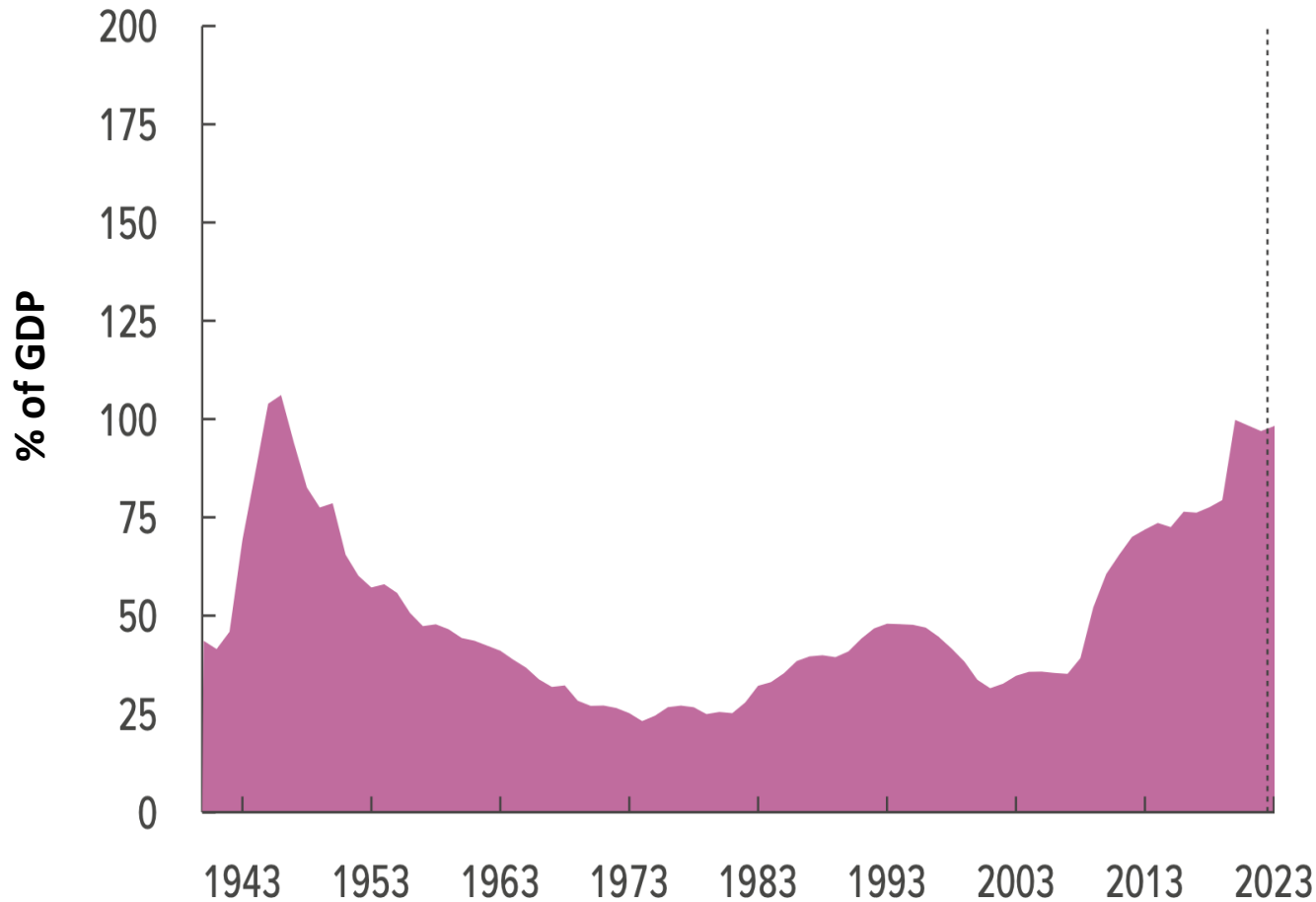
Social Security Trust Fund Ratios

Ratio of Trust Fund Balance to Scheduled Payments



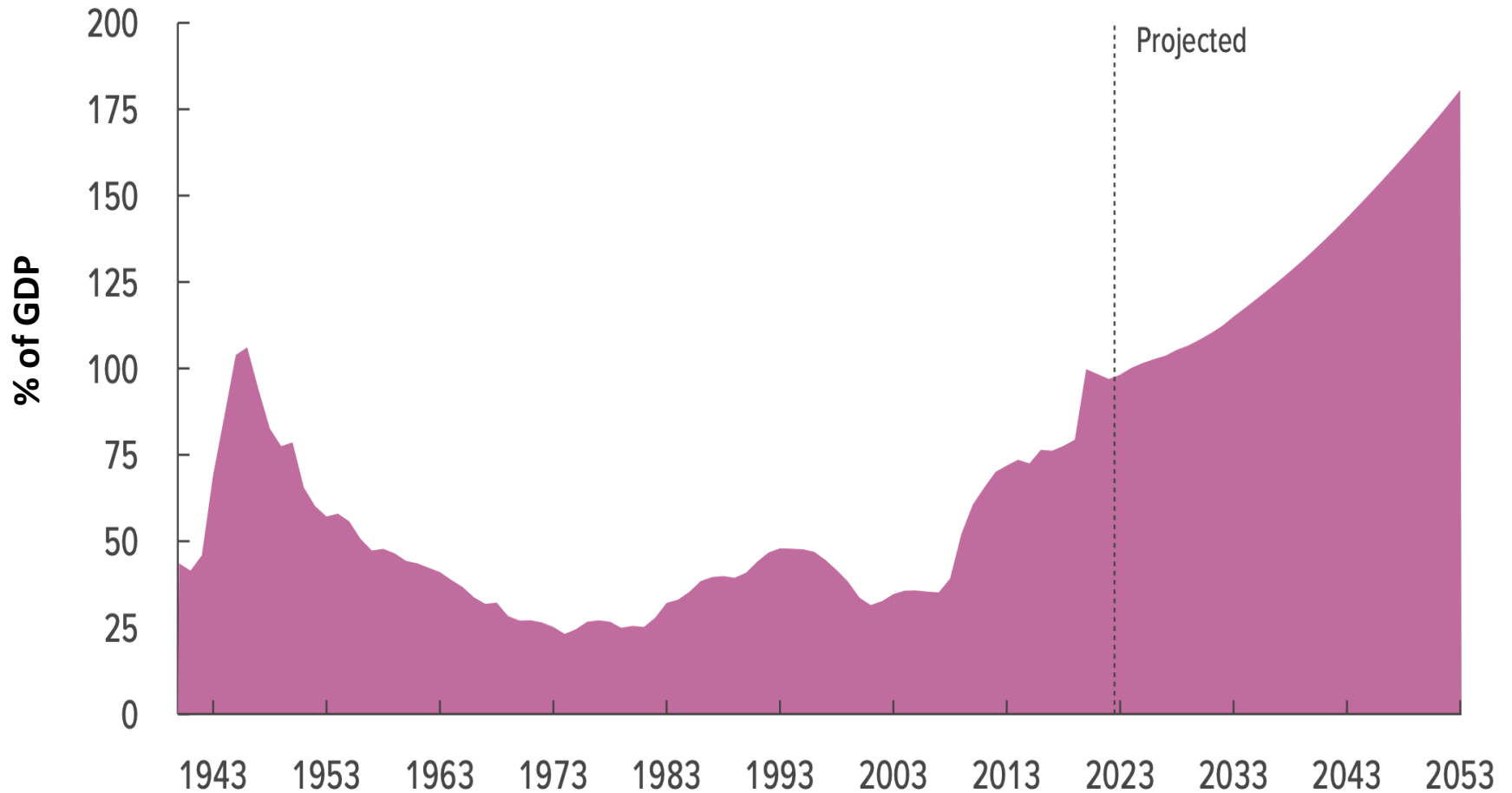
Source: Congressional Budget Office (Sept 2023 update)

Federal Debt Held By the Public



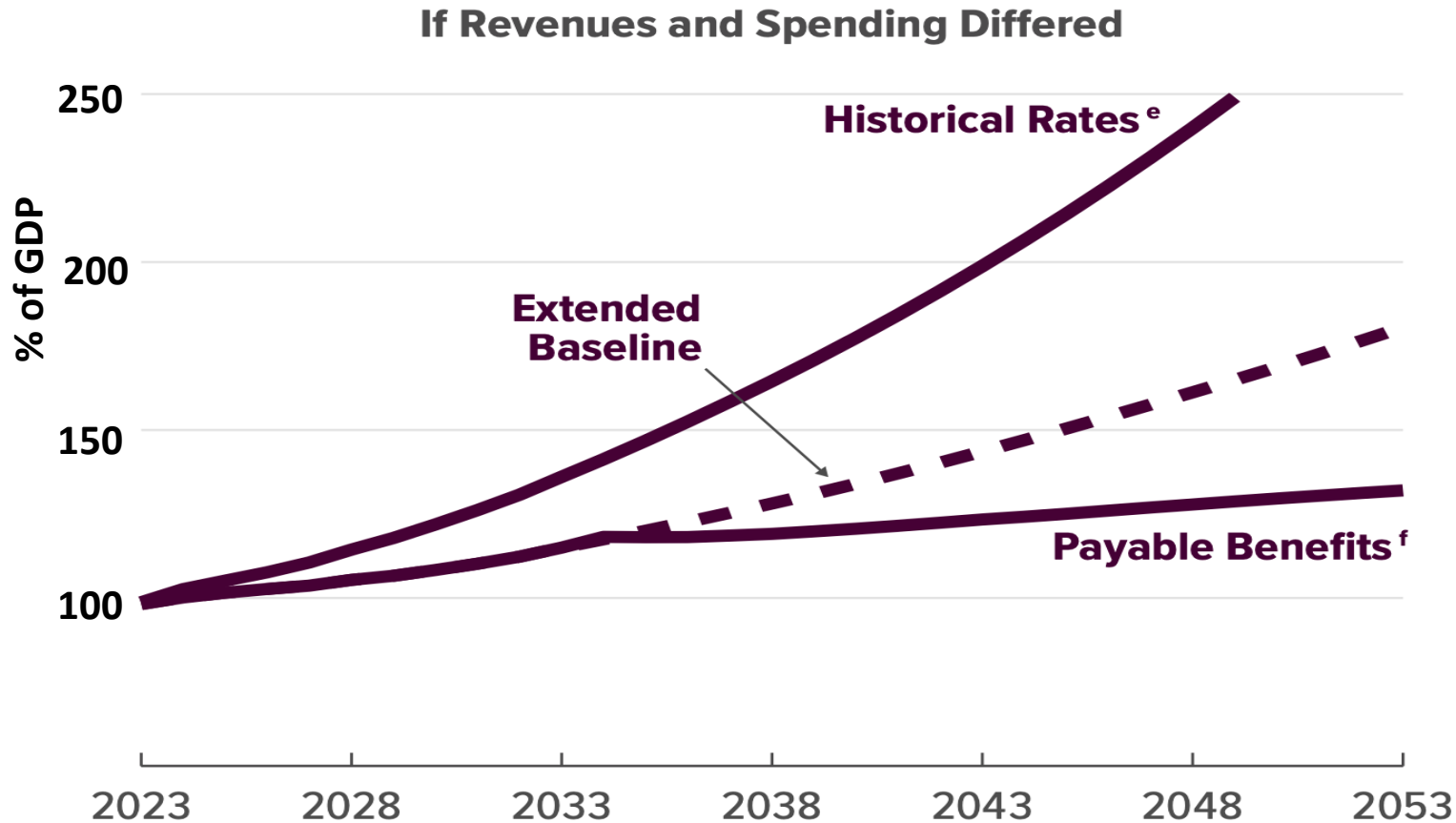
Source: Congressional Budget Office (Sept 2023 update)

Federal Debt Held By the Public



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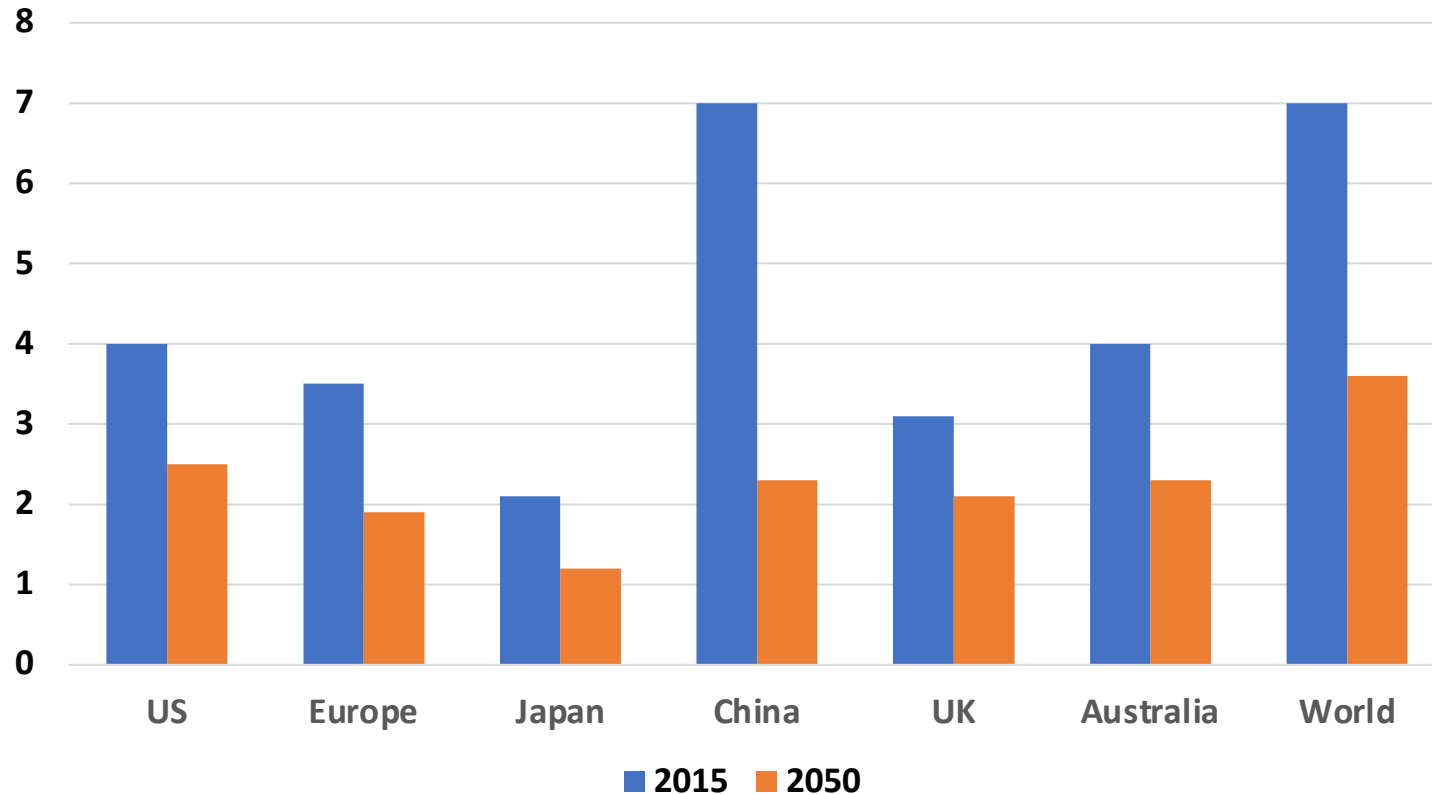
Federal Debt Held By the Public



Source: Congressional Budget Office (Sept 2023 update)

Projected Dependency Ratios

Ratio of Workers (15-64) to Retired (65+)



Sources: UN, Citibank

Putting Everything Together

Assumptions: You are born in 2000 and do not draw any benefits until you are full career (currently age 67 for you).

Social Security Replacement Ratio Relative To Final Income

Earnings Category	Scheduled Benefits	Payable Benefits		
		Annual Income Growth Rate		
		0%	2%	4%
Very Low	76.4%	55.9%	40.7%	31.0%
Low	55.5%	40.6%	29.6%	22.5%
Medium	41.2%	30.1%	21.9%	16.7%
High	34.1%	24.9%	18.1%	13.8%
Max Earnings	27.2%	19.9%	14.5%	11.0%

Source: Social Security Administration, August 2021

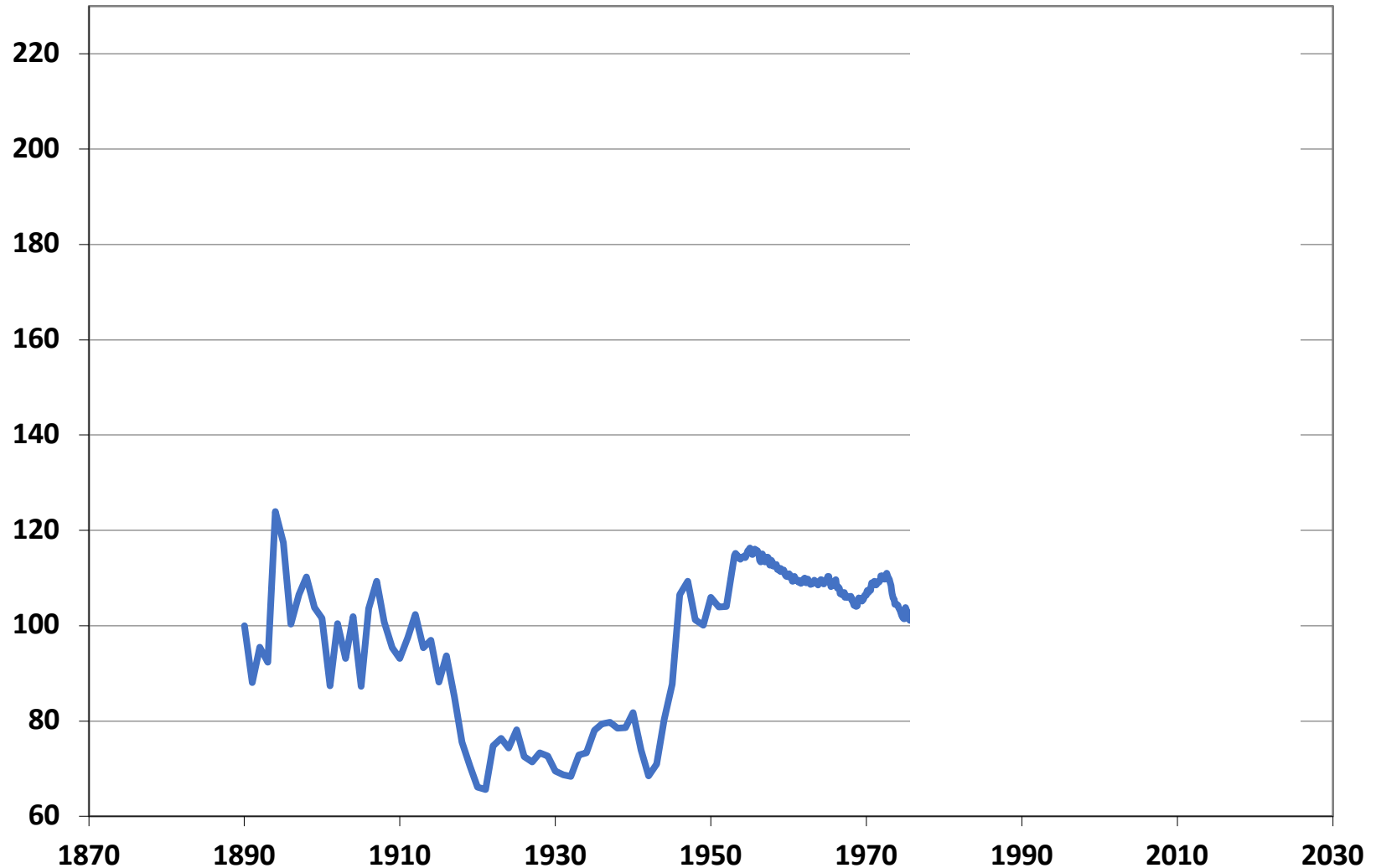
I have computed the numbers for constant 2% & 4% growth rates

II – Your House As A Retirement Asset

- Issues:
 - Expected future returns
 - Big challenges in getting income if you don't downsize
 - Potential need to use house to secure lifetime living in a retirement community
- Challenges of Reverse Mortgages (See Kotlikoff)
 - How they work
 - You get payments for as long as you live in the home
 - Loan balance increases with time
 - Which you can pay off when you sell the home
 - Or you can give them the home if loan balance exceeds value of home (say when you die)
 - Issues
 - Amount people are getting
 - Debt becomes payable if you need to move (say to a different house or to a retirement community).

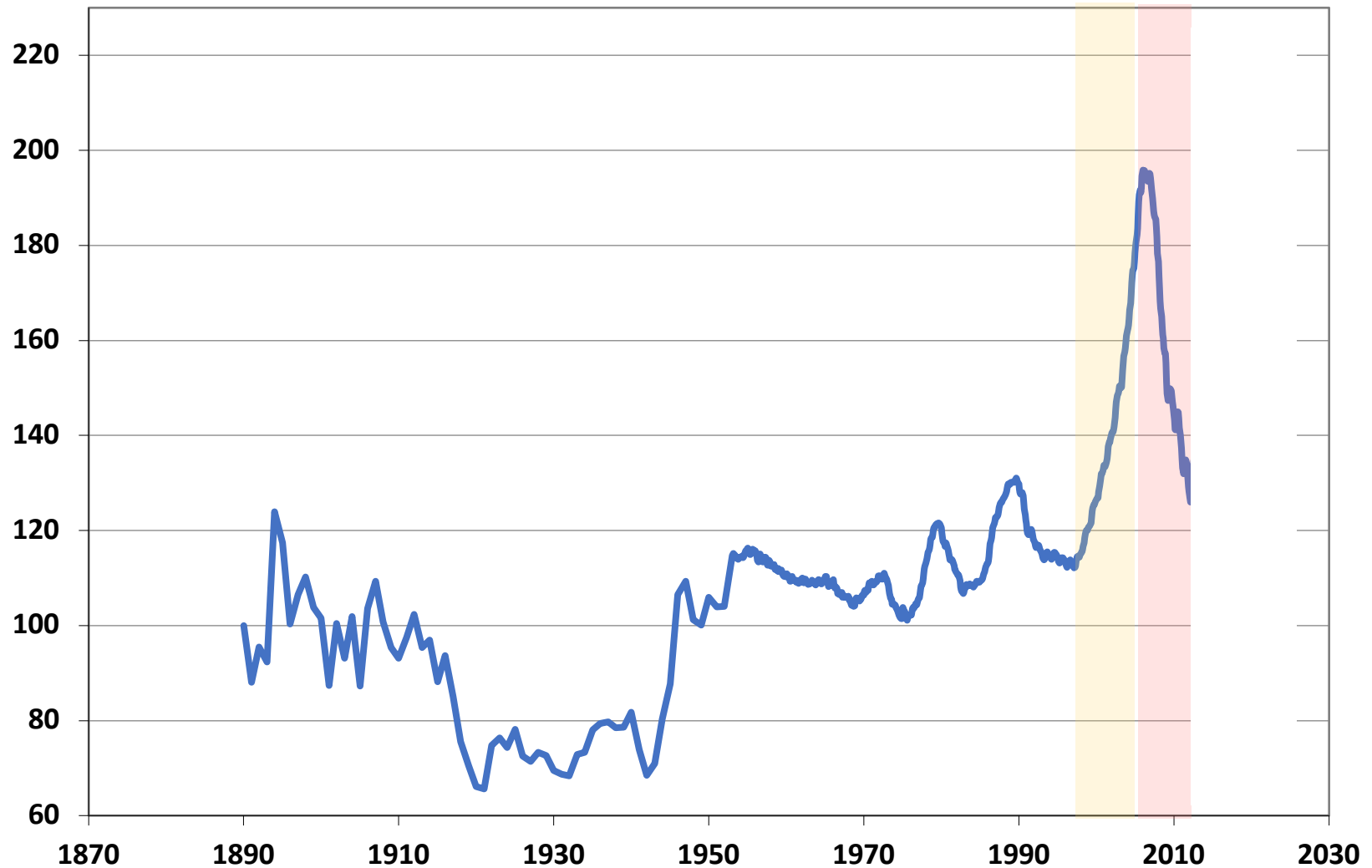
Case-Shiller Real Home Price Index

Through December 2022



Source: Robert Shiller Online Data Base

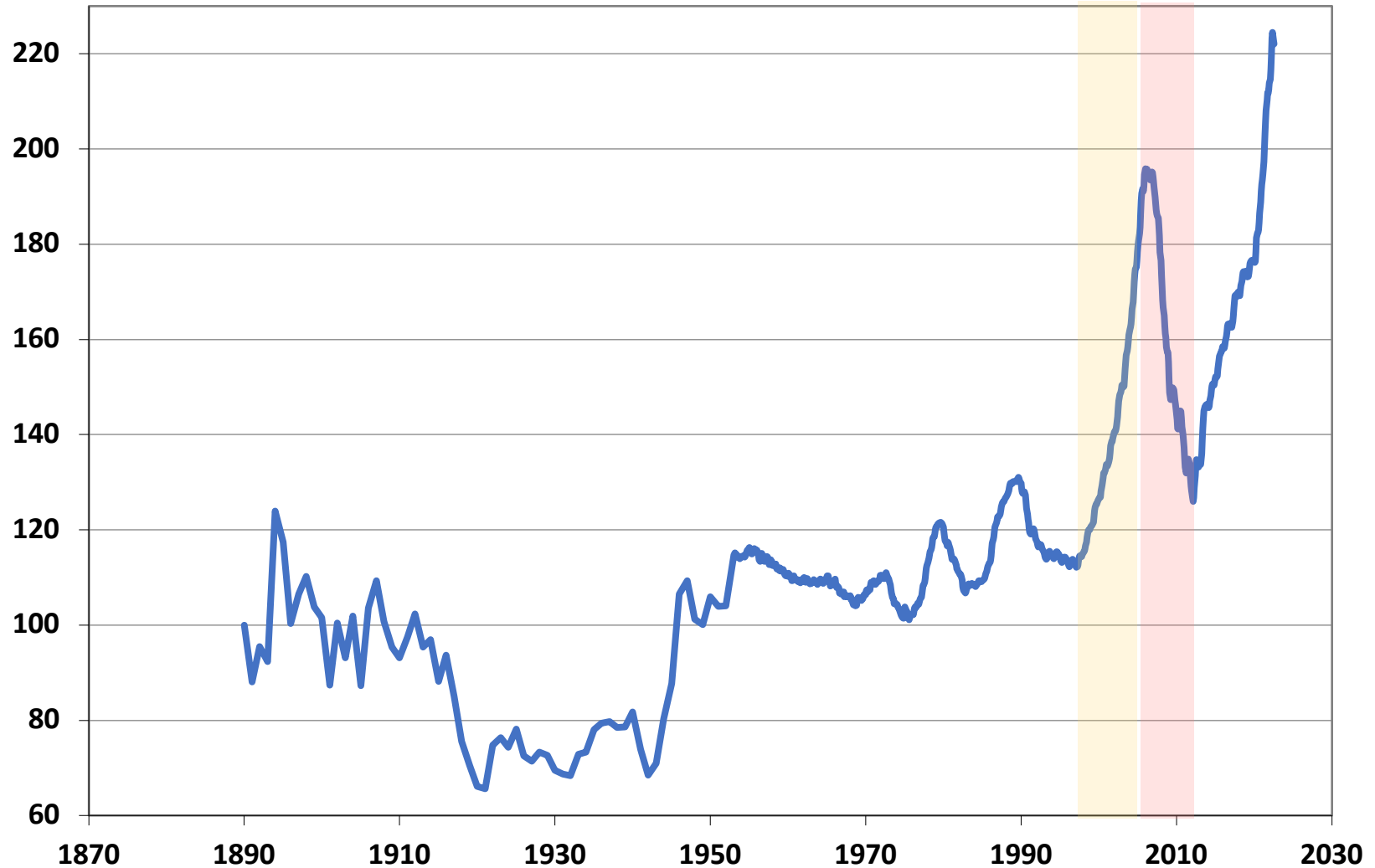
Case-Shiller Real Home Price Index



Source: Robert Shiller Online Data Base

Case-Shiller Real Home Price Index

Through December 2022



Source: Robert Shiller Online Data Base

III – Retirement Savings

- How much will you need at retirement?
- How soon do you need to start saving?
- Are you a saver or an investor?
 - What sort of returns should you expect to get
 - But what does this mean about getting risk right?
- The dangers of retiring too early

Retirement Savings: Rules of Thumb

- Want to replace at least 85% of your income in retirement
- Needed retirement wealth
 - Old rule: The 4% rule
 - Limit initial withdrawal to 4% of retirement wealth
 - Only increase withdrawals in line with inflation
 - Historically, this rule would have prevented you from running out of money during a 30-year retirement, assuming a sensible investment strategy
 - Implies you would need to have \$2.5 million on hand to retire on \$100K a year.
 - New rule: The 3% rule (*or 35 times rule*)
 - Why: To accommodate longer retirement horizon and the risk of lower investment returns in the future
 - Implies you will need to have a \$3.5 million nest egg to retire on \$100K a year.
 - And remember, \$100K may not buy that much 40 years from now.
 - Kotlikoff rule
 - Start with $(100 - \text{retirement age}) \times \text{supported retirement spending}$
 - Implies an expected 0% return after inflation and taxes.

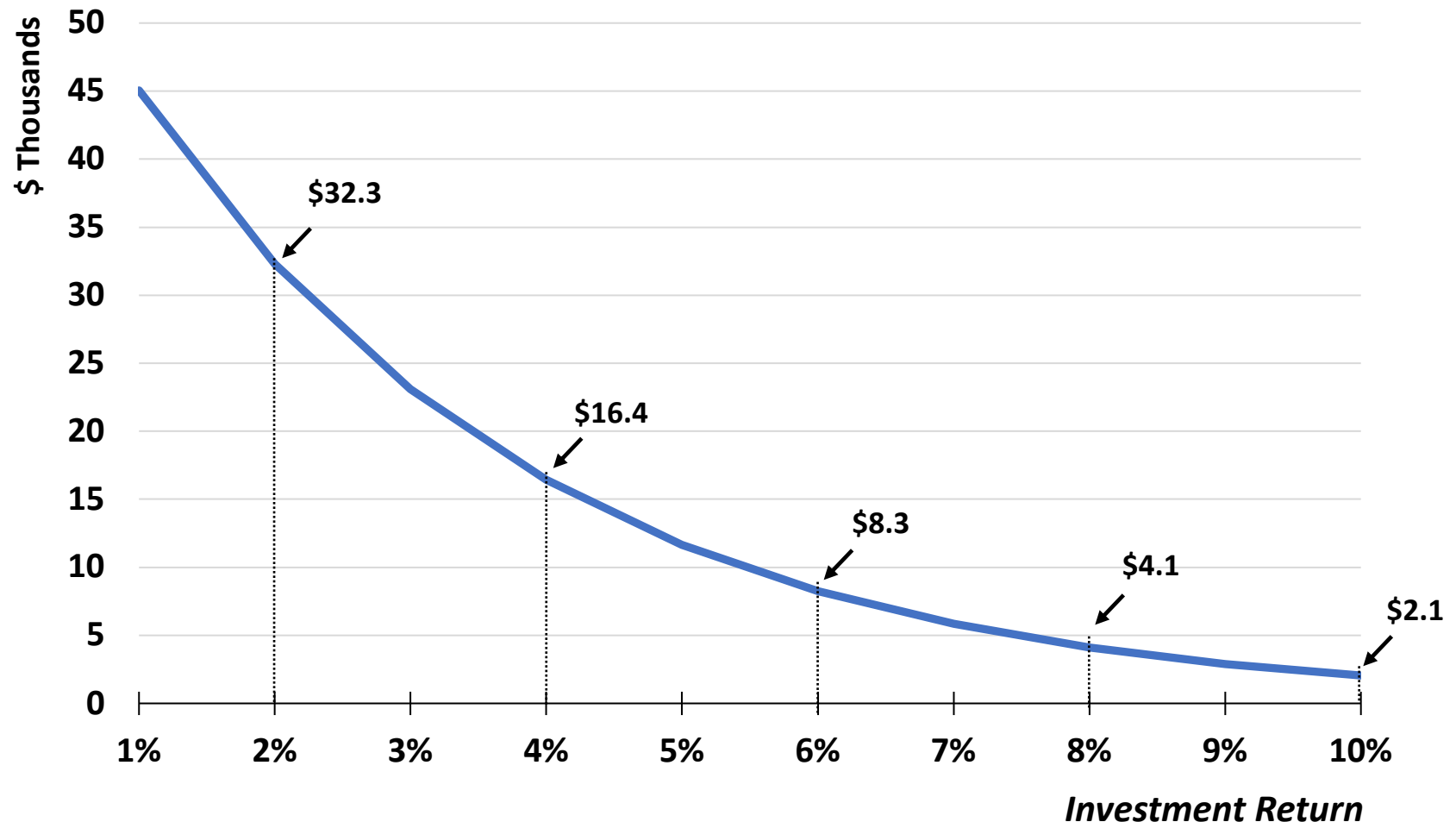
When Should You Start Saving For Retirement?

- A simple sensitivity analysis
 - You save a constant amount of money every year for 40 years
 - You earn a constant rate of return
 - You want to retire on a \$100,000 annual income for 25 years
- Issue: How much do you need to save each year?
- Note: I am not accounting for
 - Longevity risk
 - Inflation risk
 - Investment risk

Simplified Sensitivity Analysis

Amount You Need to Save Each Year if
You Want to Retire on \$100K/Year for 25 years

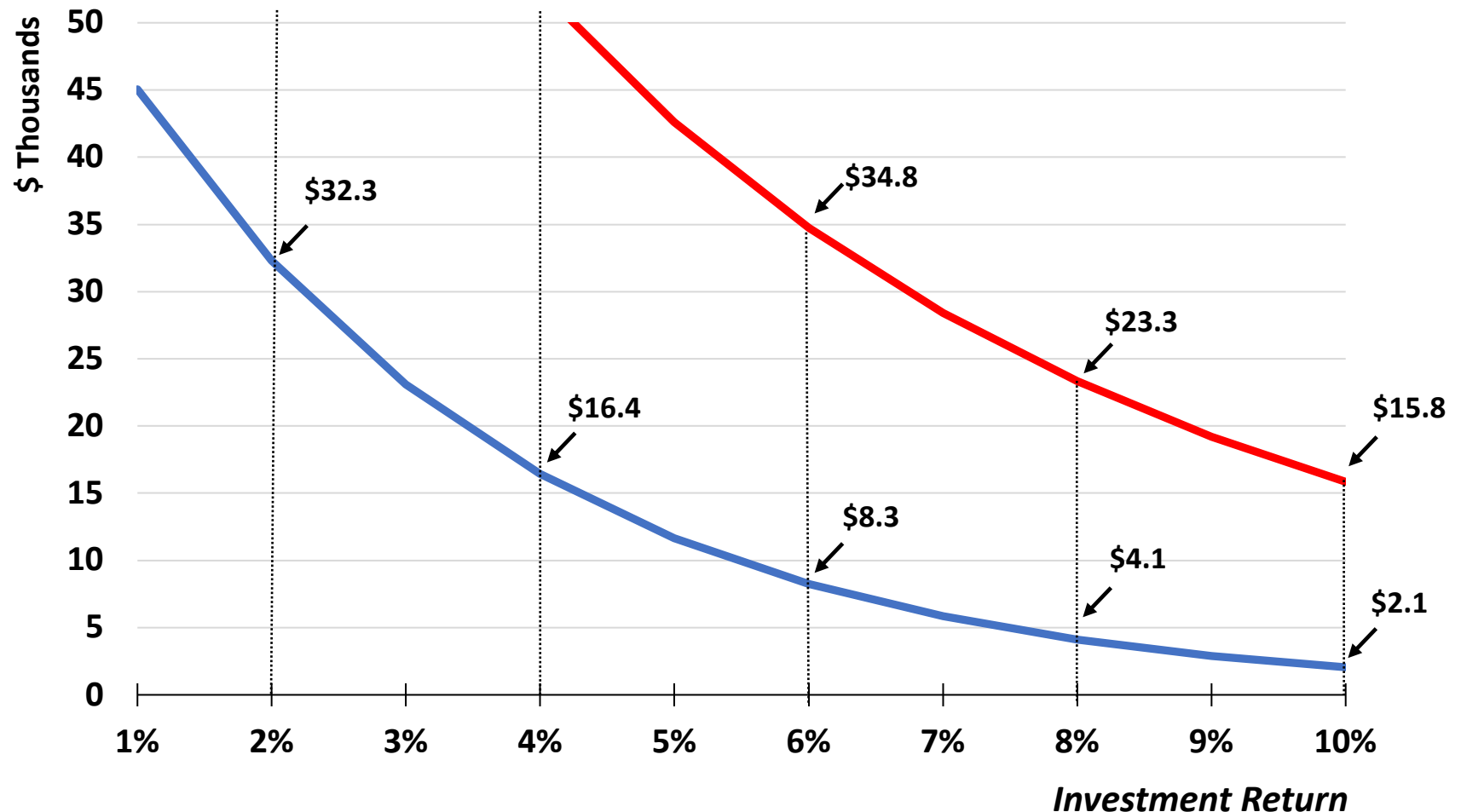
If you save for — 40 Years



Simplified Sensitivity Analysis - 2

Amount You Need to Save Each Year If
You Want to Retire on \$100K/Year for 25 years

If you save for — 40 Years — 20 Years



Simplified Sensitivity Analysis - 3

**Amount You Need to Save Each Year If
You Want to Retire on \$100K/Year for 25 years**

Rate of Return	Savings Period		
	40 Years	20 Years	10 Years
2%	\$32,000	\$80,000	\$178,000
4%	\$16,000	\$52,000	\$130,000
6%	\$8,000	\$35,000	\$97,000
8%	\$4,000	\$23,000	\$74,000
10%	\$2,000	\$16,000	\$57,000

Are We Preparing Adequately?

2016 Citibank study:

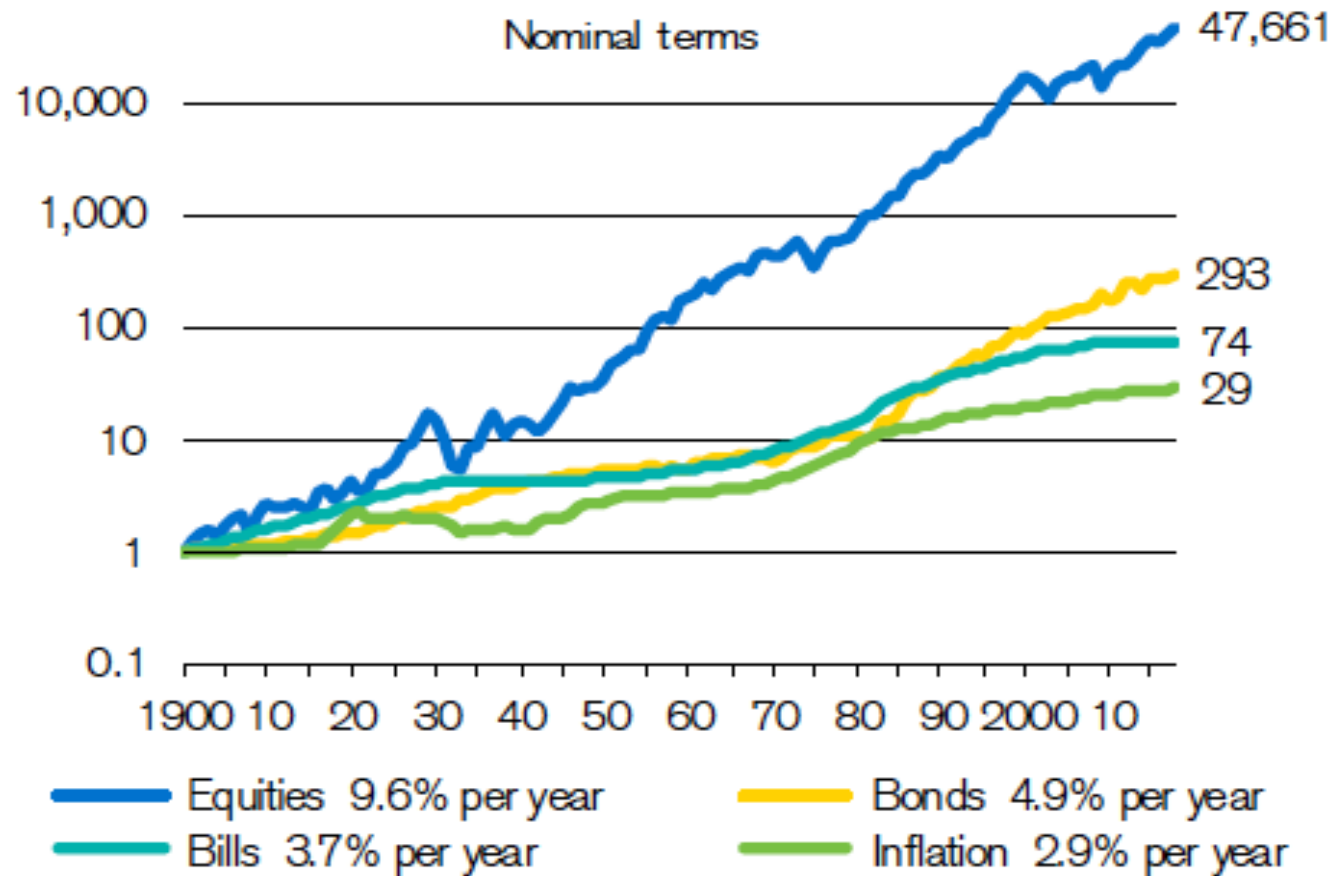
- US individuals are approximately \$7 trillion short of what they need in their DC (*i.e. defined contribution*) plans, assuming no other retirement savings.

US Senior Citizen's Biggest Financial Regrets From Their 20s (*recent survey*)

1. Didn't save enough
2. Spent too much on nonessentials
3. Didn't invest properly
4. Got into too much debt
5. Job made less money but enjoyed it
6. Made poor investment decisions
7. Job made more money but didn't enjoy it
8. Didn't save enough for child's education

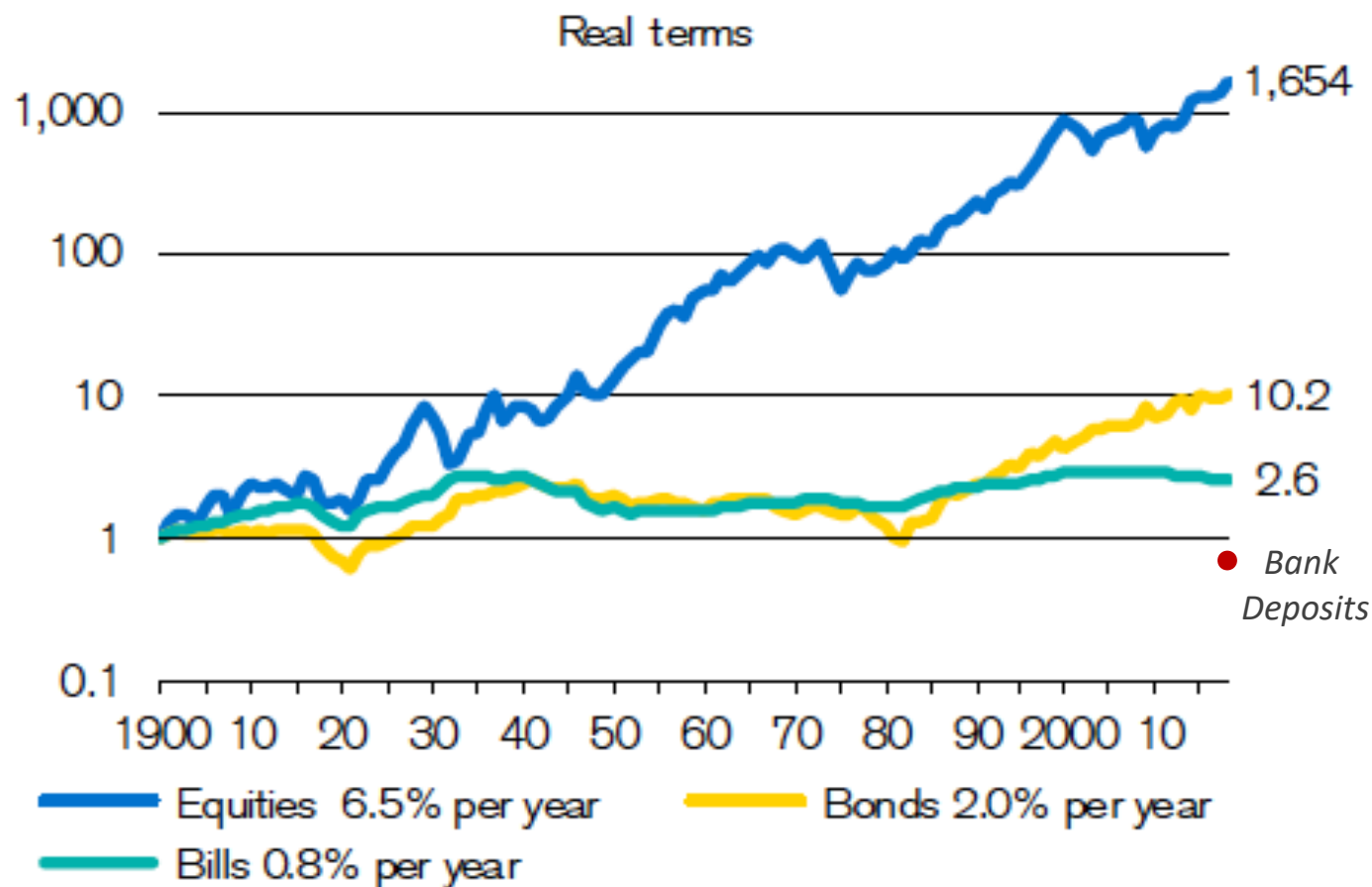
Deciding On An Investment Return

Cumulative Returns on US Assets (1900-2017)



Source: Dimson, Marsh & Staunton, Credit Suisse

Cumulative Returns on US Assets (1900-2017)

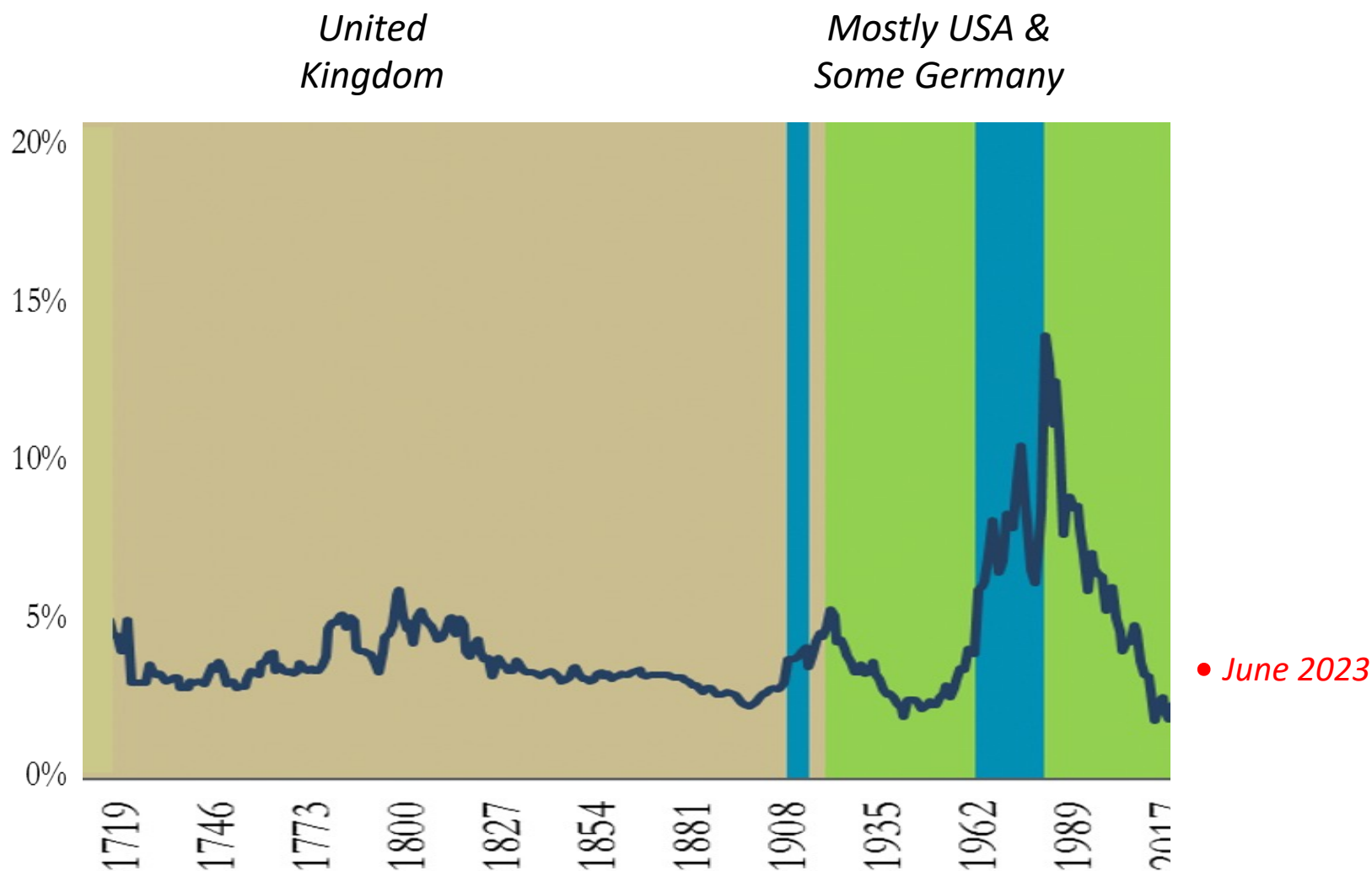


Source: Dimson, Marsh & Staunton, Credit Suisse

Investment Returns & Investment Risks

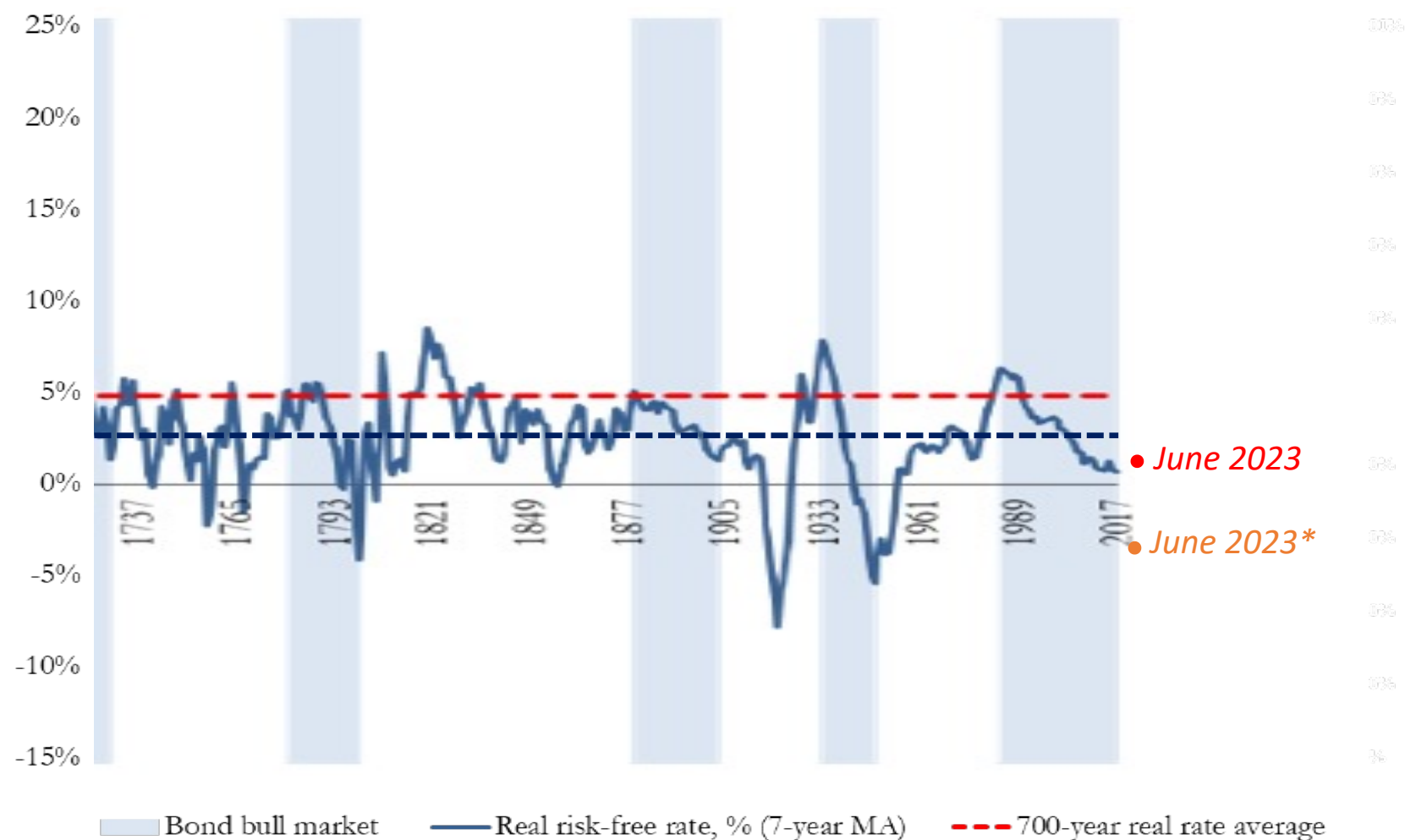
- Some assets offer higher expected returns for a reason
 - They have higher risk.
- So what is the right way to analyze this problem
 - Set saving and retirement goals – and back out investment strategy to get desired return
 - Can you really wear that risk?
 - Think about how much risk you can stand, back out expected return, and the implied saving requirement?
- What risk do you want to take?
 - Having more than you need when you retire?
 - Not having enough when you retire?
 - Will discuss investing and risk in a later lecture

300 Years of Nominal Interest Rates



Paul Schmelzing, Bank of England Staff Working Paper #686

300 Years of Real Interest Rates



Paul Schmelzing, Bank of England Staff Working Paper #686

What Does This All Mean?

- You will likely be responsible for financing much of your retirement
- You may need to finance a long retirement
- Counting on high investment returns to bail you out is risky
- And that means you need to start saving for retirement ASAP
 - You need to start saving for retirement ASAP
 - And thinking of delaying your retirement

How Are We Going To Achieve This?

The basic strategy

- Start saving for retirement early
- Invest in a tax-efficient manner
- Maximize the potential contributions from our employers to our retirement savings
- Take intelligent risks to get higher expected returns

Meeting A \$1 Million Retirement Savings Goal

Assuming constant investment returns

Investment Return	Required Monthly Savings If You Save For		
	40 Years	20 Years	10 Years
0%			
1%			
2%			
3%			
4%			
5%			
6%			
7%			
8%	\$3,860	\$21,852	\$69,029
9%			
10%			

Meeting A \$1 Million Retirement Savings Goal

Assuming constant investment returns

Investment Return	Required Annual Savings If You Save For		
	40 Years	20 Years	10 Years
0%	\$25,000	\$50,000	\$100,000
1%	\$20,456	\$45,415	\$95,582
2%	\$16,556	\$41,157	\$91,326
3%	\$13,362	\$37,216	\$87,231
4%	\$10,523	\$33,581	\$83,291
5%	\$8,278	\$30,242	\$79,504
6%	\$6,461	\$27,185	\$75,868
7%	\$5,009	\$24,393	\$72,377
8%	\$3,860	\$21,852	\$69,029
9%	\$2,960	\$19,546	\$65,820
10%	\$2,259	\$17,460	\$62,745