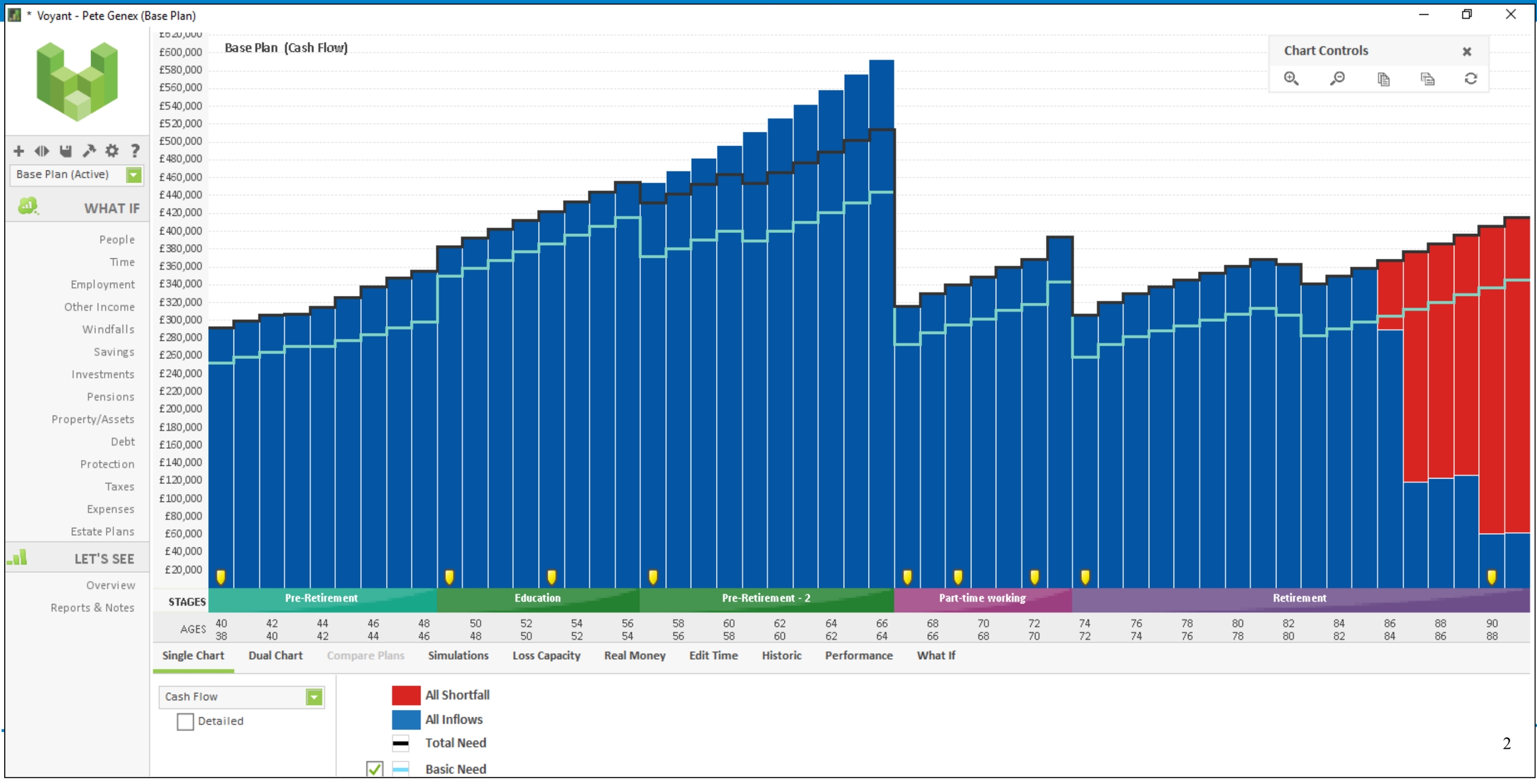
Columbia Business School

NYU STERN

Personal Risks and Opportunities in Micro-to-Macro Analysis
CARE conference
May 18, 2018

Richard Berner
Richard Foster
Trevor S. Harris

This is a cashflow profile of someone like you



That profile is based on heroic long-term extrapolations

For example:

- Your future income
- Your chosen lifestyle
- How long you will live
- How long you will remain healthy
- When you will retire (whatever that means to you)
- How asset markets will perform
- When asset markets might correct, relative to when you may need the money

In each case, Governments, employers and individual households have choices that will materially impact the outcome

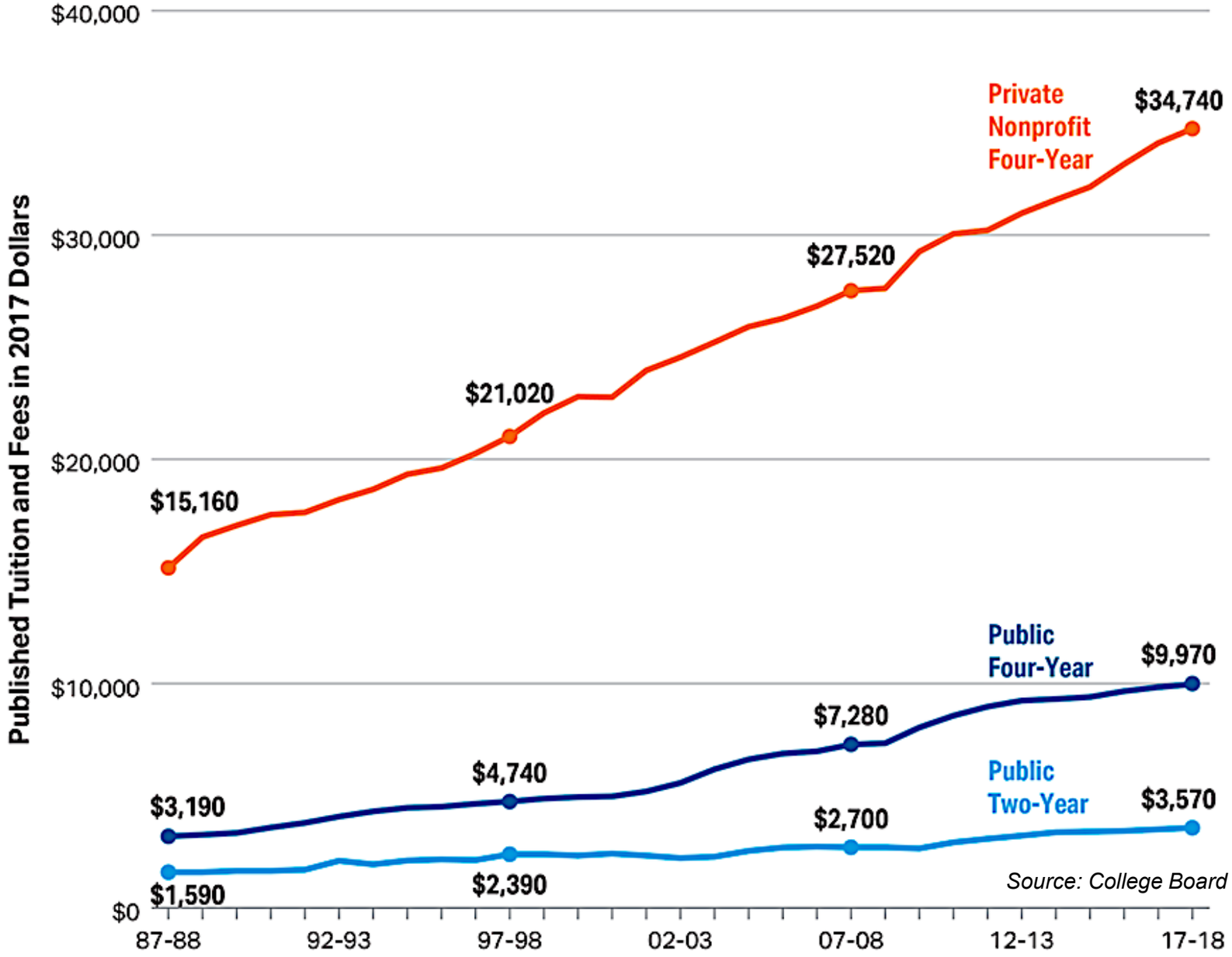
Setting the Stage

Please open ForClass and answer **ALL** the questions beginning with:

What is your current age group?

1. <35
2. 35-50
3. 51-64
4. 65-70
5. >70

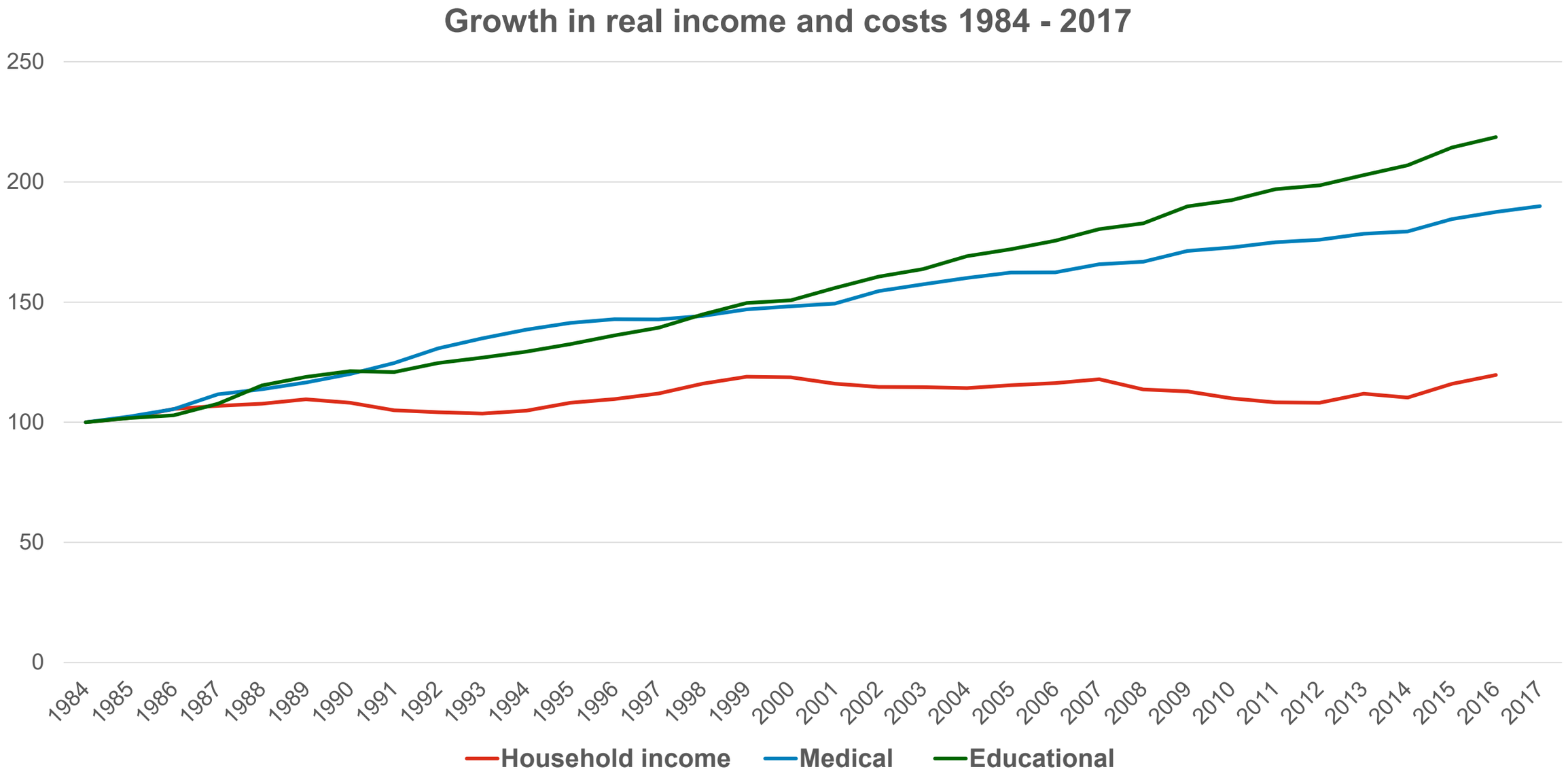
Rising Costs of Annual Tuition and Fees (in constant $)



Who is going to pay for this?

Source: College Board annual survey of colleges 2018

Continues to outpace real median incomes



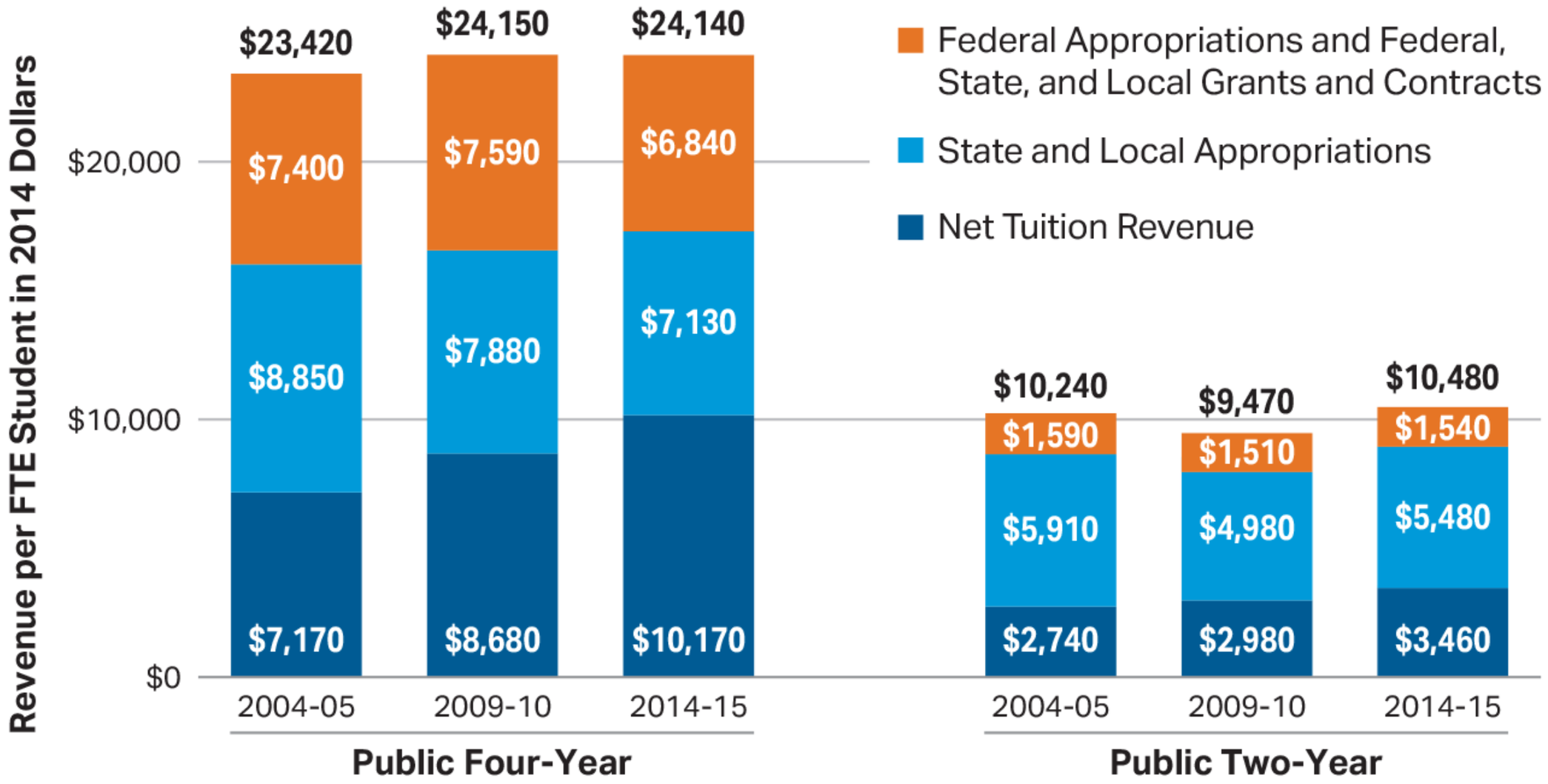
What do you think will happen to your income?

What is the probability that you will have a job as a Professor at the same or greater real income until you retire?

1. <25%
2. 25 – 50%
3. 51 – 75?
4. 76 – 95%
5. Guaranteed?

That raises the question: who will pay to sustain the trend?

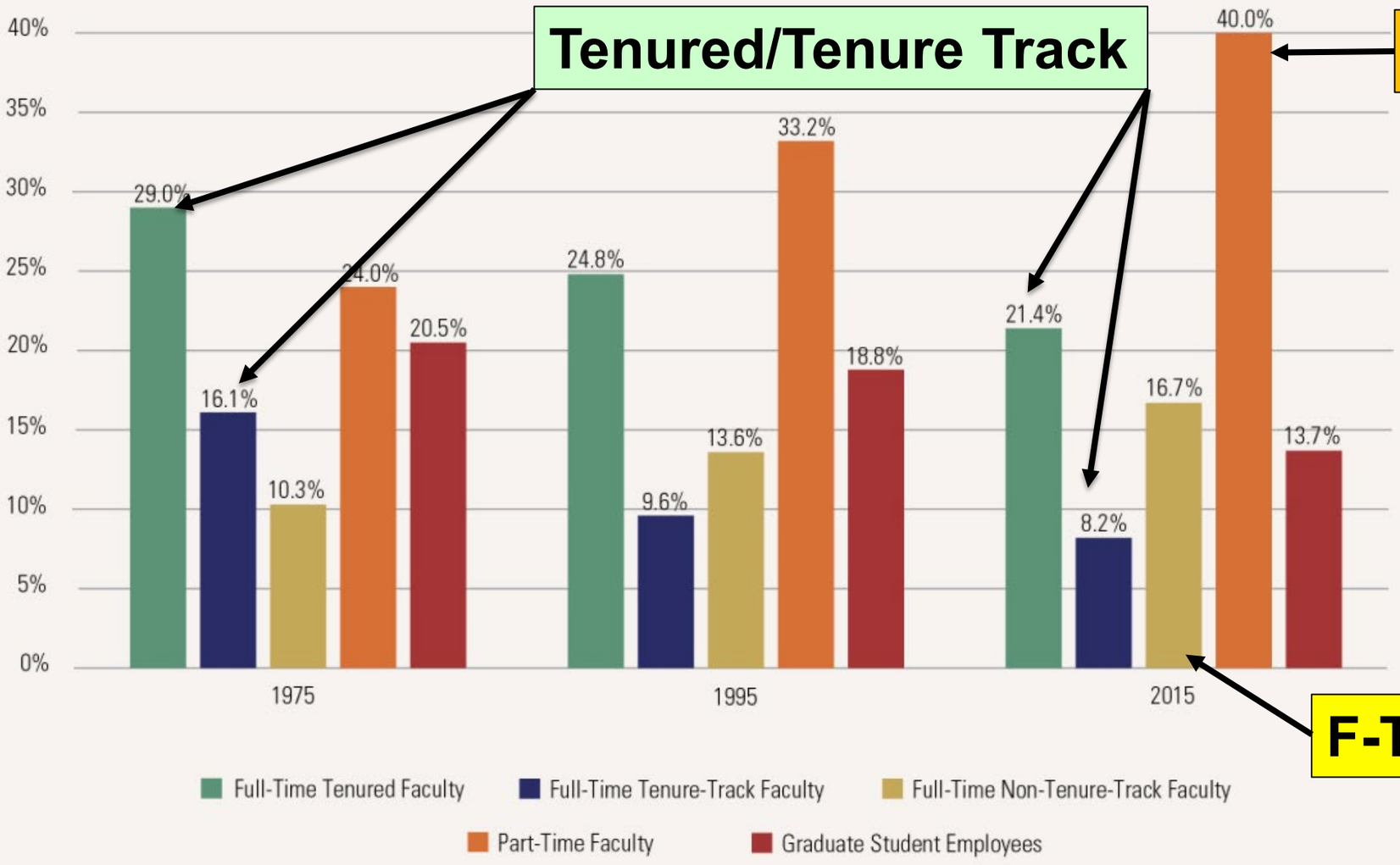
Institutional Revenues per Full-Time Equivalent (FTE) Student in 2014 Dollars at Public Institutions



Source: The College Board, Trends in College Pricing 2017, Figure 14.

Will it be you? Potential Risks to Faculty Compensation

FIGURE 1
Trends in the Academic Labor Force, 1975–2015



Source: National Center for Education Statistics, IPEDS Data Center, http://nces.ed.gov/ipeds/datacenter. Data compiled by the AAUP Research Office.

Tenured/Tenure Track

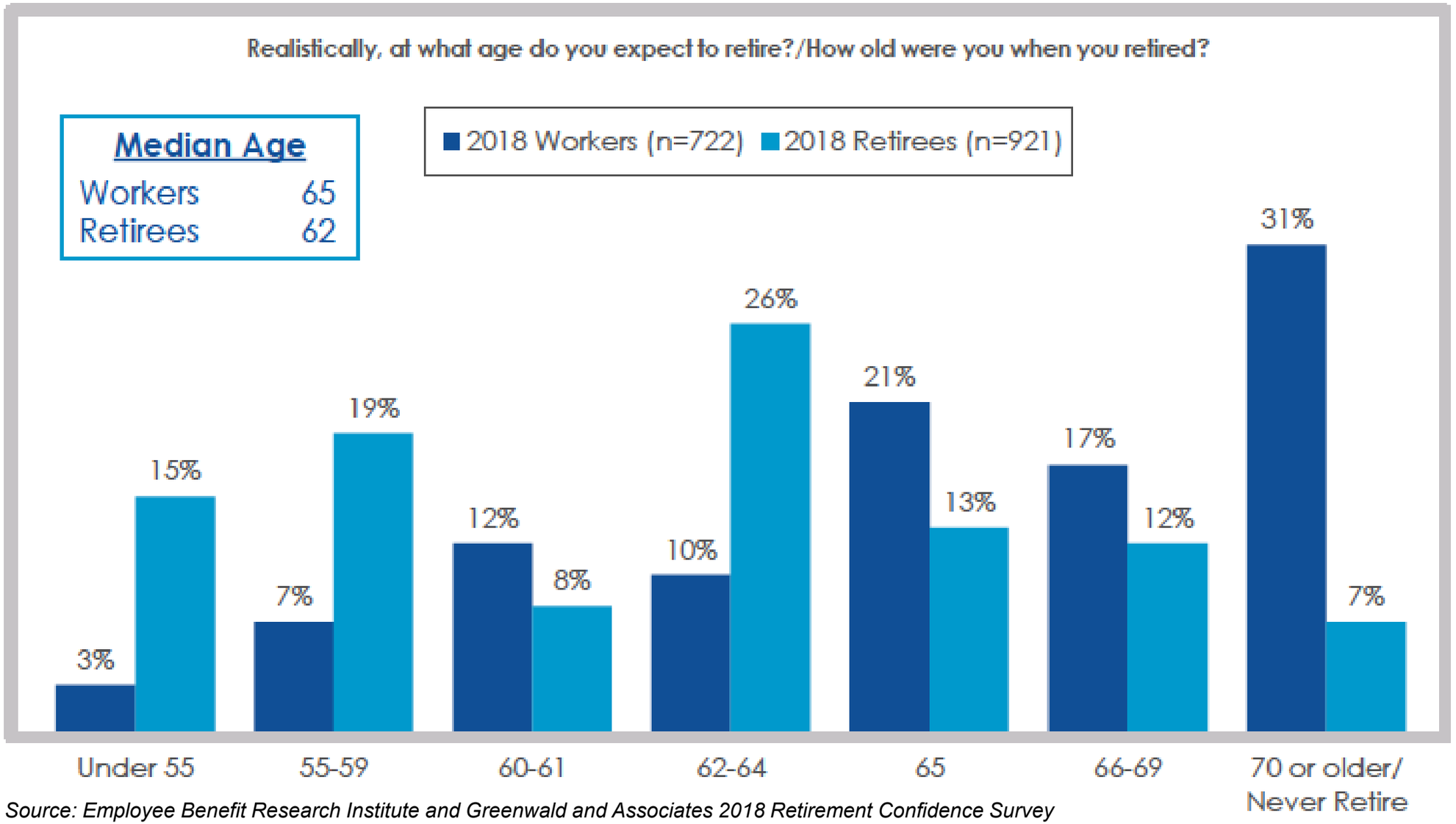
Part-time

F-T non-Tenured

At what age do you expect to stop working?

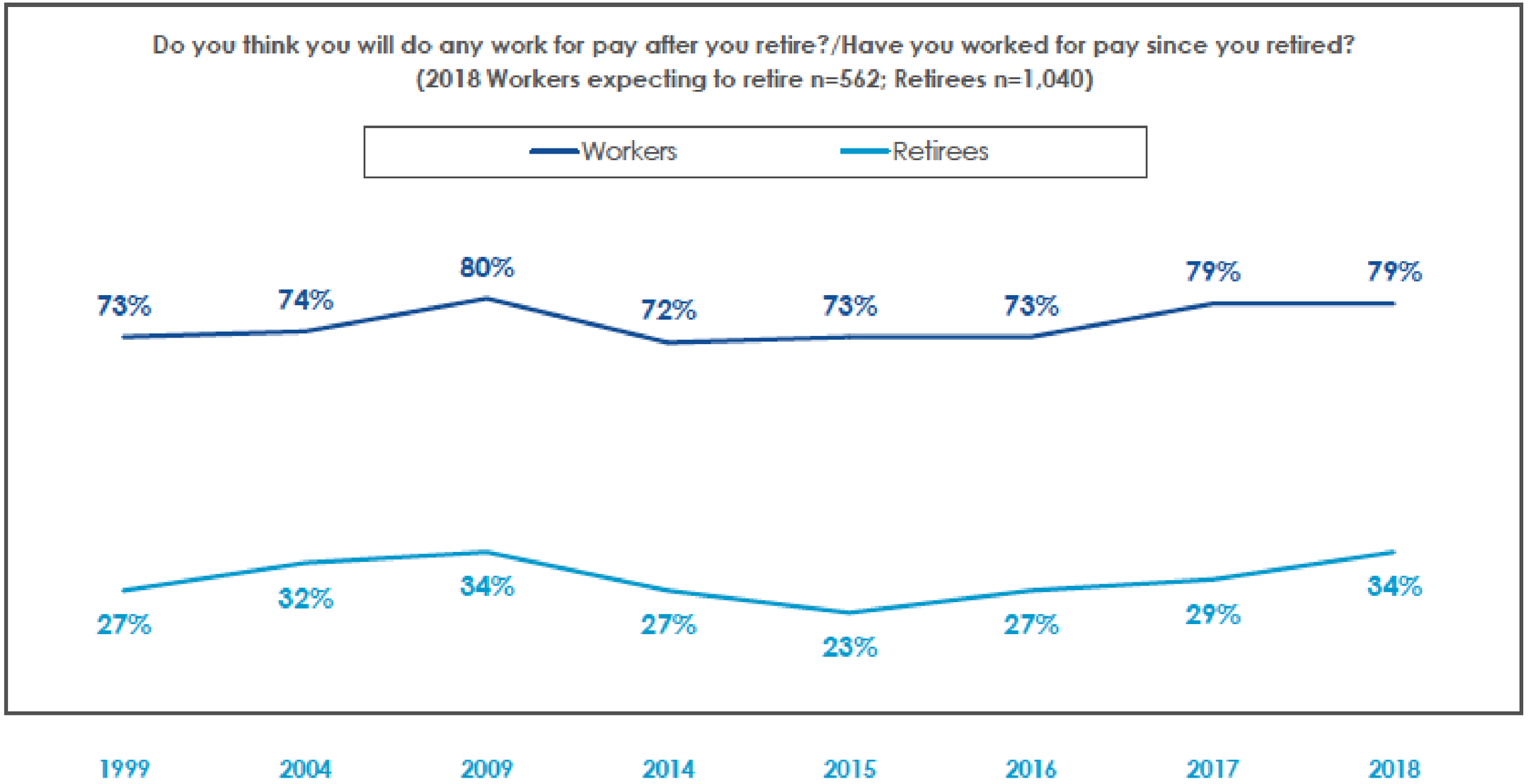
1. < 60
2. 60 - 65?
3. 66 – 70?
4. 70 – 75?
5. Never?

When might you retire?



Source: Employee Benefit Research Institute and Greenwald and Associates 2018 Retirement Confidence Survey

…and what will retirement mean to you when you get there?

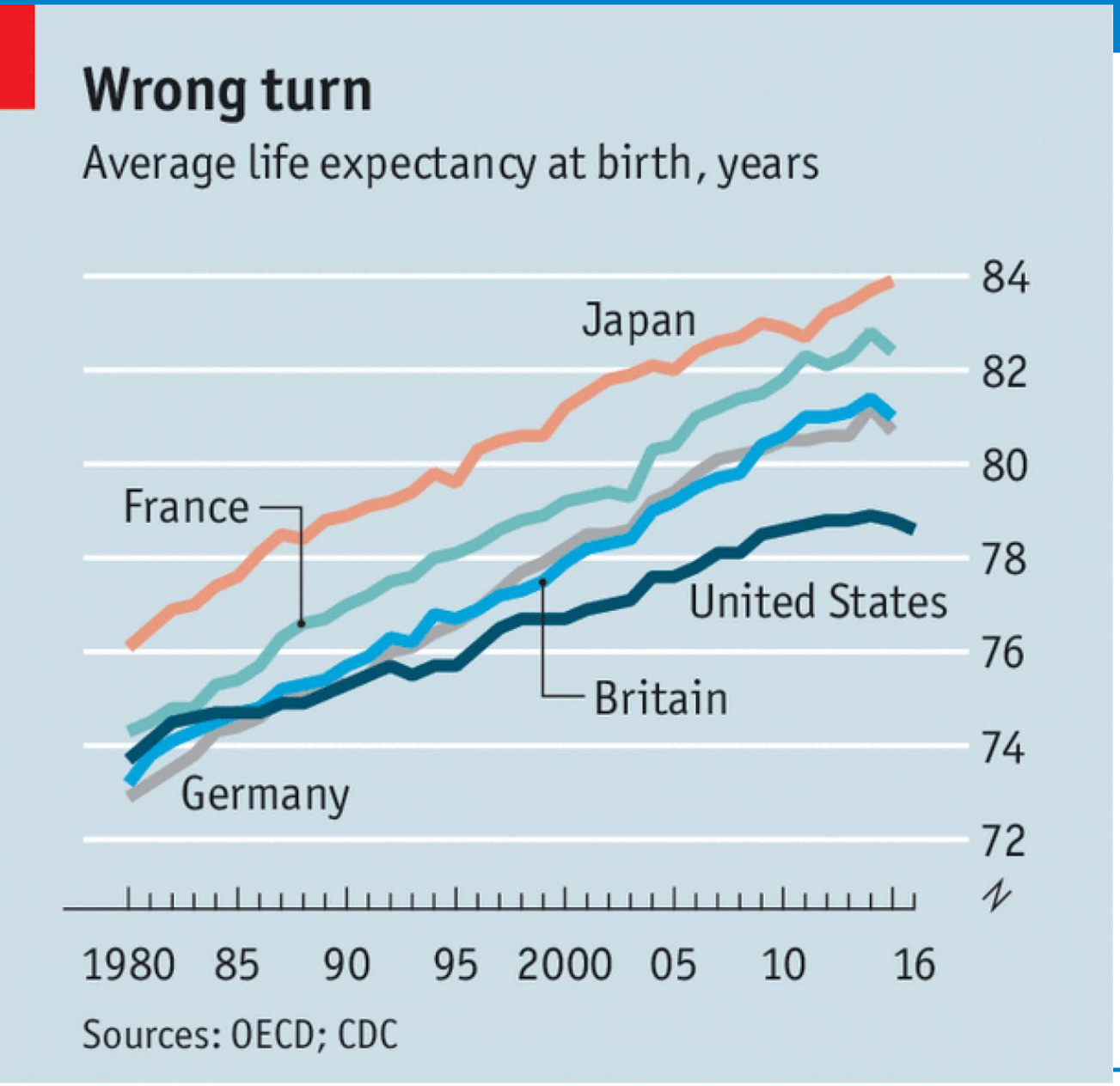


Source: Employee Benefit Research Institute and Greenwald and Associates 2018 Retirement Confidence Survey

What is your exposure to a long, possibly unhealthy life?

Medical science is evolving rapidly. At what age do you expect to die?	Longevity is out-pacing healthy life expectancy. At what age do you expect your health to be constraining?
1. < 65? 2. 65 – 73? 3. 74 – 80? 4. 81 – 88? 5. > 88?	1. < 65? 2. 65 – 73? 3. 74 – 80? 4. 81 – 85? 5. > 85?

How long will you live?

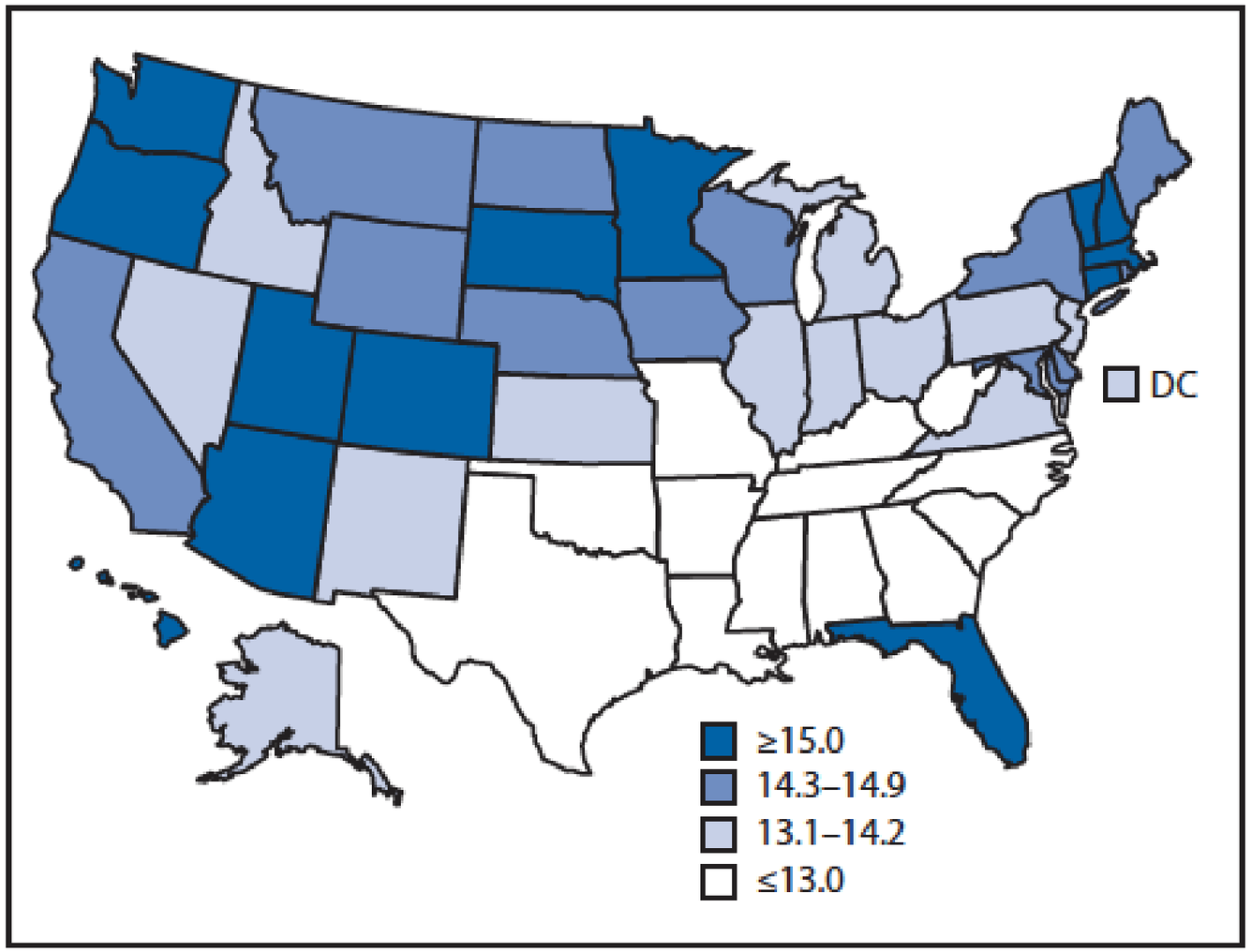


According to data compiled by Social Security Administration:
A **man reaching age 65 today** can expect to live, on average, **until age 84.3**.
A ***woman turning age 65 today*** can expect to live, on average, ***until age 86.6***.

And those are just averages. About ***25%*** of 65-year-olds today will live ***past age 90***, and ***10%*** will live ***past age 95.***

Will health keep pace with life?

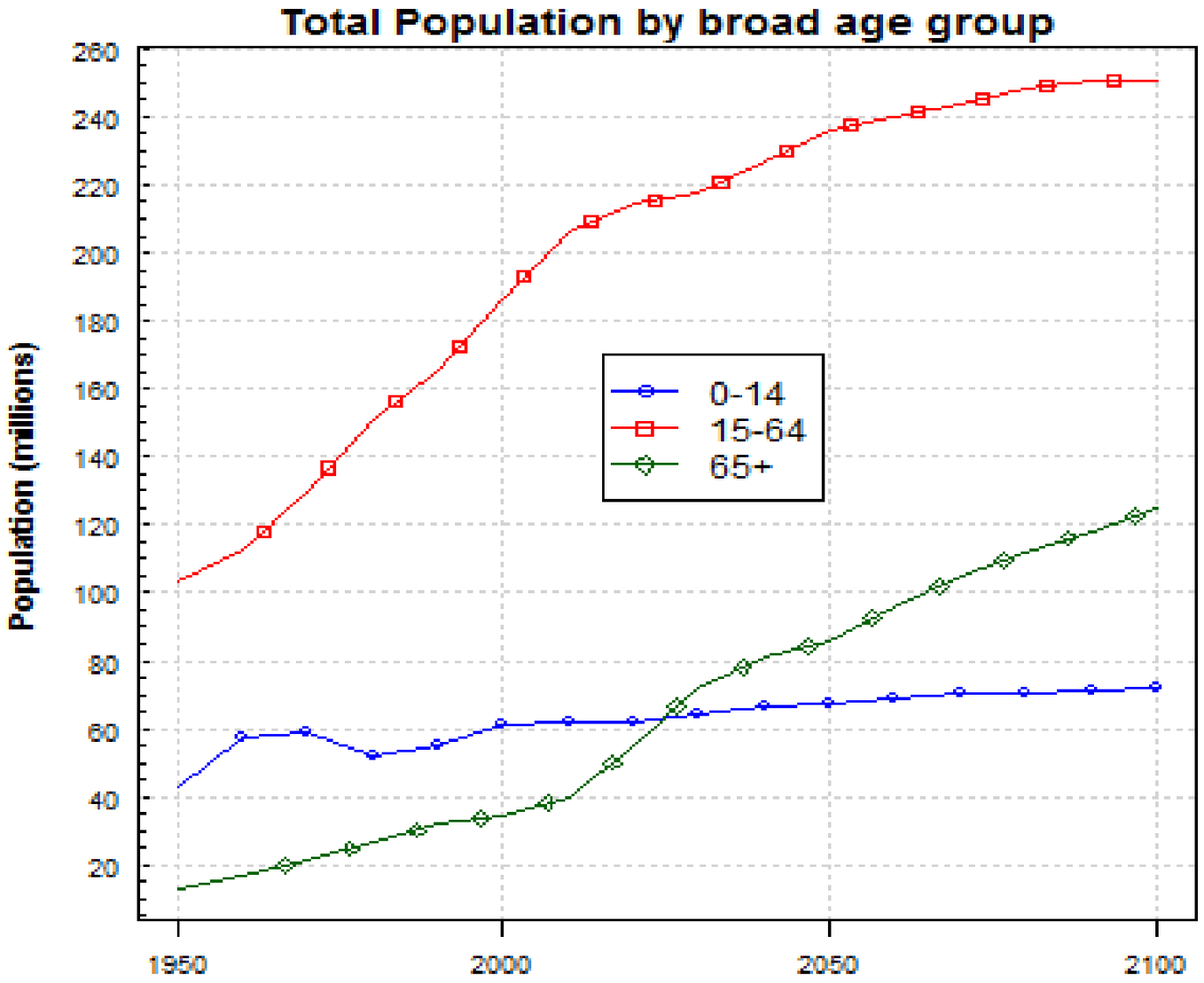
FIGURE 3. State-specific healthy life expectancy in years at age 65 years —United States, 2007–2009



How long will you live?

Source: CDC Morbidity and Mortality Weekly Report July 19, 2013

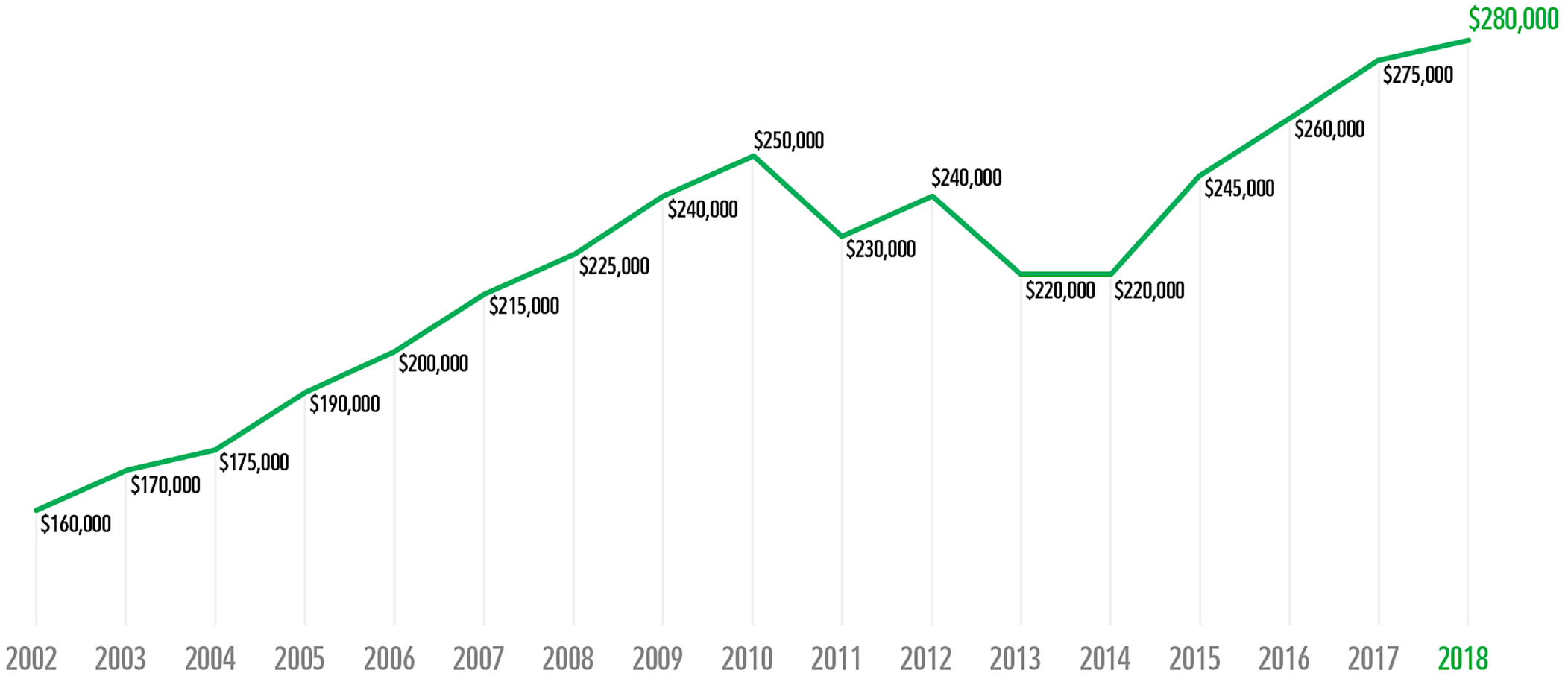
With an aging population in the USA



Source: United Nations "World Population Prospects" 2017

Average Retiree Out of Pocket Health Care Costs in the US

RETIREE HEALTH CARE COST ESTIMATES OVER TIME



Source: Fidelity Investments. These are the estimates for the last 16 years that Fidelity has been calculating this dollar amount.

Current cost of gene-based therapies for cancer – who will pay?

Million-Dollar Treatment

A new wave of gene-based therapies, like CAR-Ts for cancer, threaten to bring the cost of treatment to a million dollars, including not only the drugs themselves but also related care. The total tab will depend on the therapy and the needs of the patient.

Costly care

1. Pretreatment testing
CT scans, blood work and other testing to see if a patient is eligible for treatment.

2. Apheresis
The patient's cells are taken so they can be sent to the drug company, which weaponizes the cells.

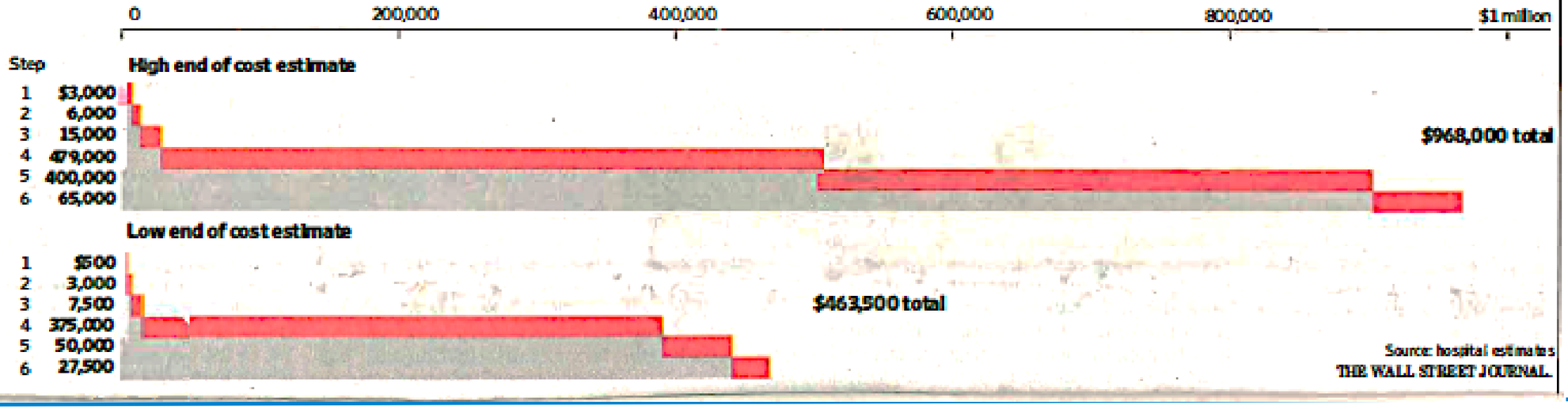
3. Conditioning
Chemotherapy is given to start attacking the cancer and deplete the patient's immune system, so the CAR-T can flourish.

4. Treatment
At the hospital, staff prepare the weaponized cells for infusion. The patient is then given the therapy in an IV.

5. Posttreatment monitoring and side-effect care
Hospitals observe the patients for about two weeks for serious side effects, such as high fever and delirium, and treat them as needed.

6. Postdischarge monitoring
The patient must be seen regularly for months after treatment to ensure the disease has responded and the patient is healthy.

Cumulative cost of CAR-T treatment



Source: hospital estimates

THE WALL STREET JOURNAL.

Unplanned trade-offs

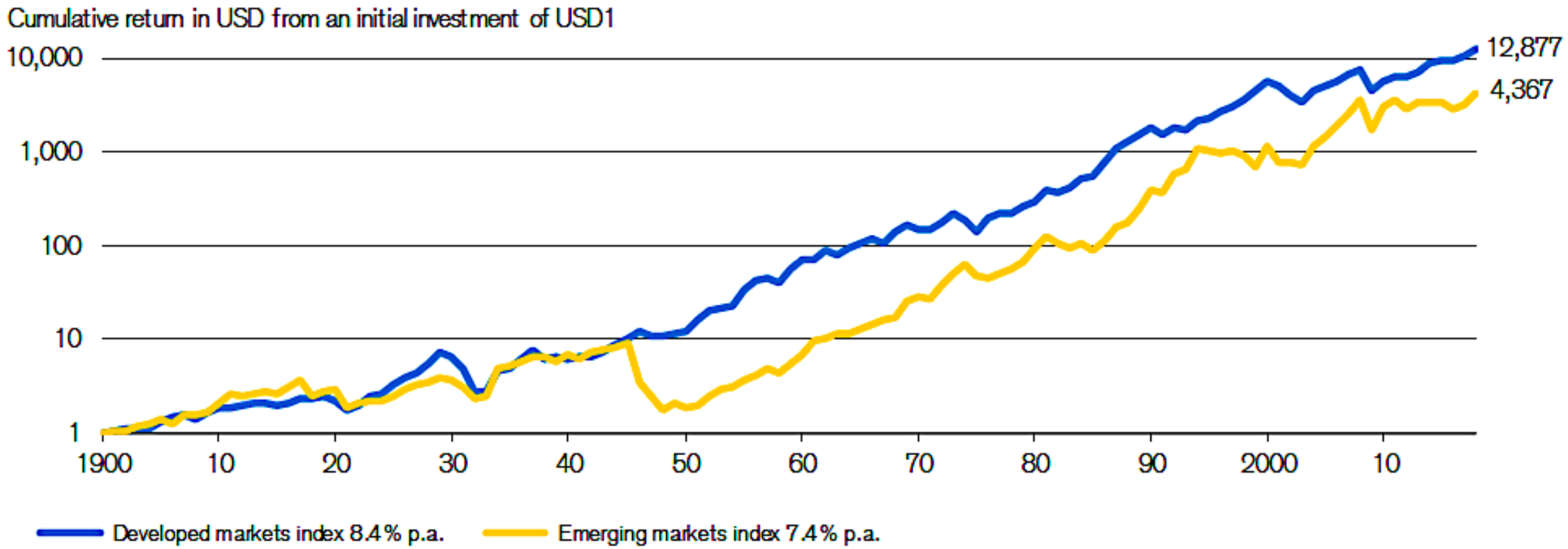
You are diagnosed with a condition that will almost certainly kill you within 12 months. There's a pioneering treatment which, if successful will extend your life by at least 10 years but will cost you personally $750,000. Would you pay it?

You	You	Your grandchild
Your present age	Aged 70	Aged 14
• Yes • No • Not sure	• Yes • No • Not sure	• Yes • No • Not sure

…and about long-term asset returns

Figure 3

Long-run emerging and developed market returns, 1900–2017



Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Credit Suisse Global Investment Returns Yearbook 2014, with subsequent updates

Credit Suisse Global Investment Returns Yearbook 2018: Summary Edition 9

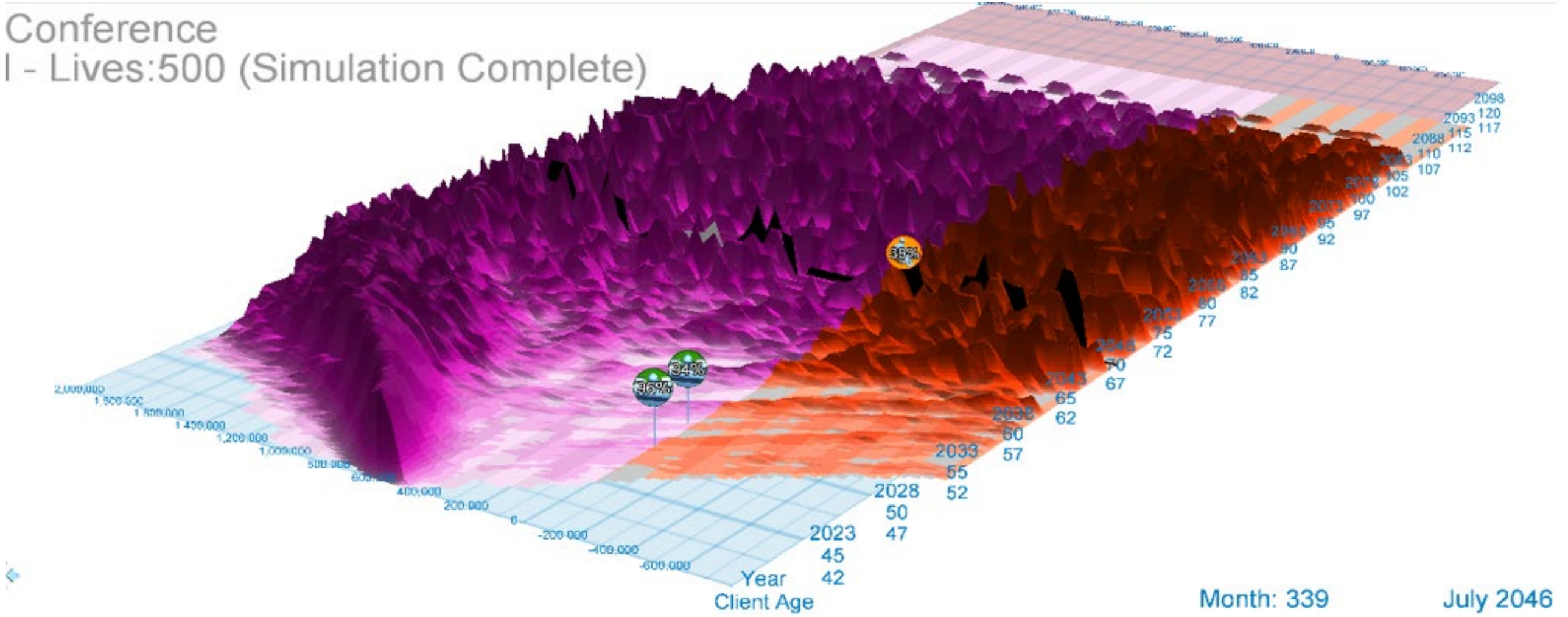
Long-term returns depend on what happens when the funds are needed

Table 1

Real equity returns in key markets over selected periods

Period (calendar years)		Real rate of return (%) over the period						
		USA	UK	France	Germany	Japan	World	World ex-US
Six worst episodes								
1914–18:	World War I	–18	–36	–50	–66	66	–31	–35
1929–31:	Wall Street Crash	–61	–31	–44	–59	11	–54	–44
1939–48:	World War II	22	34	–41	–88	–96	–12	–41
1973–74:	Oil shock/recession	–52	–71	–40	–26	–49	–47	–39
2000–02:	Internet 'bust'	–42	–38	–45	–58	–49	–44	–46
2008	Credit/banking crash	–38	–33	–41	–43	–41	–41	–44

When we allow for the uncertainty in the room it dominates the picture



The Household – elements of the solution

- **Risk defined around OUTCOMES, not portfolio volatility**
- **What outcomes are visceral, versus nice-to-have?**
- **How can we de-risk critical outcomes?**
- **How should we model adaptive decision-making through time as part of risk management in planning tools?**
- **Increased willingness to take risk on nice-to-haves, if that is partitionable – the concept of play?**
- **Articulating the trade-offs**
  - Planned
  - Unplanned
- **The levers are a function of timescale**
  - **Returns to human capital**
  - **Mitigating tail risks/ new product design**
  - **Expectations from Government and Employers**

How can households solve for that picture?

- What cashflows and risks should the household focus on?
- What role have or should employers play in solving employees needs/desires?
- What does the household need from Government? How likely is that to happen?

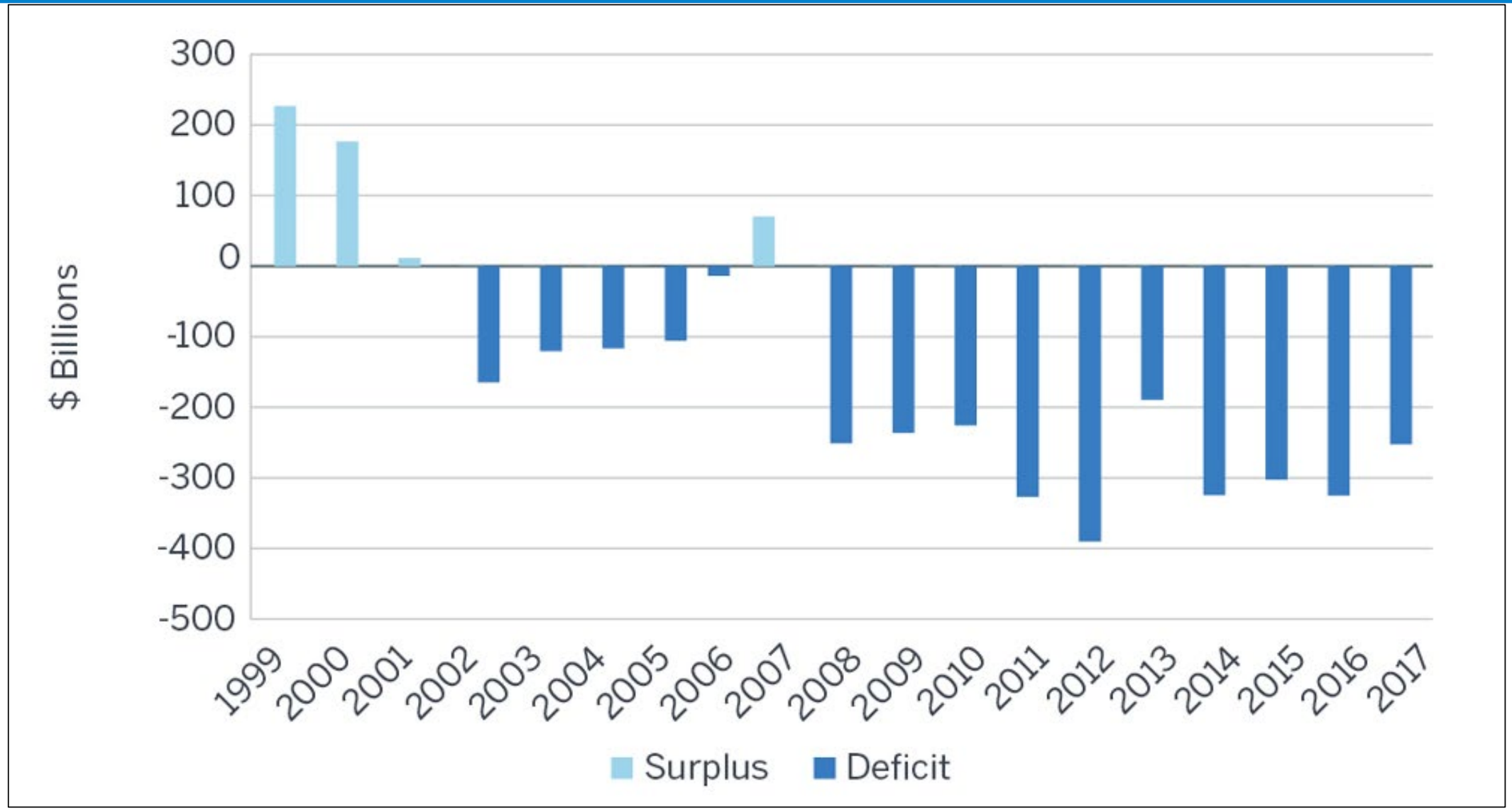
The Corporate Dilemma: Eliminating or mitigating tail risks

Scenario for decision:

- You are the CFO of a large public company
- Your DB pension plan is 140% funded
- Expected return on plan assets is 1% below norm but 3% above discount rate on obligations, the spread is reflected in operating income under GAAP
- To minimize future risks, bankers advise defeasing risk by transferring assets and obligations to an insurance company, who ALM match using a discount rate on obligations 2% below your current rate.
- This would reduce your operating income and EPS by about 20% for the next few years.

Would you agree to defease by transferring the plan assets and pension obligation to the insurance company?	
1.	Yes
2.	No

Private Pension Deficits Grow or Persist Despite Recent High Asset Returns



Source: The Milliman Private Pension Funding Study annually explores the funded status of the 100 largest U.S. private pension plans.

Why did companies fall into the pension/OPEB money pit?

- Lack of understanding of the issues and difficulty in extrapolating micro to macro
- Actuarial missteps….mistakes…..over-reliance on statistics and historic data analysis versus substance including lack of focus on ALM
- Misguided tax policy and regulatory rules
- **A misleading accounting rule that created "the cocaine of the CFO"**
- Limited focus by investors and analysts especially before late 1990s

THE WALL STREET JOURNAL.
WSJ.com

BUSINESS | October 19, 2012, 5:14 p.m. ET

AT&T to Place $9.5 Billion in Equity in Pension Plan

2012

AT&T

By THOMAS GRYTA

AT&T Inc. plans to contribute $9.5 billion in preferred equity to its underfunded pension plan, making it the latest company forced to address massive obligations accentuated by low interest rates.

Companies have tried to shore up their pension obligations, which tend to increase in a low interest-rate environment because the present value of those future payments rises. Earlier this week, Verizon Communications Inc. agreed to settle $7.5 billion in pension obligations, about a quarter of its total, through an asset transfer to a unit of Prudential Financial Inc. General Motors Co. made a similar deal with Prudential earlier this year.

AT&T's pension was underfunded by more than $10 billion at the end of last year, but its strategy

BUSINESS | February 3, 2013, 11:00 p.m. ET

Low Rates Force Companies to Pour Cash Into Pensions

2013

By MIKE RAMSEY and VIPAL MONGA

Ford Motor Co. expects to spend $5 billion this year shoring up its pension funds, almost as much as the auto maker spent last year building plants, buying equipment and developing new cars.

The nation's second-largest auto maker is one of a who's who of U.S. companies pouring cash into pension plans now being battered by record low interest rates. Verizon Communications Inc. contributed $1.7 billion to its pension plan in the fourth quarter and—highlighting companies' sensitivity to this issue—Boeing Co. now reports "core earnings" to separate out pension expenses.

Did management and investors make the right decisions in prior years?

How easily could these outcomes have been prevented?

Could they or you have built any of this into your forecasts?

AT&T Posts Pension Hit As Rates Fall and Mortality Increases

Management Myopia!

?

CFO Journal.
THE WALL STREET JOURNAL.

January 16, 2015, 6:47 PM ET

Telecommunications company AT&T Inc. announced late Friday that it will take a noncash hit of $7.9 billion on its pension and postretirement plans.

2015

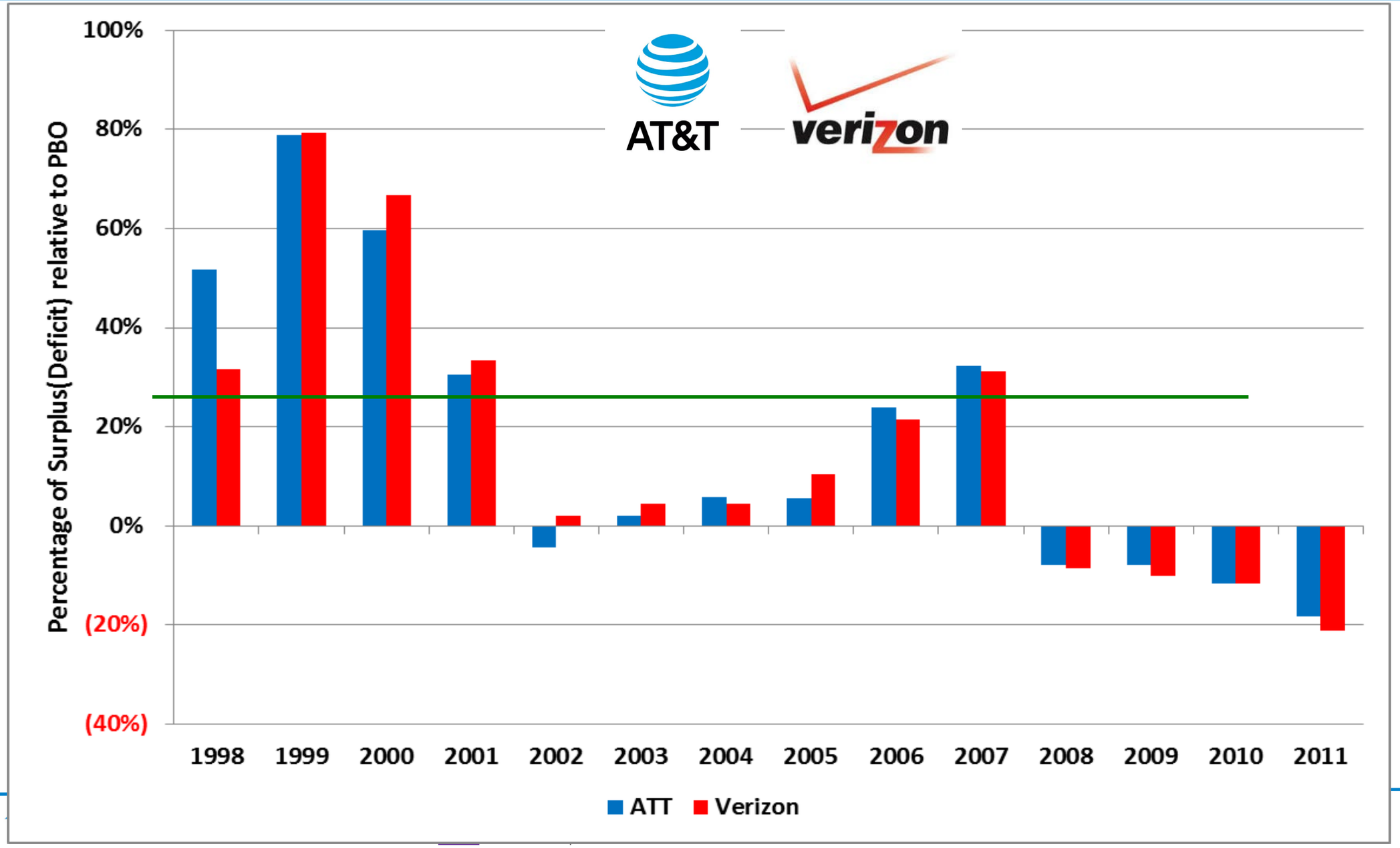
AT&T

The company said it dropped its discount rate, used to calculate the present-day value of future pension obligations, to 4.2% from 5% at the end of 2014. Pension obligations rise when the rate falls.

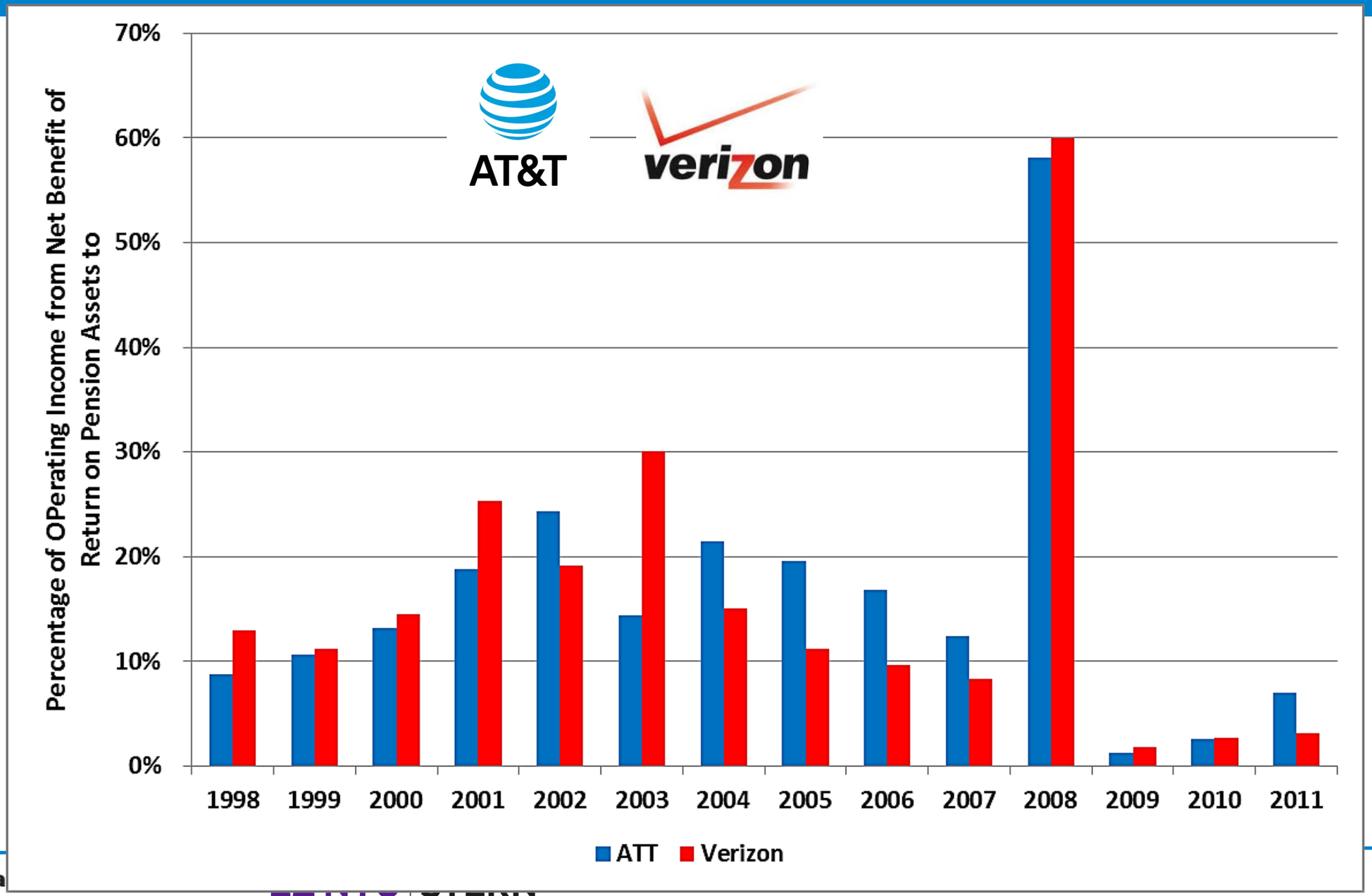
AT&T had a pension obligation of $56.6 billion at the end of 2013.
The drop in the discount rate more than offset gains in the value of pension assets last year.
The fall caused pension deficits to more than double, to $343 billion at 40% of the Fortune 1000 companies that have defined-benefit pension plans and December fiscal-year-ends, according to consulting firm Towers Watson .

AT&T also said that it used updated mortality tables to calculate the liability, which helped push the number up. The Society of Actuaries updated its mortality tables in 2014 for the first time since 2000 to reflect the longer lifespans of today's retirees.

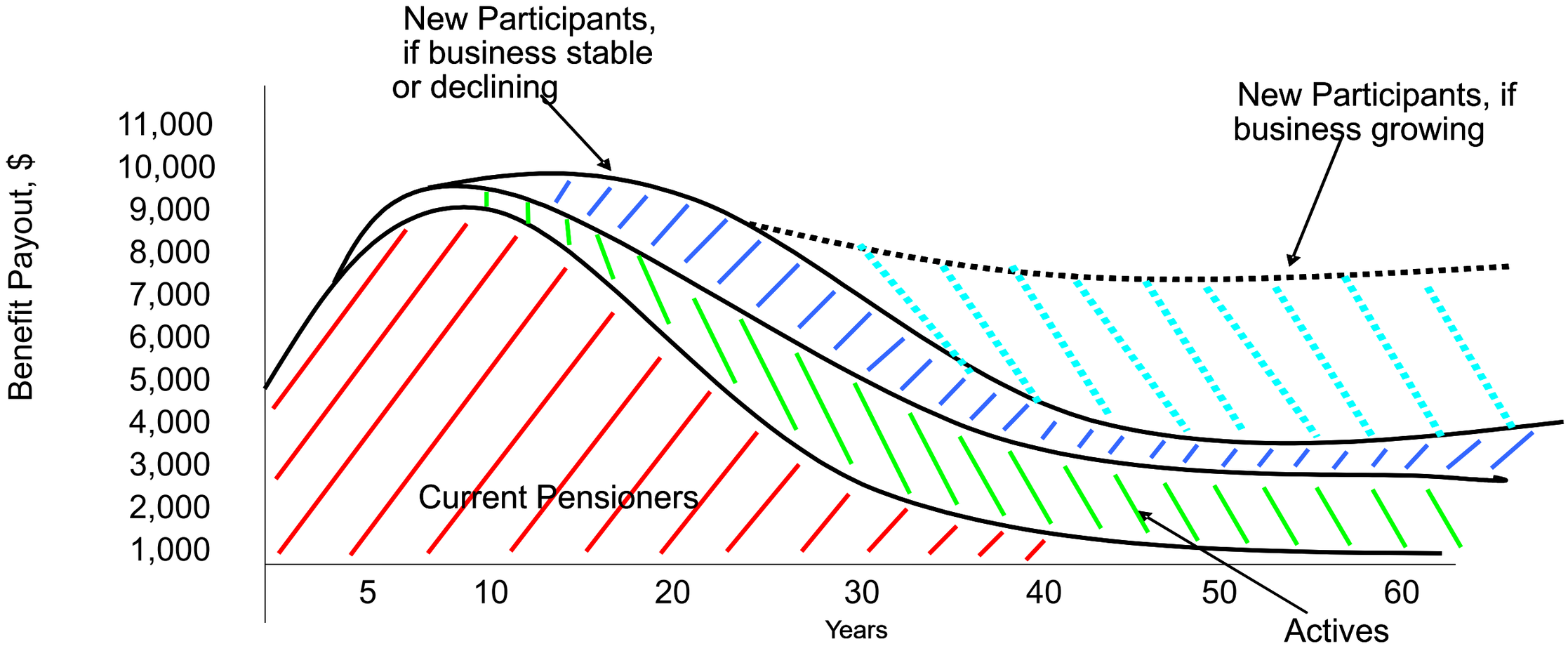
How Company Managements Hurt Investors – US Telecom



Why Company Managements Hurt Investors – US Telecom



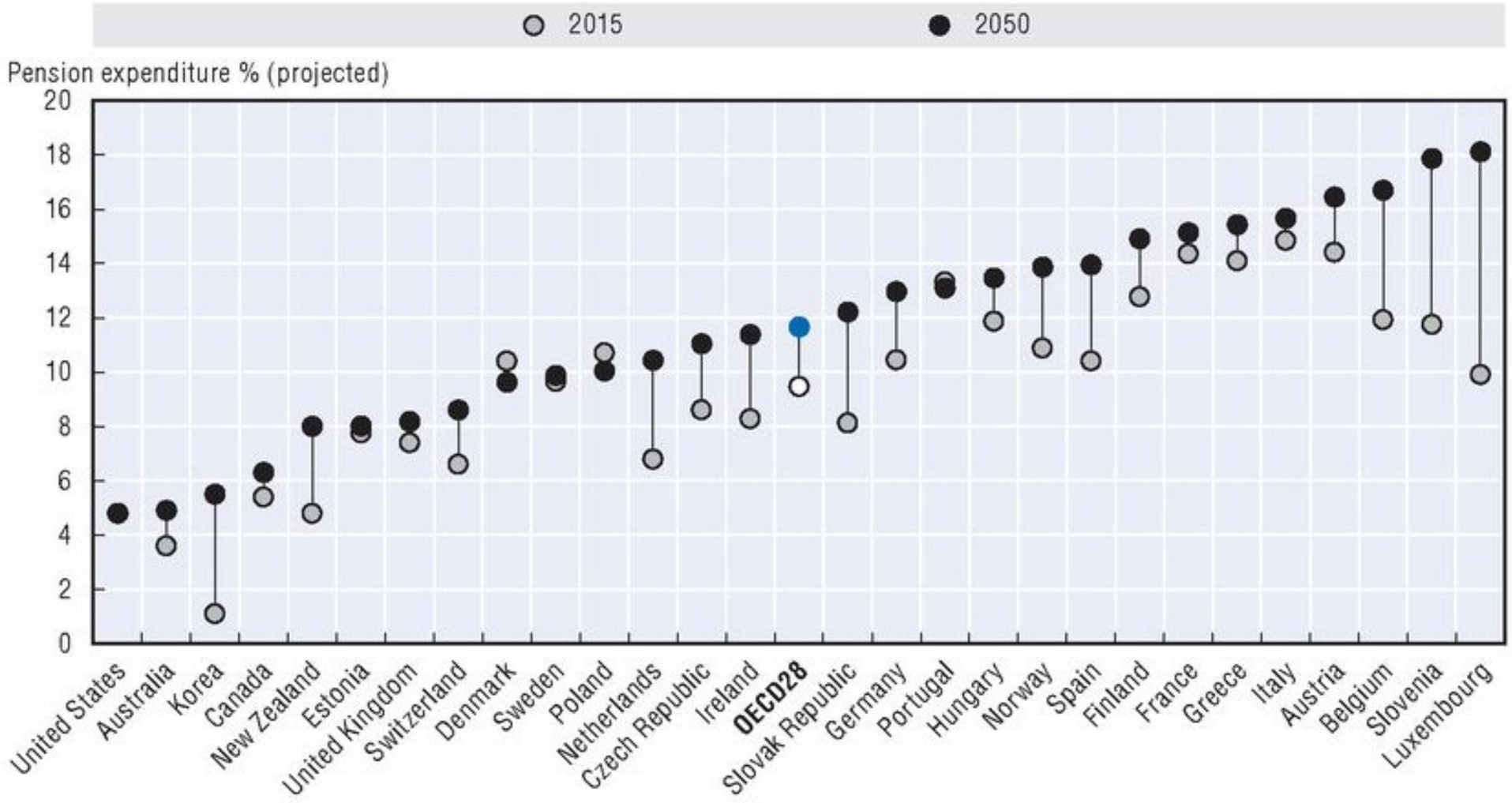
Pension Payments for a Mature Company (or Region)



Source: Morgan Stanley Research, See "Pension Missiles: Is the Cure Worse than the Disease?" March 25, 2004

The Issue is Not Just Companies?

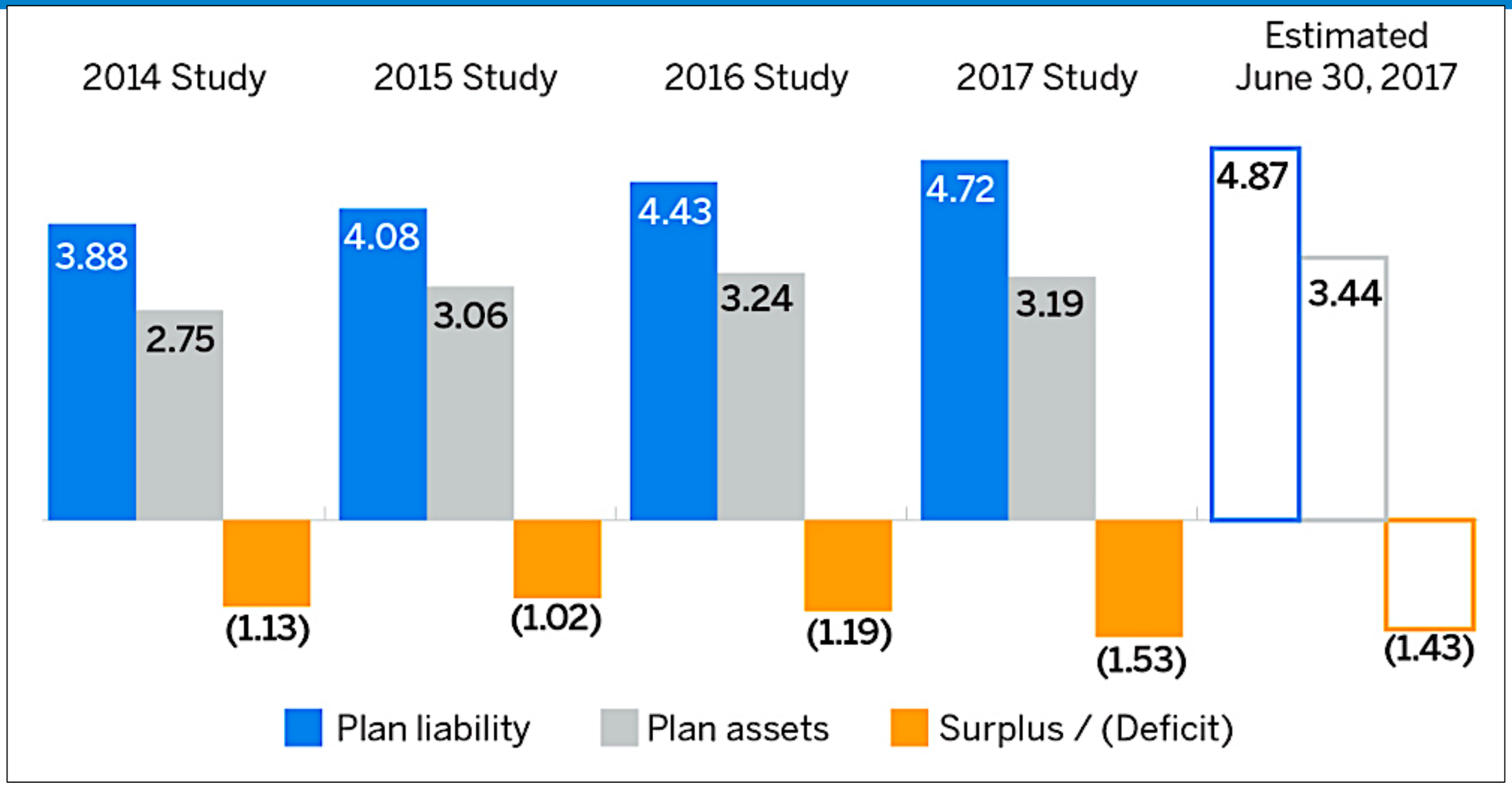
Figure 2.5. **Projections of public pension expenditure as a share of GDP from 2015 to 2050**



Who is going to pay for this?

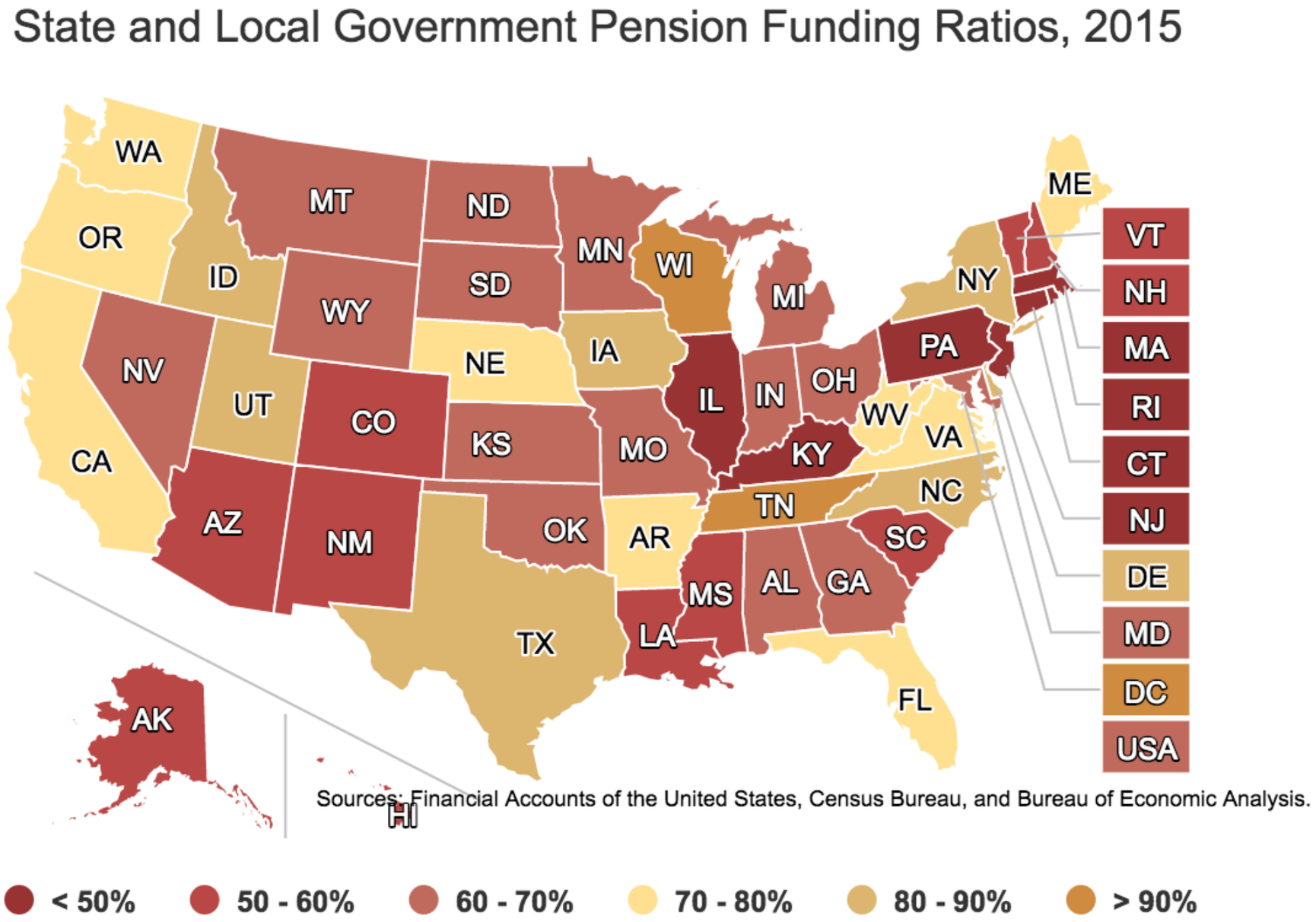
OECD (2014), *OECD Pensions Outlook 2014*, OECD Publishing

U.S. Public Pension Deficits Also Grow or Persist



Source: The Milliman Public Pension Funding Study annually explores the funded status of the 100 largest U.S. public pension plans.

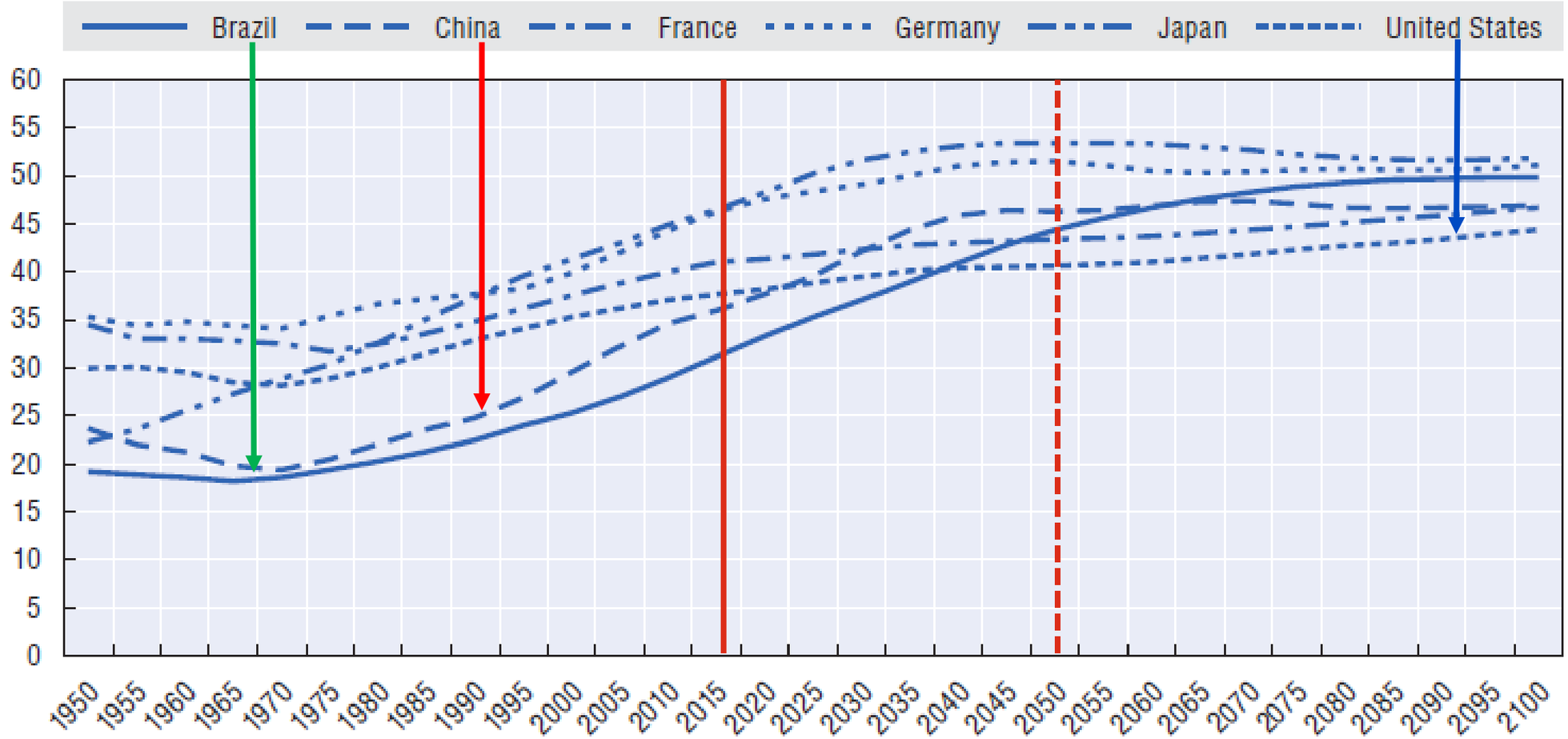
The state of the states



Who is going to pay for this?

The Demographics Dictate the Issue

Figure 1.1. **Increase in the median age of the population for selected countries, 1950-2100**



Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2012 Revision.

Bank of America
Merrill Lynch

2015

2050

Germany
21% → 33%

Russia
13% → 20%

Spain
18% → 35%

United States
15% → 21%

Italy
22% → 33%

China
9% → 24%

Japan
26% → 37%

India
5% → 13%

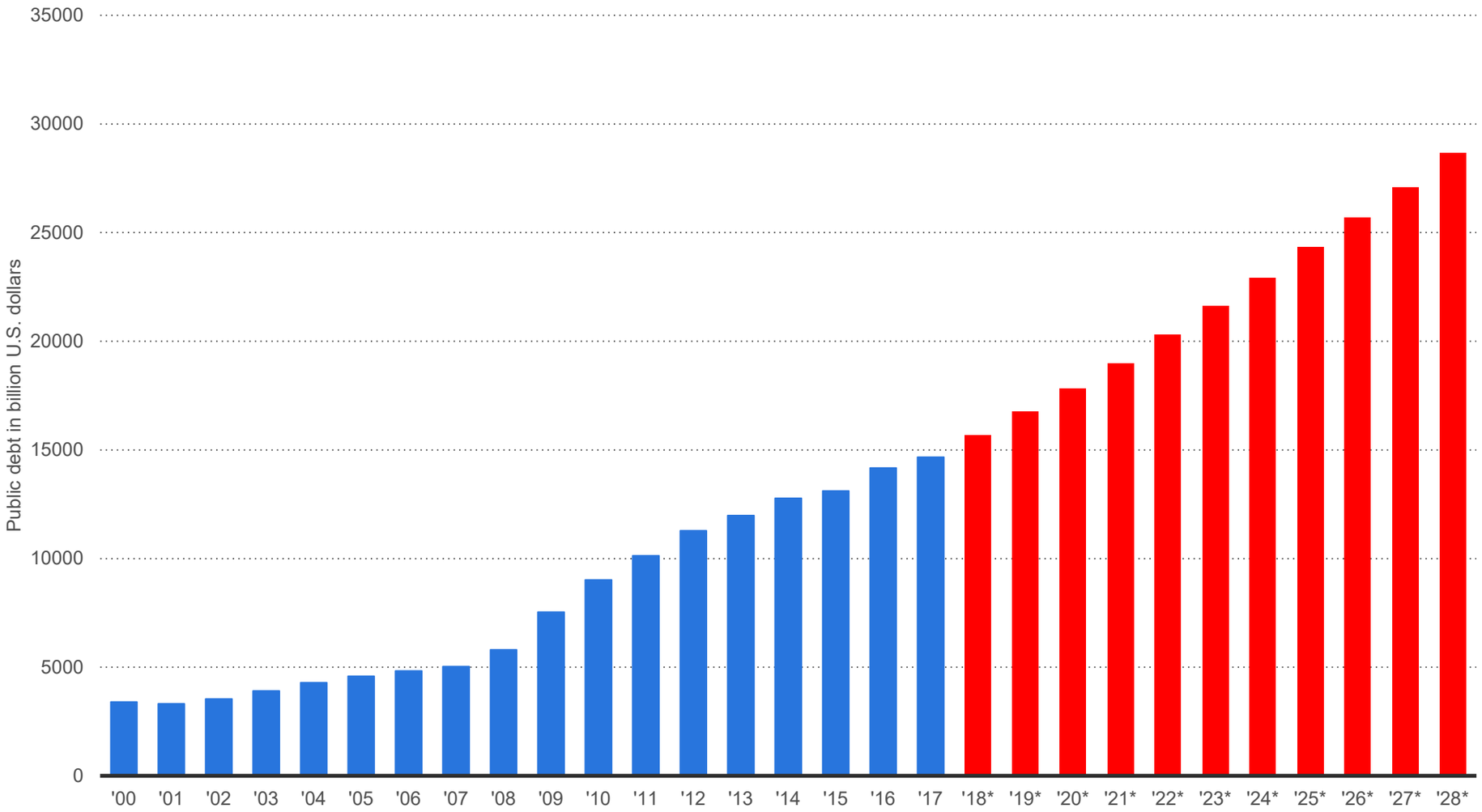
Brazil
8% → 23%

Australia
15% → 22%

% of population 65+
- > 30%
- 25-30%
- 20-25%
- 15-20%
- 10-15%
- 5-10%
- 0-5%

Source: Mapping Worlds. UN DESA

Public debt levels in the United States - past and forecast from 2000 to 2017, projected up to 2028 (in billion U.S. dollars)



In 2028 **EACH** US person (including babies) will owe:

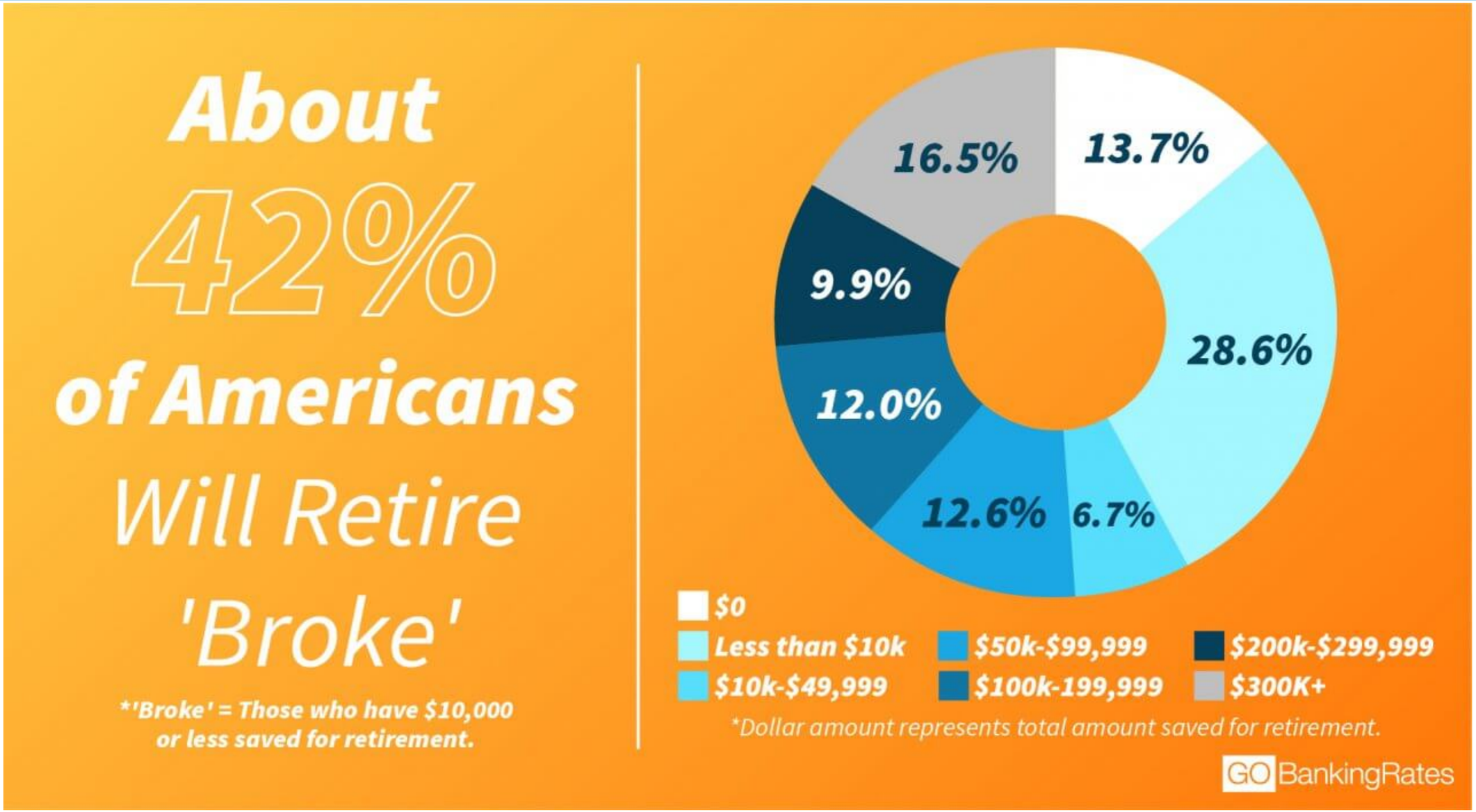
$82,000

Note: United States; 2000 to 2017

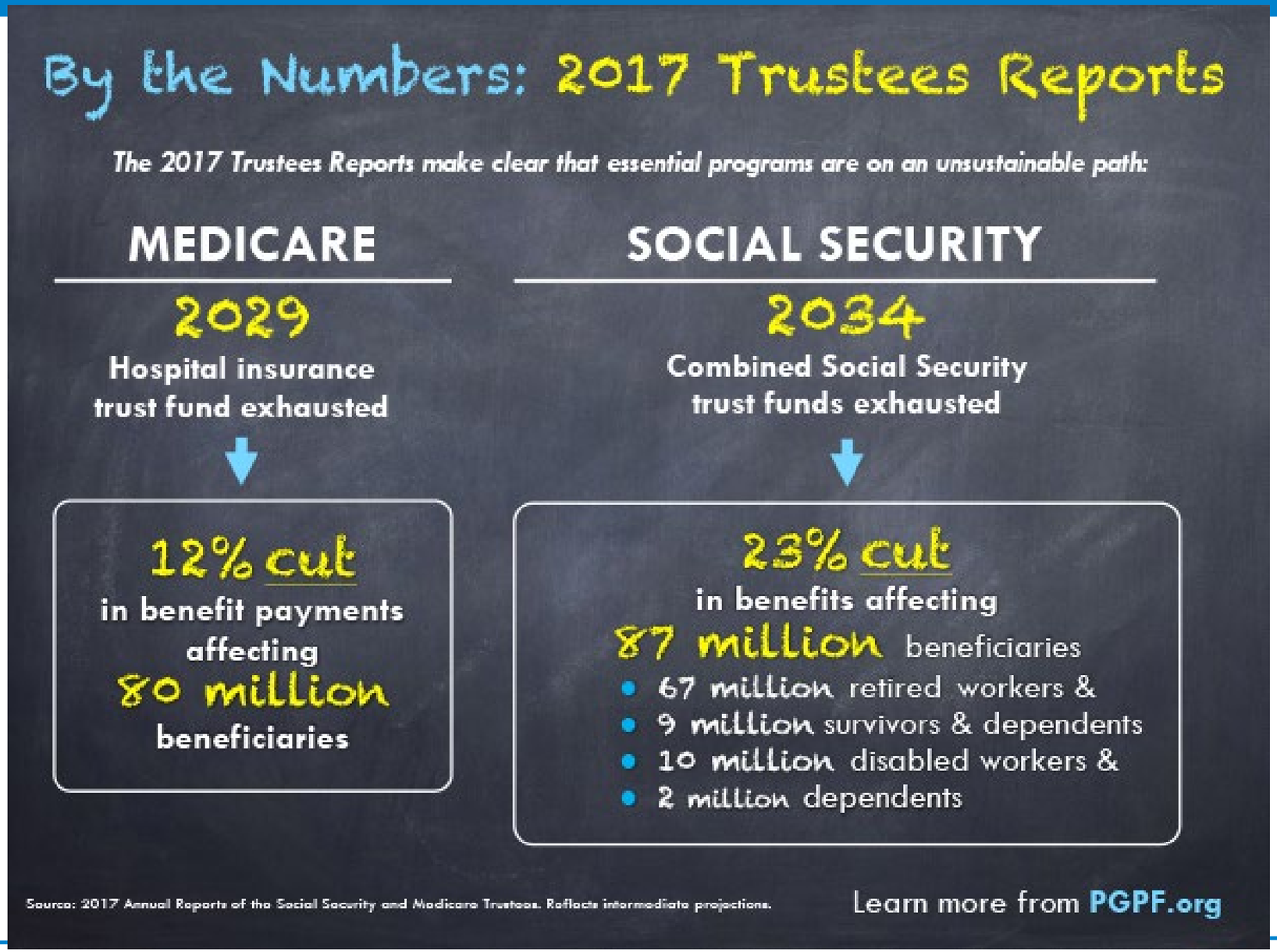
Further information regarding this statistic can be found on page 8.

Source: U.S. Congressional Budget Office ID 217404

What does this do to the Social Contract --- Who is Going to Pay?



What can the Federal Government do?



Some Key Takeaways

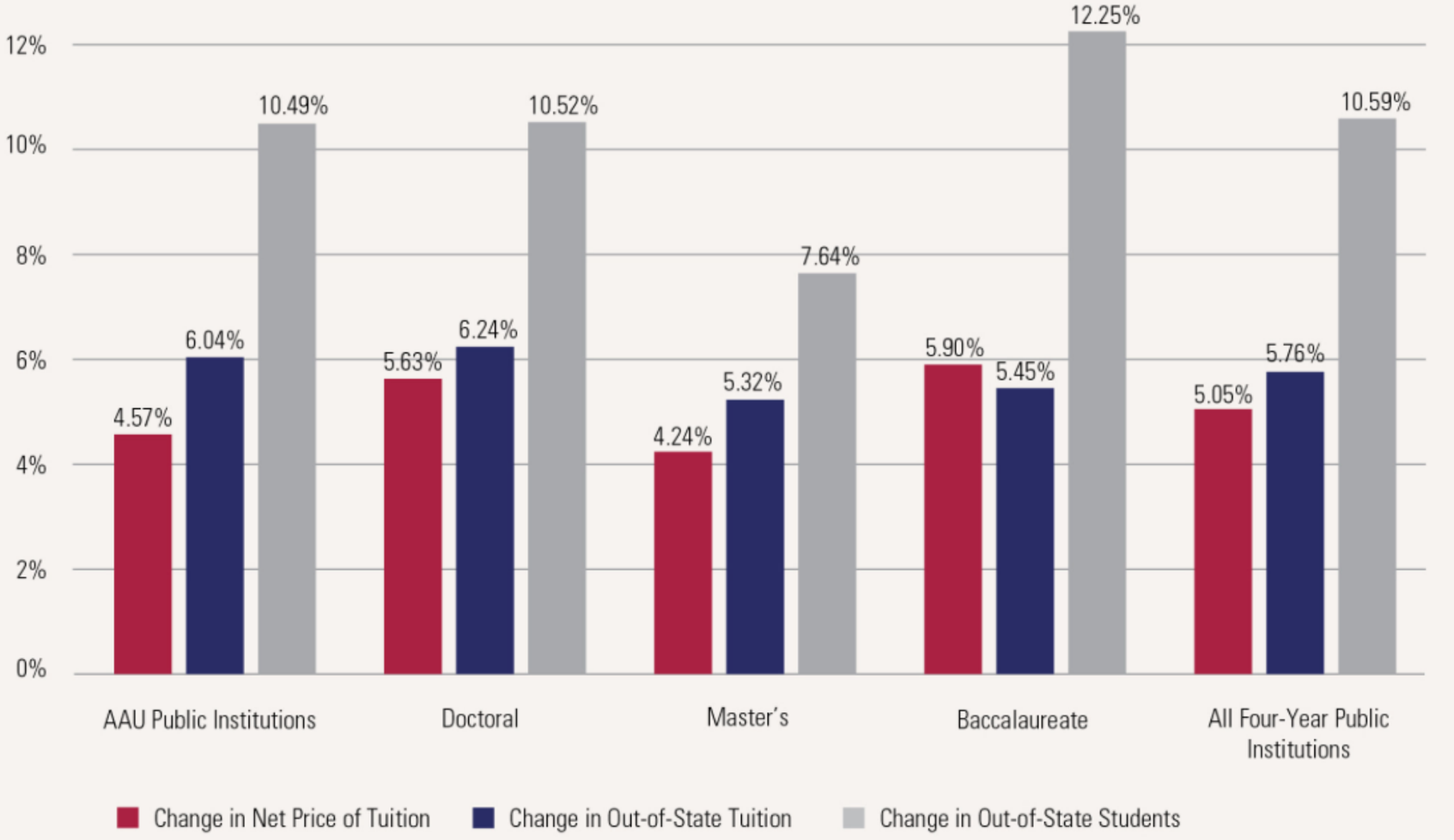
- The feasibility of achieving desired outcomes has to incorporate significant uncertainties
- The question of how we should measure and disclose the issues and outcomes related to this long run uncertainty (that distorts ALM) is an issue accountants should have a comparative advantage in assessing
- To date actuaries, asset managers as well as corporate and government accounting standards have done a poor job of measurement and providing information
- Current approaches of mean-variance and expected value analysis are inadequate and more data alone is not going to solve the problems
- The issues pervade many individual, corporate and government economic outcomes with potentially significant implications for each of us

Excluded slides

Rising Costs of Annual Tuition and Fees (Alternative slide)

FIGURE 2

Percent Change in Net Price of Tuition, Out-of-State Tuition, and Out-of-State Students at Four-Year Public Institutions, 2012–14



Source: National Center for Education Statistics, IPEDS Data Center, http://nces.ed.gov/ipeds.datacenter. Data compiled by the AAUP Research Office for the Faculty Compensation Survey.

Who is going to pay for this?

The Verizon Story

Obligations and Funded Status

(dollars in millions)

At December 31,	Pension 2008	Pension 2007	Health Care and Life 2008	Health Care and Life 2007
Change in Benefit Obligations				
Beginning of year	$ 32,495	$ 34,159	$ 27,306	$ 27,330
Service cost	382	442	306	354
Interest cost	1,966	1,975	1,663	1,592
Plan amendments	300	–	24	–
Actuarial (gain) loss, net	(154)	123	(483)	(409)
Benefits paid	(2,577)	(4,204)	(1,529)	(1,561)
Termination benefits	32	–	7	–
Curtailment gain	–	–	(29)	–
Acquisitions and divestitures, net	(183)	–	(169)	–
Settlements	(1,867)	–	–	–
End of year	$ 30,394	$ 32,495	$ 27,096	$ 27,306
Change in Plan Assets				
Beginning of year	$ 42,659	$ 41,509	$ 4,142	$ 4,303
Actual return on plan assets	(10,680)	4,591	(1,285)	352
Company contributions	487	737	1,227	1,048
Benefits paid	(2,577)	(4,204)	(1,529)	(1,561)
Settlements	(1,867)	–	–	–
Acquisitions and divestitures, net	(231)	26	–	–
End of year	$ 27,791	$ 42,659	$ 2,555	$ 4,142
Funded Status				
End of year	$ (2,603)	$ 10,164	$ (24,541)	$ (23,164)

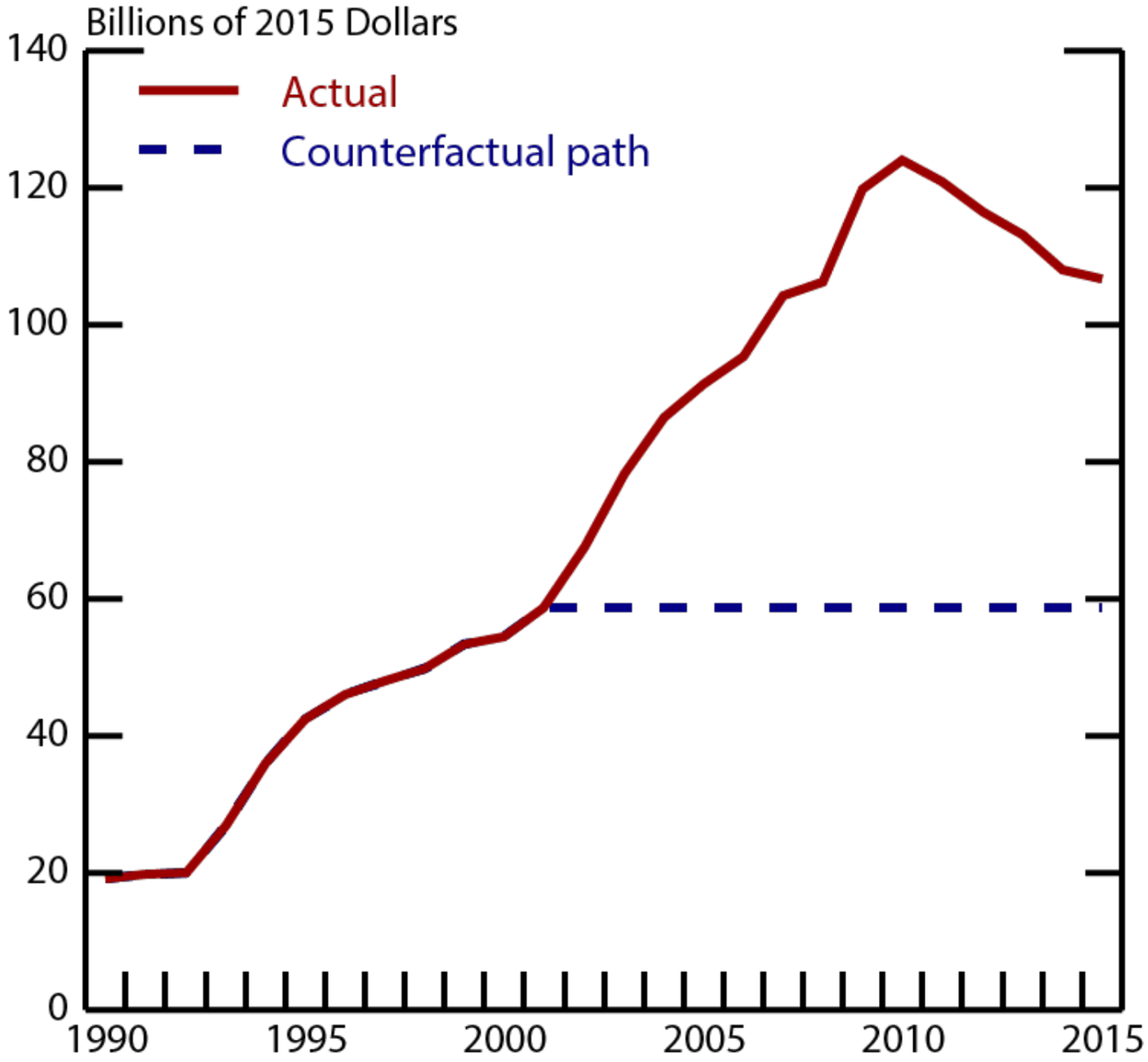
Net Periodic Cost

The following table displays the details of net periodic pension and

Years Ended December 31,	2008	2007
Service cost	$ 382	$ 442
Interest cost	1,966	1,975
Expected return on plan assets	(3,187)	(3,175)
Amortization of prior service cost	62	43
Actuarial loss, net	40	98
Net periodic benefit (income) cost	(737)	(617)
Termination benefits	32	–
Settlement loss	364	–
Curtailment loss and other, net	–	–
Subtotal	396	–
Total (income) cost	$ (341)	$ (617)

Verizon Posts Loss On Pension, Severance Costs Jan. 22, 2015 7:23 a.m. ET

Student Loans in the US



"Between 2001 and 2016, the real amount of student debt owed by American households more than tripled, from about $340 billion to more than $1.3 trillion. The increase largely reflects an acceleration in student loan originations that was **mainly due to a surge in college enrollment and ongoing increases in real tuition levels**."

How long can this be sustained?
What are the implications for you?

Source: FEDS Notes "Student Loan Debt and Aggregate Consumption Growth", Laura Feiveson, Alvaro Mezza, and Kamila Sommer March 2018