# A Multifaceted Analysis of Solvency and Sustainability of the US Social Security System

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# The US Social Security System

## The triple financial challenges

- Stability
- Solvency
- Sustainability

## The fixed payroll tax rate

- Design leads to actuarial imbalance
- Sustainability compromised

# The US Social Security System

- Cash transfer system
- Asset-income cash flow stream
- Liability-outgo cash flow stream
- Stabilization fund
- Index of Solvency (cash flow adequacy)
- Actuarial equilibrium
- Payroll tax and stability

# Measurement Framework

- Solvency metrics from 1983 baseline
- Projection periods: 25, 50, 75 years
- Economic and demographic variables
- Stochastic methodology
- Alternative scenarios assumption sets
- Secular trend over time
- Historical trends 1991-2018

# Nature of the Challenge

"It is always wise to look ahead, but difficult to look further than you can see."          Winston Churchill

"It's difficult to make predictions, especially about the future."                          Yogi Berra

"The times, they are a-changing."

Bob Dylan

"Just when you get it straightened out, it twists around again."                    Alice in Wonderland

# What would Einstein say?

- Social Security finance is multifaceted with solvency and sustainability comprising a multidimensional, ever-changing, dynamic multivariate stochastic and kinetic secular system operating in time and space with uncertainty and subject to endogenous and exogenous shocks.

- So, how to measure an ever-changing uncertain and dynamic system?

- Think like a physicist-statistician-economist.

# Asset-Income and Liability-Outgo Expense Rates

### (Percent of Covered Payroll)*

***Asset Income Rate  =***

$$\frac{Payroll\ Tax\ Income\ +\ Benefit\ Taxation\ Income\ +\ Trust\ Fund\ Assets}{Total\ Taxable\ Payroll}$$

***Liability Outgo Expense Rate  =***

$$\frac{Benefit\ Expenses\ +\ Administrative\ Expenses}{Total\ Taxable\ Payroll}$$

**\*** Based on actuarial values of income and expenses in specific projection periods, expressed as percent of corresponding projected covered payroll

# Asset-Income and Liability-Outgo Expense Rates
## (Percent of Covered Payroll)

| Projection Period | Projection Basis: 1991 | | | Projection Basis: 2018 | | |
|---|---|---|---|---|---|---|
| | Low-Cost | Intermediate | High-Cost | Low-Cost | Intermediate | High-Cost |
| | Asset-Income Rates (%) | | | Asset-Income Rates (%) | | |
| 25 Years | 13.09 | 13.14 | 13.20 | 14.36 | 14.59 | 14.89 |
| 50 Years | 13.01 | 13.10 | 13.19 | 13.77 | 14.01 | 14.31 |
| 75 Years | 13.00 | 13.11 | 13.25 | 13.59 | 13.84 | 14.18 |
| | Liability-Outgo Expense Rates (%) | | | Liability-Outgo Expense Rates (%) | | |
| 25 Years | 10.06 | 11.20 | 12.55 | 13.72 | 15.72 | 18.05 |
| 50 Years | 11.21 | 13.05 | 15.13 | 13.46 | 16.18 | 19.54 |
| 75 Years | 11.53 | 14.04 | 17.15 | 13.31 | 16.52 | 20.61 |

# Social Security Solvency Index

Based on specific projection periods and assumption sets

$$\textit{Social Security Solvency Index } =$$

$$\left( \frac{\textit{Asset Income Rate}}{\textit{Liability Outgo Expense Rate}} \right) *100$$
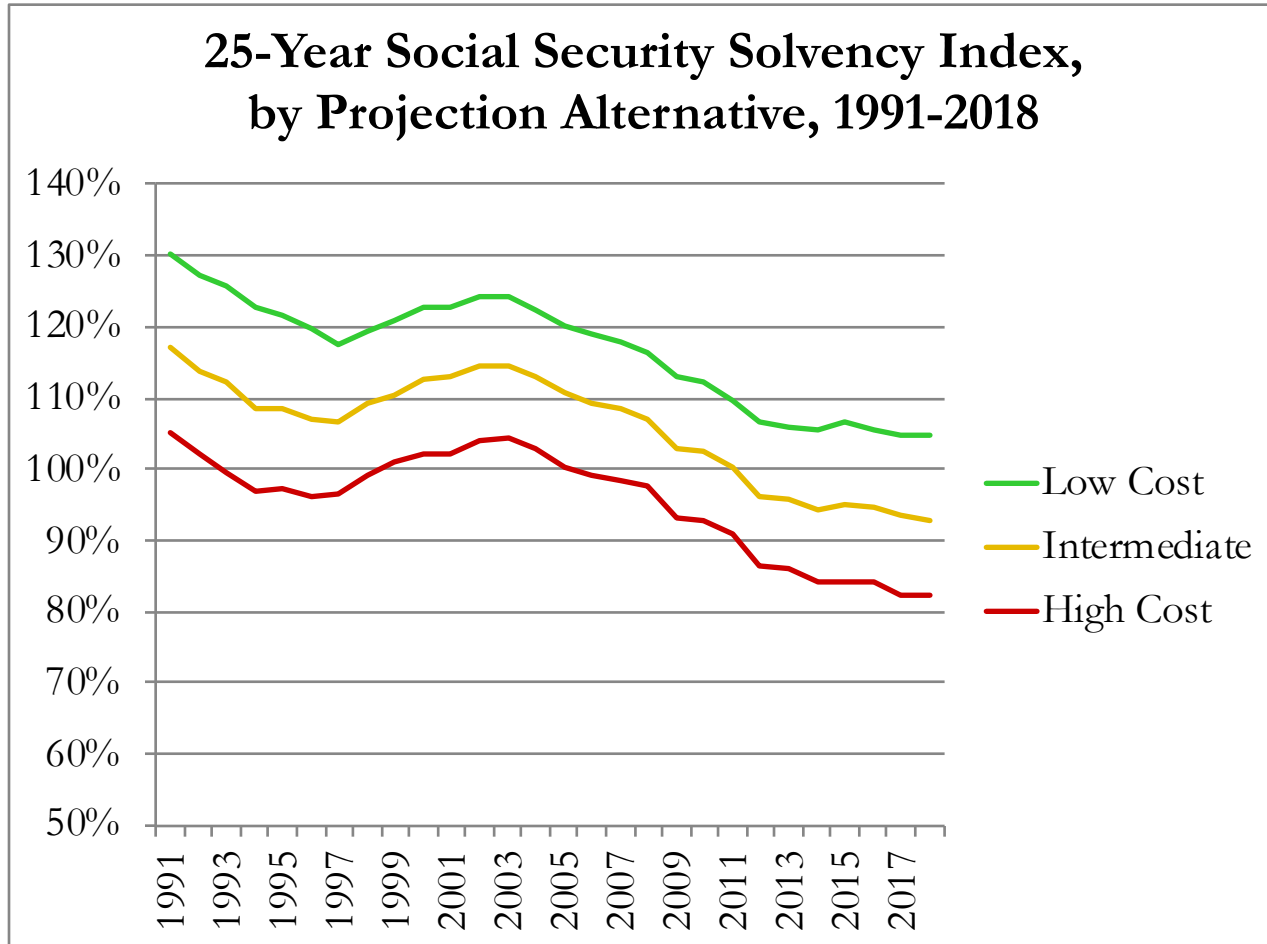
# Social Security Solvency Index

| Projection Period | Projection Basis: 2018 | | |
|---|---|---|---|
| | Low-Cost | Intermediate | High-Cost |
| | Social Security Solvency Index (%) | | |
| 25 Years | 104.66 | 92.81 | 82.49 |
| 50 Years | 102.30 | 86.59 | 73.23 |
| 75 Years | 102.10 | 83.78 | 68.80 |

# Social Security Solvency Index

| Year * | Projection Period: 25 Years | | |
| --- | --- | --- | --- |
| | Low-Cost | Intermediate | High-Cost |
| | Social Security Solvency Index (%) | | |
| 1994 | 122.87 | 108.36 | 96.83 |
| 1998 | 119.39 | 109.14 | 98.99 |
| 2002 | 124.41 | 114.41 | 104.16 |
| 2006 | 119.04 | 109.35 | 99.06 |
| 2010 | 112.19 | 102.46 | 92.95 |
| 2014 | 105.45 | 94.49 | 84.28 |
| 2018 | 104.66 | 92.81 | 82.49 |

\* Only select years of underlying data displayed

# Social Security Solvency Index



**25-Year Social Security Solvency Index, by Projection Alternative, 1991-2018**

Legend: Low Cost, Intermediate, High Cost

# Social Security Solvency Index

| Year * | Projection Period: 50 Years | | |
|---|---|---|---|
| | Low-Cost | Intermediate | High-Cost |
| | Social Security Solvency Index (%) | | |
| 1994 | 110.61 | 92.85 | 80.04 |
| 1998 | 105.35 | 92.21 | 80.13 |
| 2002 | 107.93 | 95.11 | 82.81 |
| 2006 | 105.84 | 93.29 | 81.17 |
| 2010 | 105.61 | 92.16 | 79.63 |
| 2014 | 101.39 | 86.70 | 73.80 |
| 2018 | 102.30 | 86.59 | 73.23 |

**\*** Only select years of underlying data displayed
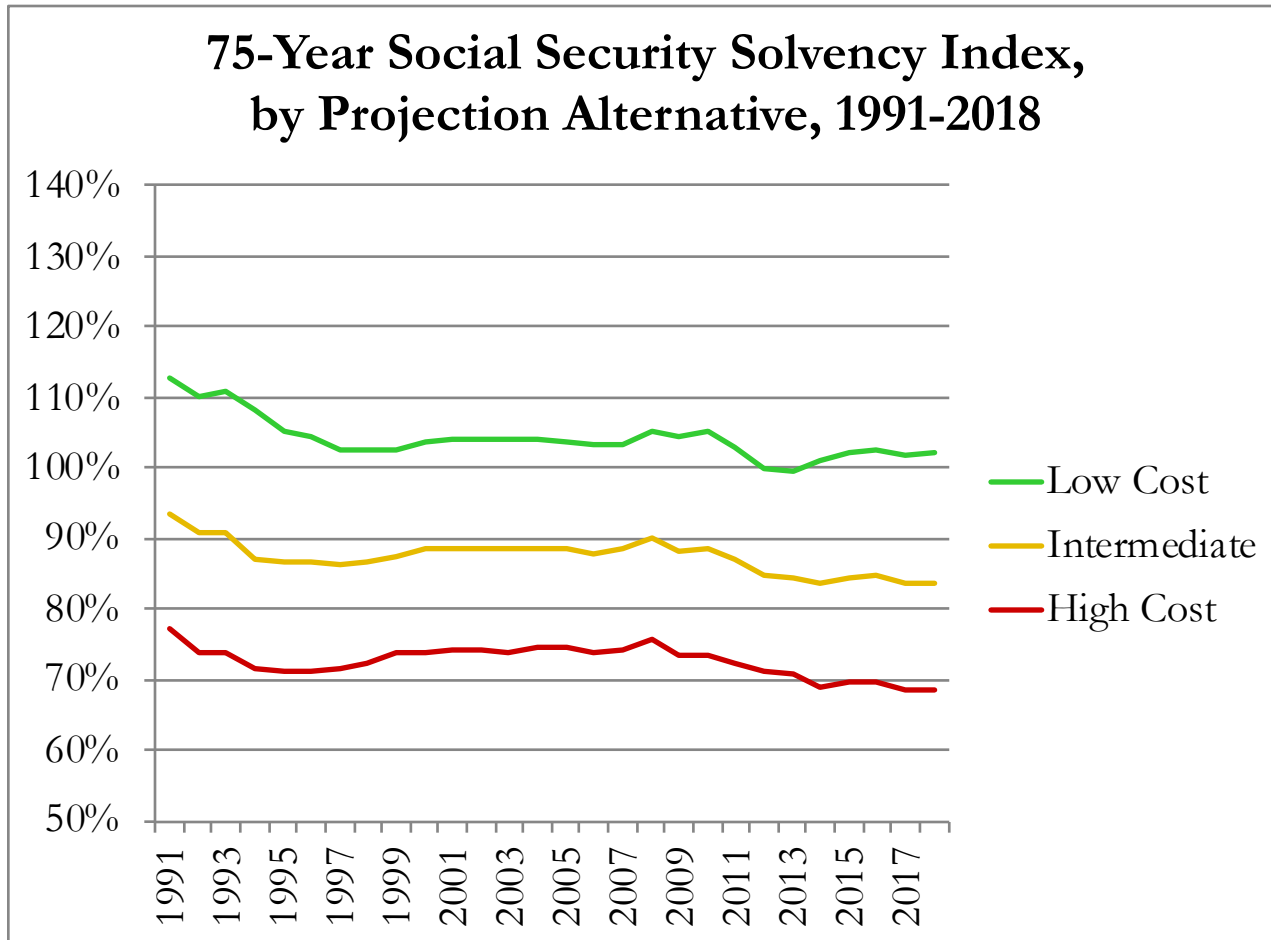
# Social Security Solvency Index



**50-Year Social Security Solvency Index, by Projection Alternative, 1991-2018**
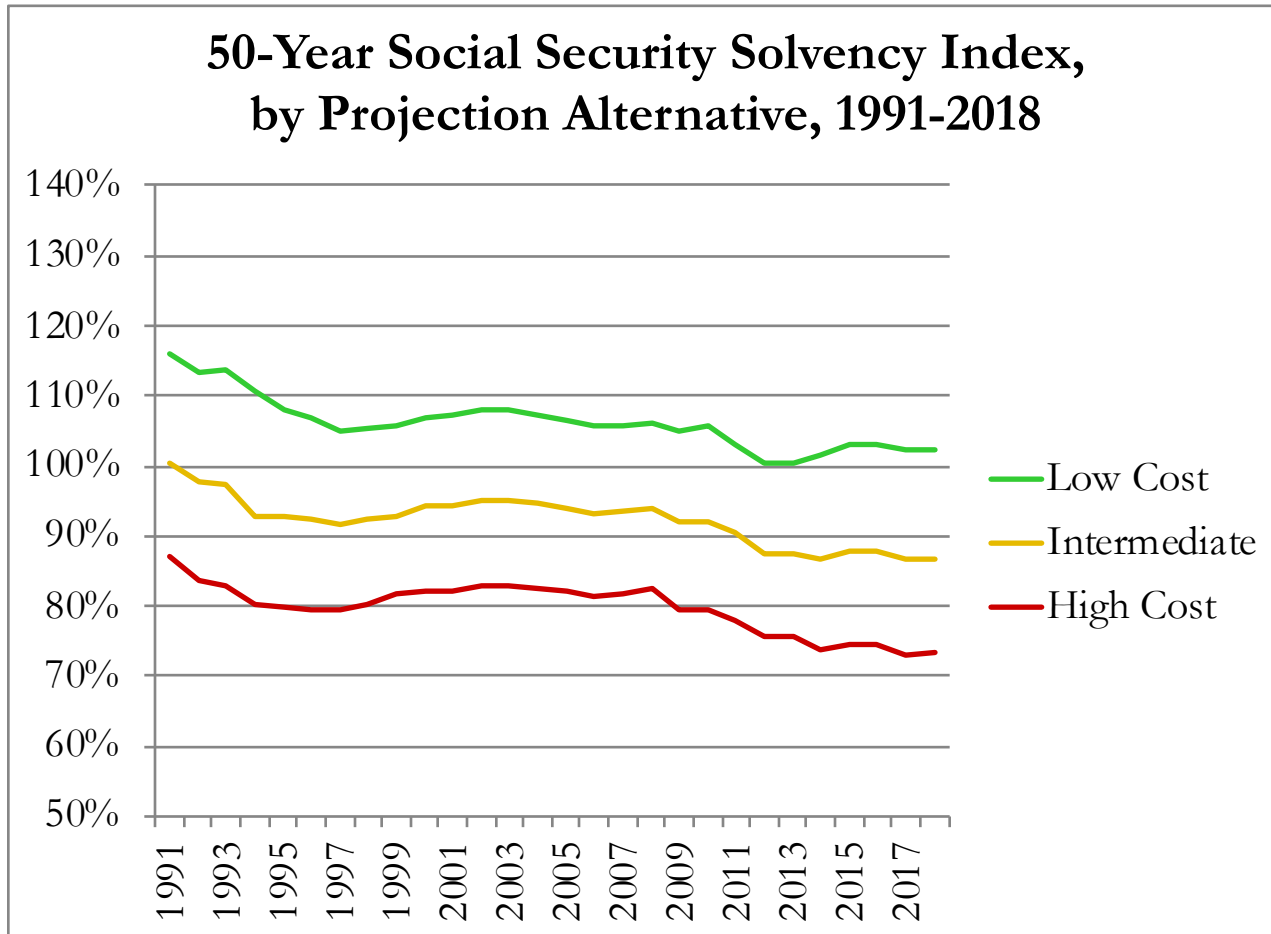
# Social Security Solvency Index

| Year * | Projection Period: 75 Years | | |
|---|---|---|---|
| | Low-Cost | Intermediate | High-Cost |
| | Social Security Solvency Index (%) | | |
| 1994 | 108.36 | 87.05 | 71.54 |
| 1998 | 102.70 | 86.77 | 72.24 |
| 2002 | 104.21 | 88.80 | 74.25 |
| 2006 | 103.46 | 88.07 | 73.80 |
| 2010 | 105.40 | 88.78 | 73.66 |
| 2014 | 100.96 | 83.57 | 68.95 |
| 2018 | 102.10 | 83.78 | 68.80 |

**\*** Only select years of underlying data displayed

# Social Security Solvency Index



**75-Year Social Security Solvency Index,
by Projection Alternative, 1991-2018**

Legend: Low Cost, Intermediate, High Cost

# The US Social Security System

- Actuarial equilibrium objective

- Payroll tax rates to achieve equilibrium

- Modest secular increase to restore balance

- 25-year solvency trigger mechanism

- Annual rate of increase over ten years

- Question of affordability

- Graduated payroll tax

# Social Security Sustainability Equilibrium Payroll Tax Rates

Based on specific projection periods and assumption sets

***Social Security Sustainability Equilibrium Payroll Tax Rate***

$$= 6.20 + \frac{\textit{Liability Outgo Expense Rate} - \textit{Asset Income Rate}}{2}$$

Payroll tax rate is payable by both employers and employees.

# Social Security Sustainability Equilibrium Payroll Tax Rates

| | Projection Basis: 2018 | | |
|---|---|---|---|
| | Low-Cost | Intermediate | High-Cost |
| **Projection Period** | Social Security Sustainability Equilibrium Payroll Tax Rates (%) | | |
| 25 Years | 5.88 | 6.77 | 7.78 |
| 50 Years | 6.05 | 7.29 | 8.82 |
| 75 Years | 6.06 | 7.54 | 9.42 |

Payroll tax rate is payable by both employers and employees.

# Social Security Sustainability Equilibrium Payroll Tax Rates

| Year * | Projection Assumptions: Intermediate | | |
|--------|------------------------------------|---|---|
|        | 25 Years | 50 Years | 75 Years |
|        | Social Security Sustainability Equilibrium Payroll Tax Rates (%) | | |
| 1994 | 5.69 | 6.71 | 7.19 |
| 1998 | 5.63 | 6.77 | 7.23 |
| 2002 | 5.31 | 6.56 | 7.07 |
| 2006 | 5.58 | 6.71 | 7.14 |
| 2010 | 6.02 | 6.81 | 7.09 |
| 2014 | 6.63 | 7.28 | 7.57 |
| 2018 | 6.77 | 7.29 | 7.54 |

Payroll tax rate is payable by both employers and employees.

**\*** Only select years of underlying data displayed

# Social Security Sustainability Equilibrium Payroll Tax Rates



Social Security Sustainability Equilibrium Payroll Tax Rate, under Intermediate Assumptions, by Projection Period and Year

Legend: 75-year, 50-year, 25-year, Actual Payroll Rate
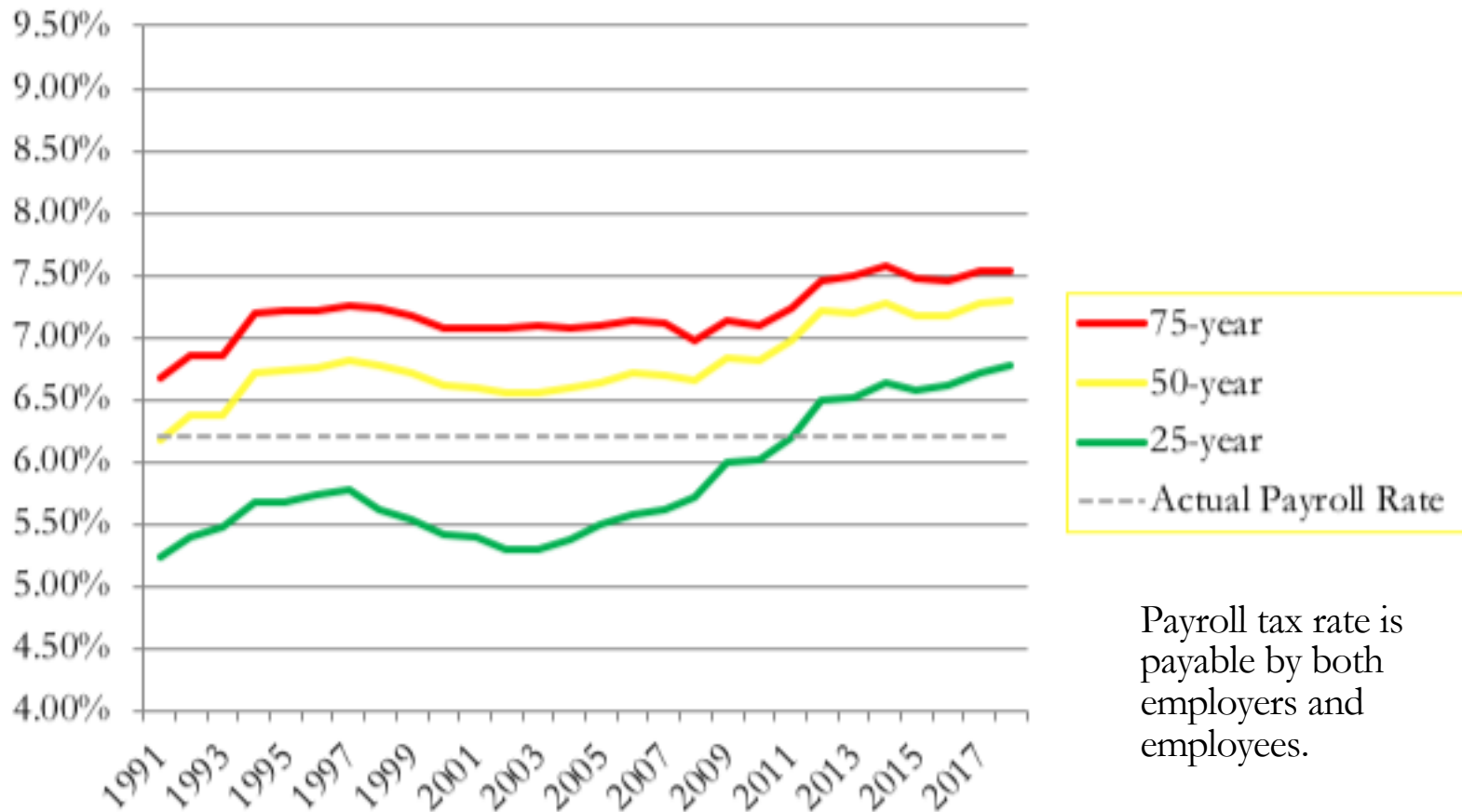
Payroll tax rate is payable by both employers and employees.

# Conclusion & Recommendations

- Suitable metrics for solvency and sustainability
- Disconnect between scheduled benefits and finance compromises sustainability
- Financing logically dynamic
- Secular trend monitoring
- Automatic balancing system
- Graduated payroll tax
- Communicating to policymakers