



# 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 =***

*Payroll Tax Income + Benefit Taxation Income + Trust Fund Assets*

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*Total Taxable Payroll*

***Liability-Outgo Expense Rate =***

*Benefit Expenses + Administrative Expenses*

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*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

***Social Security Solvency Index =***

$$\left( \frac{\text{Asset-Income Rate}}{\text{Liability-Outgo Expense Rate}} \right) * 100$$



# 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

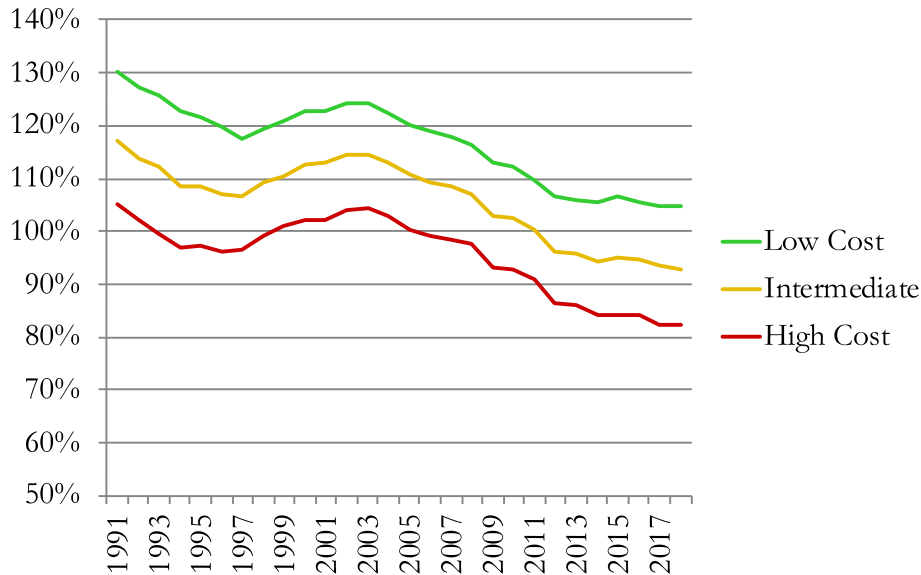
\* Only select years of underlying data displayed





# Social Security Solvency Index

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





# Social Security Solvency Index

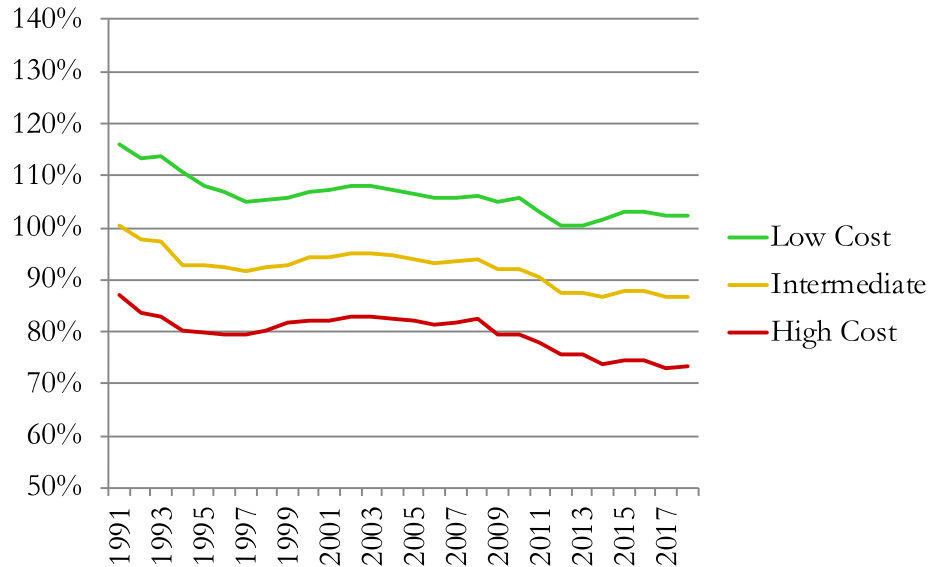
Year *	Projection Period: 50 Years		
	Low-Cost	Intermediate	High-Cost
	Social Security Solvency Index (%)		
1994	110.61	92.85	80.04
1998	105.35	92.21	80.13
2002	107.93	95.11	82.81
2006	105.84	93.29	81.17
2010	105.61	92.16	79.63
2014	101.39	86.70	73.80
2018	102.30	86.59	73.23

\* 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

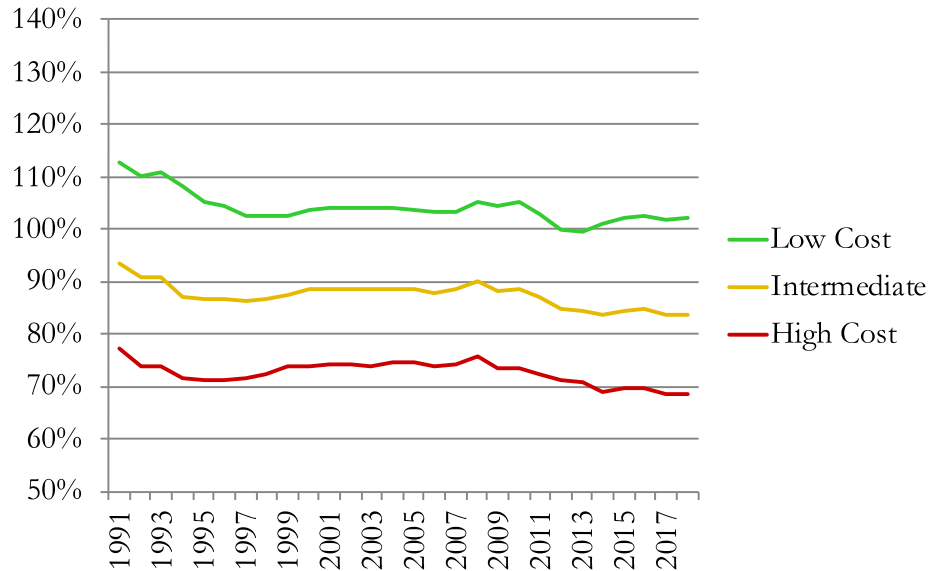
Year *	Projection Period: 75 Years		
	Low-Cost	Intermediate	High-Cost
	Social Security Solvency Index (%)		
1994	108.36	87.05	71.54
1998	102.70	86.77	72.24
2002	104.21	88.80	74.25
2006	103.46	88.07	73.80
2010	105.40	88.78	73.66
2014	100.96	83.57	68.95
2018	102.10	83.78	68.80

\* Only select years of underlying data displayed



# Social Security Solvency Index

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







# 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 =***

$$6.20 + \left( \frac{\textit{Liability-Outgo Expense Rate} - \textit{Asset-Income Rate}}{2} \right)$$

Payroll tax rate is payable by both employers and employees.



# Social Security Sustainability Equilibrium Payroll Tax Rates

Projection Period	Projection Basis: 2018		
	Low-Cost	Intermediate	High-Cost
	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.

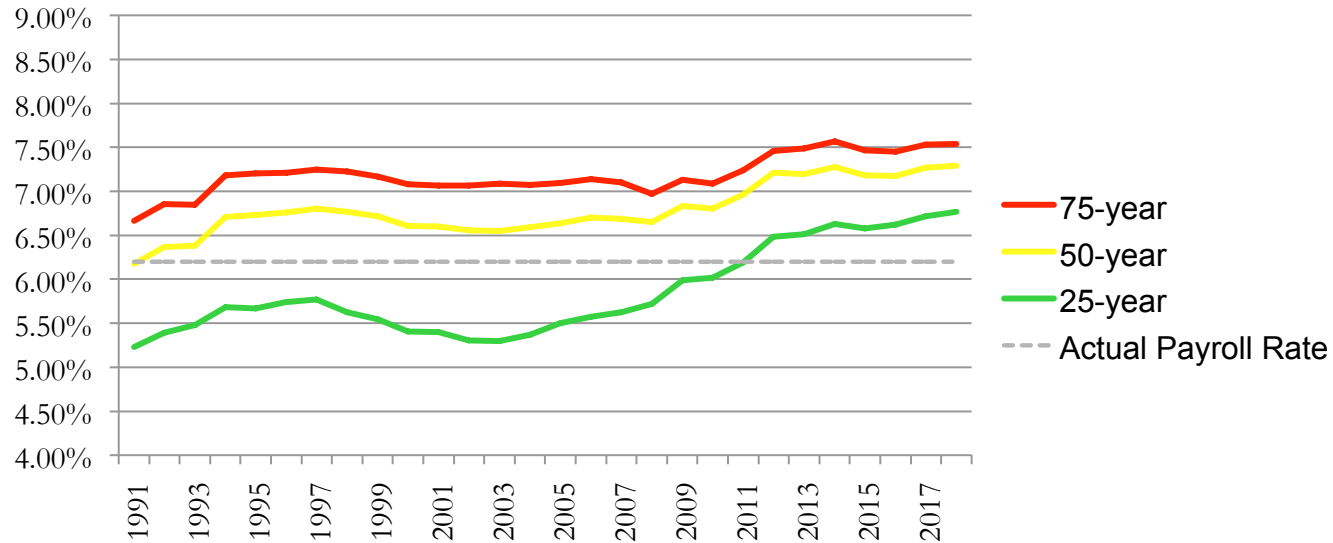
\* Only select years of underlying data displayed





# Social Security Sustainability Equilibrium Payroll Tax Rates

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





# 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