SOAH DOCKET NO. 473-24-13232
PUC DOCKET NO. 56211

APPLICATION OF CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC FOR AUTHORITY TO CHANGE RATES	**§** **§** **§** **§**	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

DIRECT TESTIMONY AND EXHIBITS

OF J. RANDALL WOOLRIDGE, PH.D.

EXHIBIT JRW-3: Summary Financial Statistics for Proxy Group

Exhibit JRW-3
CenterPoint Energy Houston Electric, LLC
Summary Financial Statistics for Proxy Group

Panel A

Electric Proxy Group													
Company		Operating Revenue ($bil)	Elec Revenue	Percent Reg Gas Revenue	Net Plant ($bil)	Market Cap ($bil)	S&P Issuer Credit Rating	Moody's Long Term Rating	Interest Coverage	Primary Service Area	Common Equity Ratio	Return on Equity	Market to Book Ratio
Alliant Energy Corporation (NYSE-LNT)	LNT	$4.03	83%	13%	$17.16	12.22	A-	Baa2	2.33	WI,IA,IL,MN	41.1%	10.77	1.80
Ameren Corporation (NYSE-AEE)	AEE	$7.27	74%	17%	$33.78	18.99	BBB+	Baa1	3.48	IL,MO	40.7%	10.46	1.67
American Electric Power Co. (NYSE-AEP)	AEP	$18.52	90%	0%	$77.31	44.72	A-	Baa2	2.19	10 States	36.6%	8.96	1.77
Avista Corporation (NYSE-AVA)	AVA	$1.75	70%	30%	$5.84	2.60	BBB	Baa2	2.07	NY,CT,ME	44.8%	7.10	1.05
CMS Energy Corporation (NYSE-CMS)	CMS	$7.46	64%	32%	$25.10	17.12	BBB+	Baa2	2.32	MI	31.8%	10.27	2.34
Consolidated Edison, Inc. (NYSE-ED)	ED	$14.66	74%	21%	$50.14	30.06	A-	Baa2	3.04	NY,PA	45.8%	11.97	1.42
Duke Energy Corporation (NYSE-DUK)	DUK	$28.60	93%	8%	$114.90	70.04	BBB+	Baa2	2.41	NC,OH,FL,SC,KY	36.9%	8.48	1.49
Edison International (NYSE-EIX)	EIX	$16.34	100%	0%	$57.18	25.59	BBB	Baa2	1.98	CA	28.1%	6.75	1.85
Entergy Corporation (NYSE-ETR)	ETR	$12.02	97%	1%	$44.25	21.42	BBB+	Baa2	2.99	LA,AR,MS,TX	35.5%	16.69	1.46
Evergy, Inc. (NYSE-EVRG)	EVRG	$5.51	100%		$23.60	11.28	BBB+	Baa2	2.48	KS,MO	42.1%	7.75	1.17
Eversource Energy (NYSE-ES)	ES	$11.91	91%	19%	$39.55	20.43	A-	Baa1	3.33	CT,NH,MA	34.5%	-2.90	1.44
Exelon Corporation (NDW-EXC)	EXC	$21.73	89%	8%	$73.85	35.47	BBB+	Baa2	2.33	PA,IL,MD,DE,NJ	36.7%	9.22	1.38
IDACORP, Inc. (NYSE-IDA)	IDA	$1.76	100%	0%	$5.75	4.41	BBB	Baa2	2.53	ID	50.7%	9.14	1.52
MGE Energy, Inc. (NYSE-MGEE)	MGEE	$0.67	65%	29%	$2.14	2.29	AA-	A1	5.00	WI	59.1%	10.60	2.00
NextEra Energy, Inc. (NYSE-NEE)	NEE	$28.11	100%	0%	$126.61	113.31	A-	Baa1	3.03	FL	39.1%	11.58	2.39
NorthWestern Corporation (NYSE-NWE)	NWE	$1.42	75%	25%	$6.04	2.95	BBB	Baa2	2.59	MT,SD,NE	49.9%	7.12	1.06
OGE Energy Corp. (NYSE-OGE)	OGE	$2.61	100%	0%	$10.95	6.58	BBB+	Baa1	2.87	OK,AR	48.1%	9.34	1.46
Pinnacle West Capital Corp. (NYSE-PNW)	PNW	$4.70	95%	0%	$18.92	7.72	BBB+	Baa1	2.49	AZ	37.5%	8.34	1.25
Portland General Electric Company (NYSE-POR)	POR	$2.92	100%	0%	$9.19	4.06	BBB+	A3	2.21	OR	42.5%	7.48	1.22
PPL Corporation (NYSE-PPL)	PPL	$8.31	90%	10%	$31.49	19.28	A-	Baa1	2.84	PA,KY,MA	46.9%	5.31	1.38
Public Service Enterprise Group Incorporated (NYSE - PEG)	PEG	$11.24	63%	19%	$38.21	31.03	BBB+	Baa2	5.54	NJ	43.1%	17.55	2.00
Southern Company (NYSE-SO)	SO	$24.30	75%	16%	$101.08	72.95	BBB+	Baa2	2.63	GA,FL,NJ,IL,VA,TN,MS	33.1%	11.04	2.32
WEC Energy Group (NYSE-WEC)	WEC	$8.89	73%	26%	$31.61	24.74	A-	Baa1	3.00	WI,IL,MN,MI	38.4%	11.23	2.11
Xcel Energy Inc. (NYSE-XEL)	XEL	$14.09	81%	19%	$52.51	27.52	A-	Baa1	2.48	MN,WI,ND,SD,MI	39.0%	10.33	1.56
Mean		$10.78	85%	13%	$41.55	$26.12	BBB+	Baa2	2.84		40.9%	9.36	1.63
Median		$8.60	89%	13%	$32.69	$19.85	BBB+	Baa2	2.56		39.9%	9.28	1.50

Data Source: Company 2023 SEC 10-K filings, S&P Capital IQ; *Value Line Investment Survey*, 2024.

Panel B

Bulkley Proxy Group													
Company		Operating Revenue ($bil)	Percent Reg Elec Revenue	Percent Reg Gas Revenue	Net Plant ($bil)	Market Cap ($bil)	S&P Issuer Credit Rating	Moody's Long Term Rating	Pre-Tax Interest Coverage	Primary Service Area	Common Equity Ratio	Return on Equity	Market to Book Ratio
Alliant Energy Corporation (NYSE-LNT)	LNT	$4.03	83%	13%	$17.16	12.22	A-	Baa2	2.33	WI,IA,IL,MN	41.1%	10.77	1.80
Ameren Corporation (NYSE-AEE)	AEE	$7.27	74%	17%	$33.78	18.99	BBB+	Baa1	3.48	IL,MO	40.7%	10.46	1.67
American Electric Power Co. (NYSE-AEP)	AEP	$18.52	90%	0%	$77.31	44.72	A-	Baa2	2.19	10 States	36.6%	8.96	1.77
Duke Energy Corporation (NYSE-DUK)	DUK	$28.60	93%	8%	$114.90	70.04	BBB+	Baa2	2.41	NC,OH,FL,SC,KY	36.9%	8.48	1.49
Edison International (NYSE-EIX)	EIX	$16.34	100%	0%	$57.18	25.59	BBB	Baa2	1.98	CA	28.1%	6.75	1.85
Entergy Corporation (NYSE-ETR)	ETR	$12.02	97%	1%	$44.25	21.42	BBB+	Baa2	2.99	LA,AR,MS,TX	35.5%	16.69	1.46
Eversource Energy (NYSE-ES)	ES	$11.91	91%	19%	$39.55	20.43	A-	Baa1	3.33	CT,NH,MA	34.5%	-2.90	1.44
Evergy, Inc. (NYSE-EVRG)	EVRG	$5.51	100%	0%	$23.60	11.28	BBB+	Baa2	2.48	KS,MO	42.1%	7.75	1.17
IDACORP, Inc. (NYSE-IDA)	IDA	$1.76	100%	0%	$5.75	4.41	BBB	Baa2	2.53	ID	50.7%	9.14	1.52
NextEra Energy, Inc. (NYSE-NEE)	NEE	$28.11	100%	0%	$126.61	113.31	A-	Baa1	3.03	FL	39.1%	11.58	2.39
NorthWestern Corporation (NYSE-NWE)	NWE	$1.42	75%	25%	$6.04	2.95	BBB	Baa2	2.59	MT,SD,NE	49.9%	7.12	1.06
OGE Energy Corp. (NYSE-OGE)	OGE	$2.61	100%	0%	$10.95	6.58	BBB+	Baa1	2.87	OK,AR	48.1%	9.34	1.46
Pinnacle West Capital Corp. (NYSE-PNW)	PNW	$4.70	95%	0%	$18.92	7.72	BBB+	Baa1	2.49	AZ	37.5%	8.34	1.25
Portland General Electric Company (NYSE-POR)	POR	$2.92	100%	0%	$9.19	4.06	BBB+	A3	2.21	OR	42.5%	7.48	1.22
Xcel Energy Inc. (NYSE-XEL)	XEL	$14.09	81%	19%	$52.51	27.52	A-	Baa1	2.48	MN,WI,ND,SD,MI	39.0%	10.33	1.56
Mean		$10.65	92%	7%	$42.51	$26.08	BBB+	Baa2	2.63		40.2%	8.69	1.54
Median		$7.27	95%	0%	$33.78	$18.99	BBB+	Baa2	2.49		39.1%	8.96	1.49

Data Source: Company 2023 SEC 10-K filings, S&P Capital IQ; *Value Line Investment Survey*, 2024.

Exhibit JRW-3
CEHE
Value Line Risk Metrics

Panel A
Electric Proxy Group

Company	Beta	Financial Strength	Safety	Earnings Predictability	Stock Price Stability
Alliant Energy Corporation (NYSE-LNT)	0.90	A	2	100	95
Ameren Corporation (NYSE-AEE)	0.90	A	1	100	95
American Electric Power Co. (NYSE-AEP)	0.85	A+	1	95	95
Avista Corporation (NYSE-AVA)	0.95	B+	3	70	70
CMS Energy Corporation (NYSE-CMS)	0.85	A	2	90	95
Consolidated Edison, Inc. (NYSE-ED)	0.80	A+	1	100	90
Duke Energy Corporation (NYSE-DUK)	0.90	A	2	100	95
Edison International (NYSE-EIX)	1.00	B++	3	10	85
Entergy Corporation (NYSE-ETR)	1.00	A	2	70	90
Evergy, Inc. (NYSE-EVRG)	0.95	B++	2	85	90
Eversource Energy (NYSE-ES)	0.95	A	2	100	80
Exelon Corporation (NDW-EXC)	NMF	B++	2	nmf	nmf
IDACORP, Inc. (NYSE-IDA)	0.85	A	2	100	95
MGE Energy, Inc. (NYSE-MGEE)	0.80	B++	3	100	75
NextEra Energy, Inc. (NYSE-NEE)	1.05	A	3	95	55
NorthWestern Corporation (NYSE-NWE)	0.95	B+	3	95	90
OGE Energy Corp. (NYSE-OGE)	1.05	B++	3	95	85
Pinnacle West Capital Corp. (NYSE-PNW)	0.95	B++	3	90	85
Portland General Electric Company (NYSE-POR)	0.90	B++	3	95	90
PPL Corporation (NYSE-PPL)	1.15	A	3	45	75
Public Service Enterprise Group Incorporated (NYSE - PEG)	0.95	A	1	100	95
Southern Company (NYSE-SO)	0.95	A	2	95	90
WEC Energy Group (NYSE-WEC)	0.85	A+	1	100	85
Xcel Energy Inc. (NYSE-XEL)	0.85	A	2	100	95
Mean	0.93	A/B++	2.2	88	87

Data Source: *Value Line Investment Survey*, 2024.

Panel B
Bulkley Proxy Group

Company	Beta	Financial Strength	Safety	Earnings Predictability	Stock Price Stability
Alliant Energy Corporation (NYSE-LNT)	0.90	A	2	100	95
Ameren Corporation (NYSE-AEE)	0.90	A	1	100	95
American Electric Power Co. (NYSE-AEP)	0.85	A+	1	95	95
Duke Energy Corporation (NYSE-DUK)	0.90	A	2	100	95
Edison International (NYSE-EIX)	1.00	B++	3	10	85
Entergy Corporation (NYSE-ETR)	1.00	A	2	70	90
Evergy, Inc. (NYSE-EVRG)	0.95	B++	2	85	90
Eversource Energy (NYSE-ES)	0.95	A	2	100	80
IDACORP, Inc. (NYSE-IDA)	0.85	A	2	100	95
NextEra Energy, Inc. (NYSE-NEE)	1.00	A	2	95	45
NorthWestern Corporation (NYSE-NWE)	0.95	B+	3	95	90
OGE Energy Corp. (NYSE-OGE)	1.05	A	2	95	85
Pinnacle West Capital Corp. (NYSE-PNW)	0.95	B++	3	90	85
Portland General Electric Company (NYSE-POR)	0.90	B++	3	95	90
Xcel Energy Inc. (NYSE-XEL)	0.85	A	2	100	95
Mean	0.93	A/B++	2.1	89	87

Data Source: *Value Line Investment Survey*, 2024.

Value Line Risk Metrics

Beta

A relative measure of the historical sensitivity of a stock's price to overall fluctuations in the New York Stock Exchange Composite Index. A beta of 1.50 indicates a stock tends to rise (or fall) 50% more than the New York Stock Exchange Composite Index. The ''coefficient'' is derived from a regression analysis of the relationship between weekly percentage changes in the price of a stock and weekly percentage changes in the NYSE Index over a period of five years. In the case of shorter price histories, a smaller time period is used, but two years is the minimum. Betas are adjusted for their long-term tendency to converge toward 1.00.

Financial Strength

A relative measure of the companies reviewed by *Value Line* . The relative ratings range from A++ (strongest) down to C (weakest).

Safety Rank

A measurement of potential risk associated with individual common stocks. The Safety Rank is computed by averaging two other *Value Line* indexes the Price Stability Index and the Financial strength Rating. Safety Ranks range from 1 (Highest) to 5 (Lowest). Conservative investors should try to limit their purchases to equities ranked 1 (Highest) and 2 (Above Average) for Safety.

Earnings Predictability

A measure of the reliability of an earnings forecast. Earnings Predictability is based upon the stability of year-to-year comparisons, with recent years being weighted more heavily than earlier ones. The most reliable forecasts tend to be those with the highest rating (100); the least reliable, the lowest (5). The earnings stability is derived from the standard deviation of percentage changes in quarterly earnings over an eight-year period. Special adjustments are made for comparisons around zero and from plus to minus.

Stock Price Stability

A measure of the stability of a stock's price. It includes sensitivity to the market (see Beta as well as the stock's inherent volatility. *Value Line's* Stability ratings range from 1 (highest) to 5 (lowest).

Source: *Value Line Investment Analyzer* .

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DIRECT TESTIMONY AND EXHIBITS

OF J. RANDALL WOOLRIDGE, PH.D.

EXHIBIT JRW-4: Capital Structure and Debt Cost Rates

Exhibit JRW-4
CEHE

Panel A
CEHE' Proposed Capital Structure and Senior Capital Cost Rates

Capital Source	Capitalization Ratio	Cost Rate
Long-Term Debt	55.10%	4.29%
Common Equity	44.90%	
Total	100.00%	

Panel B
TCUC's Proposed Capital Structure and Debt Cost Rate

Capital Source	Capitalization Ratio	Cost Rate
Long-Term Debt	57.50%	4.37%
Common Equity	42.50%	
Total	100.00%	

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DIRECT TESTIMONY AND EXHIBITS

OF J. RANDALL WOOLRIDGE, PH.D.

EXHIBIT JRW-5: DCF Study

Exhibit JRW-5

CEHE
Discounted Cash Flow Analysis

Panel A
Electric Proxy Group

Dividend Yield*	4.10%
Adjustment Factor	1.0285
Adjusted Dividend Yield	4.22%
Growth Rate**	5.70%
Equity Cost Rate	9.92%

* Page 2 of Exhibit JRW-5

** Based on data provided on pages 3, 4, 5, and 6 of Exhibit JRW-5

*** DCF ROE rounded to nearest 0.05%.

Panel B
Bulkley Proxy Group

Dividend Yield*	4.30%
Adjustment Factor	1.0285
Adjusted Dividend Yield	4.42%
Growth Rate**	5.70%
Equity Cost Rate	10.12%

* Page 2 of Exhibit JRW-5

** Based on data provided on pages 3, 4, 5, and 6 of Exhibit JRW-5

*** DCF ROE rounded to nearest 0.05%.

Exhibit JRW-5

CEHE
Monthly Dividend Yields

Panel A
Electric Proxy Group

Company		Annual Dividend	Dividend Yield 30 Day	Dividend Yield 90 Day	Dividend Yield 180 Day
Alliant Energy Corporation (NYSE-LNT)	LNT	$1.92	3.8%	3.9%	3.9%
Ameren Corporation (NYSE-AEE)	AEE	$2.68	3.6%	3.7%	3.6%
American Electric Power Co. (NYSE-AEP)	AEP	$3.52	3.9%	4.1%	4.3%
Avista Corporation (NYSE-AVA)	AVA	$1.90	5.1%	5.4%	5.5%
CMS Energy Corporation (NYSE-CMS)	CMS	$2.06	3.3%	3.5%	3.6%
Consolidated Edison, Inc. (NYSE-ED)	ED	$3.32	3.5%	3.6%	3.7%
Duke Energy Corporation (NYSE-DUK)	DUK	$4.10	4.0%	4.2%	4.3%
Edison International (NYSE-EIX)	EIX	$3.12	4.2%	4.4%	4.6%
Entergy Corporation (NYSE-ETR)	ETR	$4.52	4.1%	4.3%	4.4%
Evergy, Inc. (NYSE-EVRG)	EVRG	$2.57	4.7%	4.9%	5.0%
Eversource Energy (NYSE-ES)	ES	$2.86	4.8%	4.9%	4.9%
Exelon Corporation (NDW-EXC)	EXC	$1.52	4.0%	4.1%	4.1%
IDACORP, Inc. (NYSE-IDA)	IDA	$3.32	3.5%	3.6%	3.5%
MGE Energy, Inc. (NYSE-MGEE)	MGEE	$1.71	2.1%	2.3%	2.3%
NextEra Energy, Inc. (NYSE-NEE)	NEE	$2.06	2.8%	3.2%	3.4%
NorthWestern Corporation (NYSE-NWE)	NWE	$2.60	5.1%	5.2%	5.2%
OGE Energy Corp. (NYSE-OGE)	OGE	$1.67	4.7%	4.9%	4.9%
Pinnacle West Capital Corp. (NYSE-PNW)	PNW	$3.52	4.6%	4.8%	4.8%
Portland General Electric Company (NYSE-POR)	POR	$2.00	4.5%	4.7%	4.8%
PPL Corporation (NYSE-PPL)	PPL	$1.03	3.6%	3.8%	3.9%
Public Service Enterprise Group Incorporated (NYSE	PEG	$2.40	3.3%	3.6%	3.8%
Southern Company (NYSE-SO)	SO	$2.88	3.7%	4.0%	4.1%
WEC Energy Group (NYSE-WEC)	WEC	$3.34	4.0%	4.1%	4.1%
Xcel Energy Inc. (NYSE-XEL)	XEL	$2.19	4.0%	4.0%	3.8%
Mean			4.0%	4.1%	4.2%
Median			4.0%	4.1%	4.1%

Data Sources: S&P Cap IQ., June 11, 2024.

Panel B
Bulkley Proxy Group

Company		Annual Dividend	Dividend Yield 30 Day	Dividend Yield 90 Day	Dividend Yield 180 Day
Alliant Energy Corporation (NYSE-LNT)	LNT	$1.92	3.8%	3.9%	3.9%
Ameren Corporation (NYSE-AEE)	AEE	$2.68	3.6%	3.7%	3.6%
American Electric Power Co. (NYSE-AEP)	AEP	$3.52	3.9%	4.1%	4.3%
Duke Energy Corporation (NYSE-DUK)	DUK	$4.10	4.0%	4.2%	4.3%
Edison International (NYSE-EIX)	EIX	$3.12	4.2%	4.4%	4.6%
Entergy Corporation (NYSE-ETR)	ETR	$4.52	4.1%	4.3%	4.4%
Evergy, Inc. (NYSE-EVRG)	EVRG	$2.57	4.7%	4.9%	5.0%
Eversource Energy (NYSE-ES)	ES	$2.86	4.8%	4.9%	4.9%
IDACORP, Inc. (NYSE-IDA)	IDA	$3.32	3.5%	3.6%	3.5%
NextEra Energy, Inc. (NYSE-NEE)	NEE	$2.06	2.8%	3.2%	3.4%
NorthWestern Corporation (NYSE-NWE)	NWE	$2.60	5.1%	5.2%	5.2%
OGE Energy Corp. (NYSE-OGE)	OGE	$1.67	4.7%	4.9%	4.9%
Pinnacle West Capital Corp. (NYSE-PNW)	PNW	$3.52	4.6%	4.8%	4.8%
Portland General Electric Company (NYSE-POR)	POR	$2.00	4.5%	4.7%	4.8%
Xcel Energy Inc. (NYSE-XEL)	XEL	$2.19	4.0%	4.0%	3.8%
Mean			4.1%	4.3%	4.4%
Median			4.1%	4.3%	4.4%

Data Sources: S&P Cap IQ., June 11, 2024.

Exhibit JRW-5

CEITE
DCF Equity Cost Growth Rate Measures
Value Line Historic Growth Rates

Panel A
Electric Proxy Group

Company	*Value Line* Historic Growth					
	Past 10 Years			Past 5 Years		
	Earnings	Dividends	Book Value	Earnings	Dividends	Book Value
Alliant Energy Corporation (NYSE-LNT)	6.0	6.5	6.0	7.0	6.5	6.5
Ameren Corporation (NYSE-AEE)	4.0	3.5	2.0	8.0	5.0	5.5
American Electric Power Co. (NYSE-AEP)	5.0	5.0	3.5	4.0	5.0	3.5
Avista Corporation (NYSE-AVA)	3.0	4.5	4.0	1.0	4.5	3.5
CMS Energy Corporation (NYSE-CMS)	6.0	7.0	6.5	5.5	6.5	8.0
Consolidated Edison, Inc. (NYSE-ED)	2.0	2.5	4.0	2.0	2.5	3.5
Duke Energy Corporation (NYSE-DUK)	3.0	3.0	2.0	4.5	3.5	1.0
Edison International (NYSE-EIX)	2.0	8.0	2.0	14.0	5.0	0.5
Entergy Corporation (NYSE-ETR)	2.5	2.0	2.0	5.5	3.0	6.5
Evergy, Inc. (NYSE-EVRG)						
Eversource Energy (NYSE-ES)	6.5	7.0	4.5	5.5	6.0	4.0
Exelon Corporation (NDW-EXC)	-0.5	-3.0	4.5	2.5	4.0	3.5
IDACORP, Inc. (NYSE-IDA)	4.0	8.0	4.5	3.5	6.5	4.5
MGE Energy, Inc. (NYSE-MGEE)	4.5	4.0	5.5	5.5	4.0	5.5
Nextera Energy, Inc. (NYSE-NEE)	9.5	11.5	8.0	12.5	11.5	6.0
NorthWestern Corporation (NYSE-NWE)	3.5	5.5	6.0		3.5	4.0
OGE Energy Corp. (NYSE-OGE)	3.0	7.5	4.0	4.5	6.5	1.5
Pinnacle West Capital Corp. (NYSE-PNW)	3.5	4.0	4.0	2.0	5.0	3.5
Portland General Electric Company (NYSE-POR)	3.5	5.0	3.5	3.0	6.0	3.0
PPL Corporation (NYSE-PPL)	-6.0	-9.0	-1.0	-17.0	-4.5	4.0
Public Service Enterprise Group Incorporated (NYSE - PEG)	3.0	4.5	3.0	4.0	4.5	1.5
Southern Company (NYSE-SO)	3.0	3.5	3.0	3.0	3.5	2.5
WEC Energy Group (NYSE-WEC)	6.5	10.0	7.0	7.0	6.5	3.5
Xcel Energy Inc. (NYSE-XEL)	5.5	6.0	5.0	6.5	6.5	6.0
Mean	3.6	4.6	4.1	4.3	4.8	4.0
Median	3.5	5.0	4.0	4.5	5.0	3.5
Data Source: *Value Line Investment Survey.*	Average of Median Figures =			4.3		

Panel B
Bulkley Proxy Group

Company	*Value Line* Historic Growth					
	Past 10 Years			Past 5 Years		
	Earnings	Dividends	Book Value	Earnings	Dividends	Book Value
Alliant Energy Corporation (NYSE-LNT)	6.0	6.5	6.0	7.0	6.5	6.5
Ameren Corporation (NYSE-AEE)	4.0	3.5	2.0	8.0	5.0	5.5
American Electric Power Co. (NYSE-AEP)	5.0	5.0	3.5	4.0	5.0	3.5
Duke Energy Corporation (NYSE-DUK)	3.0	3.0	2.0	4.5	3.5	1.0
Edison International (NYSE-EIX)	2.0	8.0	2.0	14.0	5.0	0.5
Entergy Corporation (NYSE-ETR)	2.5	2.0	2.0	5.5	3.0	6.5
Evergy, Inc. (NYSE-EVRG)						
Eversource Energy (NYSE-ES)	6.5	7.0	4.5	5.5	6.0	4.0
IDACORP, Inc. (NYSE-IDA)	4.0	8.0	4.5	3.5	6.5	4.5
Nextera Energy, Inc. (NYSE-NEE)	9.5	11.5	8.0	12.5	11.5	6.0
NorthWestern Corporation (NYSE-NWE)	3.5	5.5	6.0		3.5	4.0
OGE Energy Corp. (NYSE-OGE)	3.0	7.5	4.0	4.5	6.5	1.5
Pinnacle West Capital Corp. (NYSE-PNW)	3.5	4.0	4.0	2.0	5.0	3.5
Portland General Electric Company (NYSE-POR)	3.5	5.0	3.5	3.0	6.0	3.0
Xcel Energy Inc. (NYSE-XEL)	5.5	6.0	5.0	6.5	6.5	6.0
Mean	4.4	5.9	4.1	6.2	5.7	4.0
Median	3.8	5.8	4.0	5.5	5.5	4.0
Data Source: *Value Line Investment Survey.*	Average of Median Figures =			4.8		

Exhibit JRW-5

CEHE
DCF Equity Cost Growth Rate Measures
Value Line Projected Growth Rates

Panel A
Electric Proxy Group

Company	*Value Line* Projected Growth Est'd. '21-'23 to '27-'29			*Value Line* Sustainable Growth		
	Earnings	Dividends	Book Value	Return on Equity	Retention Rate	Internal Growth
Alliant Energy Corporation (NYSE-LNT)	6.0	6.0	5.0	12.0%	38.0%	4.6%
Ameren Corporation (NYSE-AEE)	6.5	6.5	6.5	10.0%	40.0%	4.0%
American Electric Power Co. (NYSE-AEP)	6.5	5.5	6.0	11.0%	39.0%	4.3%
Avista Corporation (NYSE-AVA)	6.0	4.5	3.5	8.5%	23.0%	2.0%
CMS Energy Corporation (NYSE-CMS)	5.0	4.0	4.0	12.5%	38.0%	4.8%
Consolidated Edison, Inc. (NYSE-ED)	6.0	3.5	4.5	9.0%	40.0%	3.6%
Duke Energy Corporation (NYSE-DUK)	5.0	2.0	2.5	9.0%	32.0%	2.9%
Edison International (NYSE-EIX)	6.0	5.5	5.0	13.5%	38.0%	5.1%
Entergy Corporation (NYSE-ETR)	0.5	3.5	4.0	9.5%	38.0%	3.6%
Evergy, Inc. (NYSE-EVRG)	7.5	7.0	3.5	10.0%	37.0%	3.7%
Eversource Energy (NYSE-ES)	6.0	6.0	3.5	11.0%	38.0%	4.2%
Exelon Corporation (NDW-EXC)	NMF	NMF	NMF	10.0%	40.0%	4.0%
IDACORP, Inc. (NYSE-IDA)	5.0	5.5	4.0	9.0%	36.0%	3.2%
MGE Energy, Inc. (NYSE-MGEE)	6.0	3.5	2.0	12.5%	58.0%	7.3%
Nextera Energy, Inc. (NYSE-NEE)	8.0	9.0	9.0	13.0%	37.0%	4.8%
NorthWestern Corporation (NYSE-NWE)	4.0	2.0	3.0	8.0%	35.0%	2.8%
OGE Energy Corp. (NYSE-OGE)	6.5	3.0	5.5	13.0%	43.0%	5.6%
Pinnacle West Capital Corp. (NYSE-PNW)	4.5	1.5	4.5	8.5%	37.0%	3.1%
Portland General Electric Company (NYSE-POR)	6.0	5.5	4.0	9.5%	36.0%	3.4%
PPL Corporation (NYSE-PPL)	7.5	-0.5	3.0	9.5%	40.0%	3.8%
Public Service Enterprise Group Incorporated (NYSE - PEG)	5.0	5.0	5.0	12.0%	38.0%	4.6%
Southern Company (NYSE-SO)	6.5	3.5	3.5	14.5%	33.0%	4.8%
WEC Energy Group (NYSE-WEC)	6.0	7.0	4.0	13.0%	36.0%	4.7%
Xcel Energy Inc. (NYSE-XEL)	7.0	5.5	5.5	11.5%	43.0%	4.9%
Mean	5.8	4.5	4.4	10.8%	38.0%	4.2%
Median	6.0	5.0	4.0	10.5%	38.0%	4.1%
Average of Median Figures =		5.0			Median =	4.1%

* 'Est'd. '21-'23 to '27-'29 is the estimated growth rate from the base period 2021 to 2023 until the future period 2027 to 2029.

Panel B
Bulkley Proxy Group

Company	*Value Line* Projected Growth Est'd. '21-'23 to '27-'29			*Value Line* Sustainable Growth		
	Earnings	Dividends	Book Value	Return on Equity	Retention Rate	Internal Growth
Alliant Energy Corporation (NYSE-LNT)	6.0	6.0	5.0	12.0%	38.0%	4.6%
Ameren Corporation (NYSE-AEE)	6.5	6.5	6.5	10.0%	40.0%	4.0%
American Electric Power Co. (NYSE-AEP)	6.5	5.5	6.0	11.0%	39.0%	4.3%
Duke Energy Corporation (NYSE-DUK)	5.0	2.0	2.5	9.0%	32.0%	2.9%
Edison International (NYSE-EIX)	6.0	5.5	5.0	13.5%	38.0%	5.1%
Entergy Corporation (NYSE-ETR)	0.5	3.5	4.0	9.5%	38.0%	3.6%
Evergy, Inc. (NYSE-EVRG)	7.5	7.0	3.5	10.0%	37.0%	3.7%
Eversource Energy (NYSE-ES)	5.5	5.5	3.0	11.0%	38.0%	4.2%
IDACORP, Inc. (NYSE-IDA)	5.0	5.5	4.0	9.0%	36.0%	3.2%
Nextera Energy, Inc. (NYSE-NEE)	8.5	9.0	9.0	13.0%	37.0%	4.8%
NorthWestern Corporation (NYSE-NWE)	4.0	2.0	3.0	8.0%	35.0%	2.8%
OGE Energy Corp. (NYSE-OGE)	6.5	3.0	5.5	13.0%	43.0%	5.6%
Pinnacle West Capital Corp. (NYSE-PNW)	4.5	1.5	4.5	8.5%	37.0%	3.1%
Portland General Electric Company (NYSE-POR)	6.0	5.5	4.0	9.5%	36.0%	3.4%
Xcel Energy Inc. (NYSE-XEL)	7.0	5.5	5.5	11.5%	43.0%	4.9%
Mean	5.7	4.9	4.7	10.6%	37.8%	4.0%
Median	6.0	5.5	4.5	10.0%	38.0%	4.0%
Average of Median Figures =		5.3			Median =	4.0%

* 'Est'd. '21-'23 to '27-'29 is the estimated growth rate from the base period 2021 to 2023 until the future period 2027 to 2029.

Exhibit JRW-5

CEHE
DCF Equity Cost Growth Rate Measures
Analysts Projected EPS Growth Rate Estimates

Panel A
Electric Proxy Group

Company		Yahoo	Zacks	S&P	Mean
Alliant Energy Corporation (NYSE-LNT)	LNT	6.3%	6.1%	6.6%	6.3%
Ameren Corporation (NYSE-AEE)	AEE	5.5%	6.2%	6.3%	6.0%
American Electric Power Co. (NYSE-AEP)	AEP	6.4%	6.1%	6.4%	6.3%
Avista Corporation (NYSE-AVA)	AVA	6.2%	NA	5.0%	5.6%
CMS Energy Corporation (NYSE-CMS)	CMS	7.6%	7.6%	7.3%	7.5%
Consolidated Edison, Inc. (NYSE-ED)	ED	6.1%	7.4%	5.8%	6.4%
Duke Energy Corporation (NYSE-DUK)	DUK	6.7%	6.1%	6.3%	6.4%
Edison International (NYSE-EIX)	EIX	7.6%	NA	7.4%	7.5%
Entergy Corporation (NYSE-ETR)	ETR	6.8%	7.3%	7.1%	7.1%
Evergy, Inc. (NYSE-EVRG)	EVRG	6.0%	5.0%	5.4%	5.5%
Eversource Energy (NYSE-ES)	ES	4.2%	5.4%	5.9%	5.2%
Exelon Corporation (NDW-EXC)	EXC	4.2%	5.7%	5.9%	5.2%
IDACORP, Inc. (NYSE-IDA)	IDA	4.4%	NA	6.2%	5.3%
MGE Energy, Inc. (NYSE-MGEE)	MGEE	5.4%	NA	0.0%	2.7%
Nextera Energy, Inc. (NYSE-NEE)	NEE	8.0%	8.0%	8.0%	8.0%
NorthWestern Corporation (NYSE-NWE)	NWE	4.5%	NA	5.1%	4.8%
OGE Energy Corp. (NYSE-OGE)	OGE	-12.3%	5.0%	5.3%	-0.7%
Pinnacle West Capital Corp. (NYSE-PNW)	PNW	7.2%	8.2%	7.0%	7.5%
Portland General Electric Company (NYSE-POR)	POR	12.5%	NA	9.0%	10.7%
PPL Corporation (NYSE-PPL)	PPL	6.8%	6.8%	6.9%	6.8%
Public Service Enterprise Group Incorporated (NYSE - PEG)	PEG	5.5%	6.6%	6.6%	6.2%
Southern Company (NYSE-SO)	SO	7.3%	7.0%	7.1%	7.1%
WEC Energy Group (NYSE-WEC)	WEC	7.2%	8.0%	7.4%	7.5%
Xcel Energy Inc. (NYSE-XEL)	XEL	6.7%	6.4%	6.4%	6.5%
Mean		5.7%	6.6%	6.2%	6.1%
Median		6.3%	6.5%	6.4%	6.3%

Data Sources: www.zacks.com, http://quote.yahoo.com, S&P Cap IQ, June 11, 2024.

Panel B
Bulkley Proxy Group

Company		Yahoo	Zacks	S&P	Mean
Alliant Energy Corporation (NYSE-LNT)	LNT	6.3%	6.1%	6.6%	6.3%
Ameren Corporation (NYSE-AEE)	AEE	5.5%	6.2%	6.3%	6.0%
American Electric Power Co. (NYSE-AEP)	AEP	6.4%	6.1%	6.4%	6.3%
Duke Energy Corporation (NYSE-DUK)	DUK	6.7%	6.1%	6.3%	6.4%
Edison International (NYSE-EIX)	EIX	7.6%	NA	7.4%	7.5%
Entergy Corporation (NYSE-ETR)	ETR	6.8%	7.3%	7.1%	7.1%
Evergy, Inc. (NYSE-EVRG)	EVRG	6.0%	5.0%	5.4%	5.5%
Eversource Energy (NYSE-ES)	ES	4.2%	5.4%	5.9%	5.2%
IDACORP, Inc. (NYSE-IDA)	IDA	4.4%	NA	6.2%	5.3%
Nextera Energy, Inc. (NYSE-NEE)	NEE	8.0%	8.0%	8.0%	8.0%
NorthWestern Corporation (NYSE-NWE)	NWE	4.5%	NA	5.1%	4.8%
OGE Energy Corp. (NYSE-OGE)	OGE	-12.3%	5.0%	5.3%	-0.7%
Pinnacle West Capital Corp. (NYSE-PNW)	PNW	7.2%	8.2%	7.0%	7.5%
Portland General Electric Company (NYSE-POR)	POR	12.5%	NA	9.0%	10.7%
Xcel Energy Inc. (NYSE-XEL)	XEL	6.7%	6.4%	6.4%	6.5%
Mean		5.4%	6.4%	6.5%	6.2%
Median		6.4%	6.1%	6.4%	6.3%

Data Sources: www.zacks.com, http://quote.yahoo.com, S&P Cap IQ, June 11, 2024.

Exhibit JRW-5

CEHE
DCF Growth Rate Indicators

Growth Rate Indicator	Electric Proxy Group	Bulkley Proxy Group
Historic *Value Line* Growth in EPS, DPS, and BVPS	4.3%	4.8%
Projected *Value Line* Growth in EPS, DPS, and BVPS	5.0%	5.3%
Sustainable Growth ROE * Retention Rate	4.1%	4.0%
Projected EPS Growth from Yahoo, Zacks, and S&P Cap IQ - Mean/Median	6.1%/6.3%	6.2%/6.3%
DCF Growth Rate	5.70%	5.70%

SOAH DOCKET NO. 473-24-13232
PUC DOCKET NO. 56211

APPLICATION OF CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC FOR AUTHORITY TO CHANGE RATES	**§** **§** **§** **§**	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

DIRECT TESTIMONY AND EXHIBITS

OF J. RANDALL WOOLRIDGE, PH.D.

EXHIBIT JRW-6: CAPM Study

Exhibit JRW-6

CEHE
Capital Asset Pricing Model

Panel A
Electric Proxy Group***

Risk-Free Interest Rate	**4.50%**
Beta*	**0.81**
Ex Ante Market Risk Premium**	**5.00%**
CAPM Cost of Equity	**8.55%**

* See page 3 of Exhibit JRW-8

** See pages 5 and 6 of Exhibit JRW-8

*** CAPM ROE rounded to nearest 0.05%.

Panel B
Bulkley Proxy Group***

Risk-Free Interest Rate	**4.50%**
Beta*	**0.81**
Ex Ante Market Risk Premium**	**5.00%**
CAPM Cost of Equity	**8.55%**

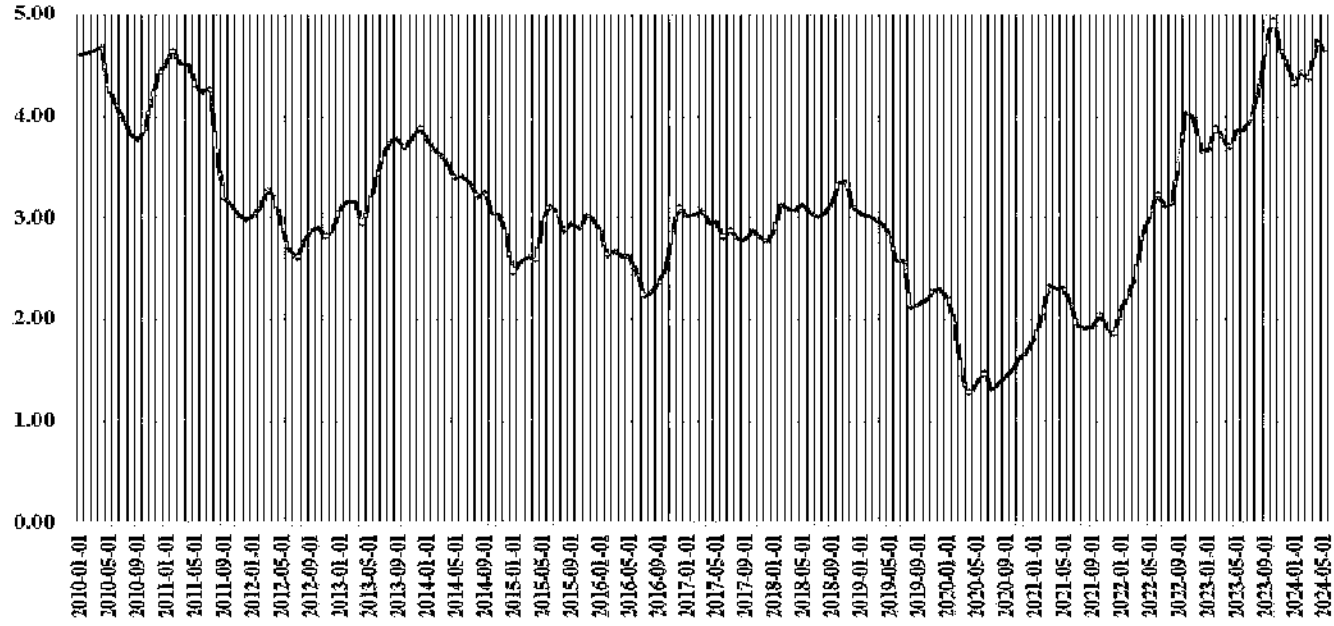
* See page 3 of Exhibit JRW-8

** See pages 5 and 6 of Exhibit JRW-8

*** CAPM ROE rounded to nearest 0.05%.

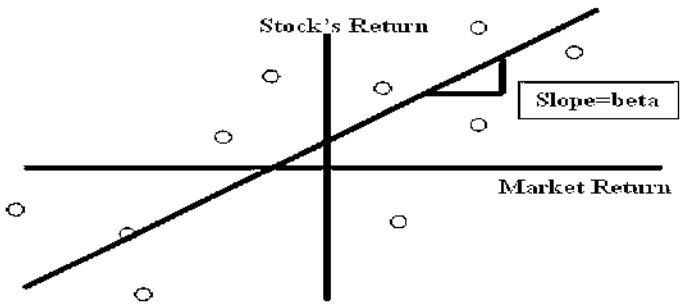
Exhibit JRW-6

Thirty-Year U.S. Treasury Yields
2010-2024



Source: Federal Reserve Bank of St. Louis, FRED Database.

Calculation of Beta



Panel A

Electric Proxy Group			
	V-Line	Cap IQ	Average
Company	Beta	Beta	Beta
Alliant Energy Corporation (NYSE-LNT)	0.90	0.70	0.80
Ameren Corporation (NYSE-AEE)	0.90	0.64	0.77
American Electric Power Co. (NYSE-AEP)	0.85	0.68	0.77
Avista Corporation (NYSE-AVA)	0.95	0.65	0.80
CMS Energy Corporation (NYSE-CMS)	0.85	0.59	0.72
Consolidated Edison, Inc. (NYSE-ED)	0.80	0.56	0.68
Duke Energy Corporation (NYSE-DUK)	0.90	0.63	0.76
Edison International (NYSE-EIX)	1.00	0.97	0.99
Entergy Corporation (NYSE-ETR)	1.00	0.81	0.91
Evergy, Inc. (NYSE-EVRG)	0.95	0.73	0.84
Eversource Energy (NYSE-ES)	0.95	0.74	0.84
Exelon Corporation (NDW-EXC)	NMF	0.72	0.72
IDACORP, Inc. (NYSE-IDA)	0.85	0.71	0.78
MGE Energy, Inc. (NYSE-MGEE)	0.80	0.82	0.81
NextEra Energy, Inc. (NYSE-NEE)	1.05	0.70	0.88
NorthWestern Corporation (NYSE-NWE)	0.95	0.65	0.80
OGE Energy Corp. (NYSE-OGE)	1.05	0.82	0.93
Pinnacle West Capital Corp. (NYSE-PNW)	0.95	0.67	0.81
Portland General Electric Company (NYSE-POR)	0.90	0.73	0.82
PPL Corporation (NYSE-PPL)	1.15	0.89	1.02
Public Service Enterprise Group Incorporated (NYSE - I	0.95	0.73	0.84
Southern Company (NYSE-SO)	0.95	0.67	0.81
WEC Energy Group (NYSE-WEC)	0.85	0.61	0.73
Xcel Energy Inc. (NYSE-XEL)	0.85	0.59	0.72
Mean	0.94	0.72	0.82
Median	0.95	0.71	0.81

Data Source: *Value Line Investment Survey*, 2024; S&P Cap IQ, 2024.

Panel B

Bulkley Proxy Group			
	V-Line	Cap IQ	Average
Company	Beta	Beta	Beta
Alliant Energy Corporation (NYSE-LNT)	0.90	0.70	0.80
Ameren Corporation (NYSE-AEE)	0.90	0.64	0.77
American Electric Power Co. (NYSE-AEP)	0.85	0.68	0.77
Duke Energy Corporation (NYSE-DUK)	0.90	0.63	0.76
Edison International (NYSE-EIX)	1.00	0.97	0.99
Entergy Corporation (NYSE-ETR)	1.00	0.81	0.88
Evergy, Inc. (NYSE-EVRG)	0.95	0.73	0.84
Eversource Energy (NYSE-ES)	0.95	0.74	0.84
IDACORP, Inc. (NYSE-IDA)	0.85	0.71	0.78
NextEra Energy, Inc. (NYSE-NEE)	1.05	0.70	0.88
NorthWestern Corporation (NYSE-NWE)	0.95	0.65	0.80
OGE Energy Corp. (NYSE-OGE)	1.05	0.82	0.93
Pinnacle West Capital Corp. (NYSE-PNW)	0.95	0.67	0.81
Portland General Electric Company (NYSE-POR)	0.90	0.73	0.82
Xcel Energy Inc. (NYSE-XEL)	0.85	0.59	0.72
Mean	0.93	0.71	0.83
Median	0.94	0.71	0.81

Data Source: *Value Line Investment Survey*, 2024; S&P Cap IQ, 2024.

Exhibit JRW-6
Risk Premium Approaches

	Historical Ex Post Returns	**Surveys**	**Expected Return Models and Market Data**
Means of Assessing The Market Risk Premium	Historical Average Stock Minus Bond Returns	Surveys of CFOs, Financial Forecasters, Companies, Analysts on Expected Returns and Market Risk Premiums	Use Market Prices and Market Fundamentals (such as Growth Rates) to Compute Expected Returns and Market Risk Premiums
Problems/Debated Issues	Time Variation in Required Returns, Measurement and Time Period Issues, and Biases such as Market and Company Survivorship Bias	Questions Regarding Survey Histories, Responses, and Representativeness Surveys may be Subject to Biases, such as Extrapolation	Assumptions Regarding Expectations, Especially Growth

Source: Adapted from Antti Ilmanen, Expected Returns on Stocks and Bonds," *Journal of Portfolio Management*, (Winter 2003).

CAPM Study

Market Risk Premium - 2000-2023

Category	Category	Study Authors	Publication Date	Time Period Of Study	Methodology	Return Measure	Range Low	Range High	Midpoint of Range	Mean	Median
Historical Risk	Historical Risk Premium										
		Ibbotson	2016	1928-2015	Historical Stock Returns - Bond Returns	Arithmetic				6.00%	
						Geometric				4.40%	
		Damodaran	2024	1928-2023	Historical Stock Returns - Bond Returns	Arithmetic				6.80%	
						Geometric				5.23%	
		Dimson, Marsh, Staunton _Credit Suisse Report	2023	1900-2022	Historical Stock Returns - Bond Returns	Arithmetic				6.40%	
						Geometric				4.60%	
		Bate	2008	1900-2007	Historical Stock Returns - Bond Returns	Geometric				1.50%	
		Shiller	2006	1926-2005	Historical Stock Returns - Bond Returns	Arithmetic				7.00%	
						Geometric				5.50%	
		Siegel	2005	1926-2005	Historical Stock Returns - Bond Returns	Arithmetic				6.10%	
						Geometric				1.60%	
		Dimson, Marsh, and Staunton	2006	1900-2005	Historical Stock Returns - Bond Returns	Arithmetic				5.50%	
		Goyal & Welch	2006	1872-2004	Historical Stock Returns - Bond Returns					1.77%	
		Median									5.50%
Ex Ante Model	Ex Ante Models (Puzzle Research)										
		Claus Thomas	2001	1985-1998	Abnormal Earnings Model					3.00%	
		Arnott and Bernstein	2002	1810-2001	Fundamentals - Div Yld + Growth					2.40%	
		Constantinides	2002	1872-2000	Historical Returns & Fundamentals - P/D & P/E					6.90%	
		Cornell	1999	1926-1997	Historical Returns & Fundamental GDP/Earnings		3.50%	5.50%	4.50%	4.50%	
		Easton, Taylor, et al	2002	1981-1998	Residual Income Model					5.30%	
		Fama French	2002	1951-2000	Fundamental DCF with EPS and DPS Growth		2.55%	4.32%		3.44%	
		Harris & Marston	2001	1982-1998	Fundamental DCF with Analysts' EPS Growth					7.14%	
		McKinsey	2002	1962-2002	Fundamental (P/E, D/P, & Earnings Growth)		3.50%	4.00%		3.75%	
		Siegel	2005	1802-2001	Historical Earnings Yield					2.50%	
		Grabowski	2006	1926-2005	Historical and Projected		3.50%	6.00%	4.75%	4.75%	
		Maheu & McCurdy	2006	1885-2003	Historical Excess Returns, Structural Breaks,		4.02%	5.10%	4.56%	4.56%	
		Bostock	2004	1960-2002	Bond Yields, Credit Risk, and Income Volatility		3.90%	1.30%	2.60%	2.60%	
		Bakshi & Chen	2005	1982-1998	Fundamentals - Interest Rates					7.31%	
		Donaldson, Kamstra, & Kramer	2006	1952-2004	Fundamental, Dividend yld., Returns,, & Volatility		3.00%	4.00%	3.50%	3.50%	
		Campbell	2008	1982-2007	Historical & Projections (D/P & Earnings Growth)		4.10%	5.40%		4.75%	
		Best & Byrne	2001	Projection	Fundamentals - Div Yld + Growth					2.00%	
		Fernandez	2007	Projection	Required Equity Risk Premium					1.00%	
		DeLong & Magin	2008	Projection	Earnings Yield - TIPS					3.22%	
		Siegel - Rethink ERP	2011	Projection	Real Stock Returns and Components					5.50%	
		Kroll (Duff & Phelps)	2024	Projection	Normalized with 5.5% Long-Term Treasury Yield					5.00%	
		Machchowski - VL - 2014	2014	Projection	Fundamentals - Expected Return Minus 10-Year Treasury Rate					5.50%	
		American Appraisal Quarterly ERP	2015	Projection	Fundamental Economic and Market Factors					6.00%	
		JP Morgan Asset Management	2023	Projection	Equity Return of 7.90% and Long-Term Bond of 3.50%					4.40%	
		Market Risk Premia - 5-1-24	2023	Projection	Fundamental Economic and Market Factors					2.61%	
		KPMG	2024	Projection	Fundamental Economic and Market Factors					5.00%	
		Damodaran 6-1-24	2024	Projection	Fundamentals - Implied from FCF to Equity Model (Trailing 12 month, with adjusted payout)					4.12%	
		John Campbell	2001	1860-2000	Historical & Projections (D/P & Earnings Growth)	Arithmetic	3.00%	4.00%	3.50%	3.50%	
				Projected for 75 Years		Geometric	1.50%	2.50%	2.00%	2.00%	
		Peter Diamond	2001	Projected for 75 Years	Fundamentals (D/P, GDP Growth)		3.00%	4.80%	3.90%	3.90%	
		John Shoven	2001	Projected for 75 Years	Fundamentals (D/P, P/E, GDP Growth)		3.00%	3.50%	3.25%	3.25%	
		Median									4.06%
Surveys	Surveys										
		New York Fed	2015	Five-Year	Survey of Wall Street Firms					3.70%	
		Survey of Financial Forecasters	2024	10-Year Projection	Equity Return of 7.00% and Long-Term Bond of 3.60%					3.40%	
		Duke - CFO Magazine Survey	2024	10-Year Projection	Approximately 300 CFOs Expected S&P 500 Return of 9.1% and Risk-Free Rate of 5.5%					1.60%	
		Fernandez - Academics, Analysts, and Companies	2024	Long-Term	Survey of Academics, Analysts, and Companies					5.50%	
		Median									5.05%
Buildins Block	Buildins Block										
		Ibbotson and Chen	2015	Projection	Historical Supply Model (D/P & Earnings Growth)	Arithmetic			6.22%	5.21%	
						Geometric			1.20%		
		Chen - Rethink ERP	2010	20-Year Projection	Combination Supply Model (Historic and Projected)	Geometric				4.00%	
		Ilmanen - Rethink ERP	2010	Projection	Current Supply Model (D/P & Earnings Growth)	Geometric				3.00%	
		Grinold, Kroner, Siegel - Rethink ERP	2011	Projection	Current Supply Model (D/P & Earnings Growth)	Arithmetic			1.63%	1.12%	
						Geometric			3.60%		
		Median									4.06%
Mean	Mean										4.67%
Median	Median										4.56%

CAPM Study

Market Risk Premium Results 2010-2023

Category	Study Authors	Publication Date	Time Period Of Study	Methodology	Return Measure	Range Low	Range High	Midpoint of Range	Mean	Median
Historical Risk Premium										
	Ibbotson	2016	1928-2015	Historical Stock Returns - Bond Returns	Arithmetic				6.00%	
					Geometric				4.10%	
	Damodaran	2024	1928-2023	Historical Stock Returns - Bond Returns	Arithmetic				6.80%	
					Geometric				5.23%	
	Dimson, Marsh, Staunton Credit Suisse Report	2023	1900-2022	Historical Stock Returns - Bond Returns	Arithmetic				6.10%	
					Geometric				4.60%	
	Median									5.57%
Ex Ante Models (Puzzle Research)										
	Siegel - Rethink ERP	2011	Projection	Real Stock Returns and Components					5.50%	
	Kroll (Duff & Phelps)	2021	Projection	Normalized with 3.5% Long-Term Treasury Yield					5.00%	
	Maslichowski - VL - 2014	2014	Projection	Fundamentals - Expected Return Minus 10-Year Treasury Rate					5.50%	
	American Appraisal Quarterly ERP	2015	Projection	Fundamental Economic and Market Factors					6.00%	
	JP Morgan Asset Management	2023	Projection	Equity Return of 7.90% and Long-Term Bond of 3.50%					4.10%	
	Market Risk Premia - 3-1-24	2023	Projection	Fundamental Economic and Market Factors					2.61%	
	KPMG	2024	Projection	Fundamental Economic and Market Factors					5.00%	
	Damodaran 6-1-24	2024	Projection	Fundamentals - Implied from FCF to Equity Model (Trailing 12 month, with adjusted payout)					4.12%	
	Median									5.00%
Surveys										
	New York Fed	2015	Five-Year	Survey of Wall Street Firms					5.70%	
	Survey of Financial Forecasters	2024	10-Year Projection	Equity Return of 7.00% and Long-Term Bond of 3.60%					3.40%	
	Duke - CFO Magazine Survey	2024	10-Year Projection	Approximately 300 CFOs Expected S&P 500 Return of 9.1% and Risk-Free Rate of 5.5%					3.60%	
	Fernandez - Academics, Analysts, and Companies	2024	Long-Term	Survey of Academics, Analysts, and Companies					5.50%	
	Median									5.05%
Building Block										
	Ibbotson and Chen	2015	Projection	Historical Supply Model (D/P & Earnings Growth)	Arithmetic			6.22%	5.21%	
					Geometric			1.20%		
	Chen - Rethink ERP	2010	20-Year Projection	Combination Supply Model (Historic and Projection)	Geometric				4.00%	
	Ilmanen - Rethink ERP	2010	Projection	Current Supply Model (D/P & Earnings Growth)	Geometric				3.00%	
	Grinold, Kroner, Siegel - Rethink ERP	2011	Projection	Current Supply Model (D/P & Earnings Growth)	Arithmetic			1.63%	4.12%	
					Geometric			3.60%		
	Median									4.06%
Mean										**4.92%**
Median										**5.03%**

CAPM Study
Kroll (Duff & Phelps) and KPMG Equity Risk Premium Estimates

KROLL

Kroll Recommended U.S. Equity Risk Premium (ERP) and Corresponding Risk-free Rates (R_f): January 2008–Present

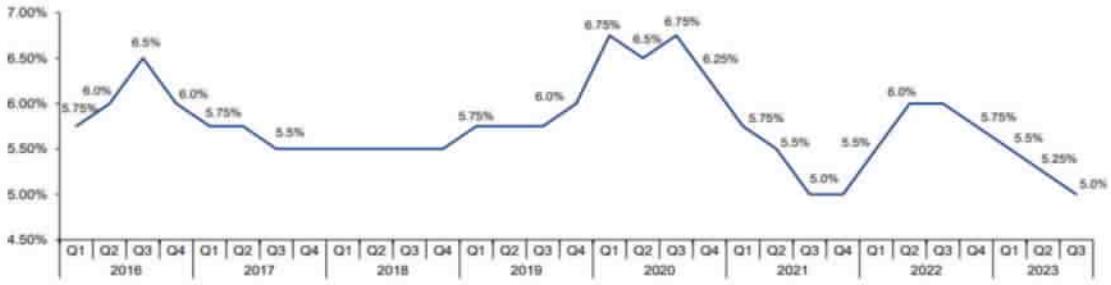
For additional information, please vis
kroll.com/cost-of-capital-resources-com

Date	Risk-free Rate (R_f)	R_f (%)	Kroll Recommended U.S. ERP (%)	What Changed
Current Guidance:				
June 5, 2024 – UNTIL FURTHER NOTICE*	Normalized 20-year U.S. Treasury yield*	3.50*	5.00	ERP
June 6, 2023 – June 4, 2024*	Normalized 20-year U.S. Treasury yield*	3.50*	5.50	ERP
October 18, 2022 – June 7, 2023*	Normalized 20-year U.S. Treasury yield*	3.50*	6.00	ERP
June 16, 2022 – October 17, 2022*	Normalized 20-year U.S. Treasury yield*	3.50*	5.50	RF
April 7, 2022 – June 15, 2022	Normalized 20-year U.S. Treasury yield	3.00	5.50	RF
December 7, 2020 – April 6, 2022	Normalized 20-year U.S. Treasury yield	2.50	5.50	ERP
June 30, 2020 – December 6, 2020	Normalized 20-year U.S. Treasury yield	2.50	6.00	RF
March 25, 2020 – June 29, 2020	Normalized 20-year U.S. Treasury yield	3.00	6.00	ERP
December 19, 2019 – March 24, 2020	Normalized 20-year U.S. Treasury yield	3.00	5.00	ERP
September 30, 2019 – December 18, 2019	Normalized 20-year U.S. Treasury yield	3.00	5.50	R_f
December 31, 2018 – September 29, 2019	Normalized 20-year U.S. Treasury yield	3.50	5.50	ERP
September 5, 2017 – December 30, 2018	Normalized 20-year U.S. Treasury yield	3.50	5.00	ERP
November 15, 2016 – September 4, 2017	Normalized 20-year U.S. Treasury yield	3.50	5.50	R_f
January 31, 2016 – November 14, 2016	Normalized 20-year U.S. Treasury yield	4.00	5.50	ERP
December 31, 2015	Normalized 20-year U.S. Treasury yield	4.00	5.00	
December 31, 2014	Normalized 20-year U.S. Treasury yield	4.00	5.00	
December 31, 2013	Normalized 20-year U.S. Treasury yield	4.00	5.00	
February 28, 2013 – January 30, 2016	Normalized 20-year U.S. Treasury yield	4.00	5.00	ERP
December 31, 2012	Normalized 20-year U.S. Treasury yield	4.00	5.50	
January 15, 2012 – February 27, 2013	Normalized 20-year U.S. Treasury yield	4.00	5.50	ERP
December 31, 2011	Normalized 20-year U.S. Treasury yield	4.00	6.00	
September 30, 2011 – January 14, 2012	Normalized 20-year U.S. Treasury yield	4.00	6.00	ERP
July 1 2011 – September 29, 2011	Normalized 20-year U.S. Treasury yield	4.00	5.50	R_f
June 1, 2011 – June 30, 2011	Spot 20-year U.S. Treasury yield	Spot	5.50	R_f
May 1, 2011 – May 31, 2011	Normalized 20-year U.S. Treasury yield	4.00	5.50	R_f
December 31, 2010	Spot 20-year U.S. Treasury yield	Spot	5.50	
December 1, 2010 – April 30, 2011	Spot 20-year U.S. Treasury yield	Spot	5.50	R_f
June 1, 2010 – November 30, 2010	Normalized 20-year U.S. Treasury yield	4.00	5.50	R_f
December 31, 2009	Spot 20-year U.S. Treasury yield	Spot	5.50	
December 1, 2009 – May 31, 2010	Spot 20-year U.S. Treasury yield	Spot	5.50	ERP
June 1, 2009 – November 30, 2009	Spot 20-year U.S. Treasury yield	Spot	6.00	R_f
December 31, 2008	Normalized 20-year U.S. Treasury yield	4.50	6.00	
November 1, 2008 – May 31, 2009	Normalized 20-year U.S. Treasury yield	4.50	6.00	R_f
October 27, 2008 – October 31, 2008	Spot 20-year U.S. Treasury yield	Spot	6.00	ERP
January 1, 2008 – October 26, 2008	Spot 20-year U.S. Treasury yield	Spot	5.00	Initialized

*** We recommend using the spot 20-year U.S. Treasury yield as the proxy for the risk-free rate, if the prevailing yield as of the valuation date is higher than our recommended U.S. normalized risk-free rate of 3.5%. This guidance is effective when developing USD-denominated discount rates as of June 16, 2022 and thereafter.**

Source: https://www.kroll.com/-/media/cost-of-capital/kroll-us-erp-rf-table-2024.pdf

KPMG Equity Risk Premium



KPMG

Source: https://indialogue.io/clients/reports/public/5d9da61986db2894649a7ef2/5d9da63386db2894649a7ef5

SOAH DOCKET NO. 473-24-13232
PUC DOCKET NO. 56211

APPLICATION OF CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC FOR AUTHORITY TO CHANGE RATES	**§** **§** **§** **§**	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

DIRECT TESTIMONY AND EXHIBITS

OF J. RANDALL WOOLRIDGE, PH.D.

EXHIBIT JRW-7: The Company's Proposed Cost of Capital

Exhibit JRW-7
CEHE Rate of Return Recemmendation

Capital Source	Capitalization Ratio	Cost Rate	Weighted Cost Rate
Long-Term Debt	55.10%	4.29%	2.36%
Common Equity	44.90%	10.40%	4.67%
Total	100.00%		7.03%

Bulkley ROE Results

	Constant Growth DCF		
	Minimum Growth Rate	Average Growth Rate	Maximum Growth Rate
Mean Results:			
30-Day Average	8.68%	9.92%	11.13%
90-Day Average	8.78%	10.02%	11.23%
180-Day Average	8.65%	9.89%	11.10%
Average	8.70%	9.94%	11.15%
Median Results:			
30-Day Average	8.70%	9.75%	10.84%
90-Day Average	8.80%	9.86%	10.90%
180-Day Average	8.63%	9.69%	10.63%
Average	8.71%	9.77%	10.79%

	CAPM / ECAPM / Bond Yield Risk Premium		
	30-Year Treasury Bond Yield		
	Current 30-Day Avg	Near-Term Projected	Longer-Term Projected
CAPM:			
Value Line Beta	11.57%	11.56%	11.56%
Bloomberg Beta	10.61%	10.59%	10.59%
Long-term Avg. Beta	10.36%	10.34%	10.34%
ECAPM:			
Value Line Beta	11.73%	11.72%	11.72%
Bloomberg Beta	11.01%	11.00%	11.00%
Long-term Avg. Beta	10.83%	10.81%	10.81%
Bond Yield Risk Premium	10.36%	10.31%	10.31%

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DIRECT TESTIMONY AND EXHIBITS

OF J. RANDALL WOOLRIDGE, PH.D.

EXHIBIT JRW-8: Investment Firms' Expected Equity Market Annual Returns

Investment Firms' Expected U.S. Large Cap Equity Market Annual Returns
12/31/2022

Investment Firm	AUM ($ in Bn) 12/31/2022	Duration of Forecast 5-, 10-,20- Year	Expected Return US Large Cap Equities
AQR	$100.00	5-10 Years	5.70%
Allianz	$1,782.64	10 Years	7.50%
Bar's	$468.22	10 Years	7.80%
BlackRock	$8,600.00	10 Years	7.90%
BNY Mellon	$1,800.00	10 Years	6.40%
Callan	$15.42	10 Years	7.25%
Capital Group	$2,300.00	20 Years	7.20%
Citi	$250.00	10 Years	9.50%
Cresset	$30.00	10 Years	7.00%
Fidelity	$3,876.00	20 Years	4.00%
Franklin Templeton	$1,300.00	10 Years	7.90%
Invesco	$1,409.20	10 Years	7.70%
Janney Montgomery	$2.90	10 Years	7.50%
JPMorgan	$2,760.00	10 - 15 Years	7.90%
Mackenzie	$192.20	10 Years	8.20%
Morgan Stanley	$1,300.00	7 Years	4.60%
Morningstar	$253.60	-	7.40%
Neuberger Bergman	$427.00	20 Years	5.79%
Northern Trust	$1,000.00	5 Years	6.00%
Nuveen	$1,100.00	10 Years	6.96%
PGIM	$1,200.00	10 Years	7.76%
PIMCO	$1,740.00	5 Years	6.80%
RBC	$389.00	10 Years	7.85%
RVK	$1.30	20 Years	6.75%
Schroeder	$915.53	10 Years	9.10%
Schwab	$755.00	10 Years	6.10%
State Street	$3,500.00	10 Years	6.60%
T-Rowe Price	$1,275.00	5 Years	4.90%
UBS	$3,960.00	5 Years	4.90%
Vanguard	$7,200.00	10 Years	5.30%
Voya	$321.00	10 Years	6.75%
Average	$50,224.01	10 Years	6.87%

Data Source: Company websites. Source documents provided in work papers.

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DIRECT TESTIMONY AND EXHIBITS

OF J. RANDALL WOOLRIDGE, PH.D.

EXHIBIT JRW-9: GDP and S&P 500 Growth Rates

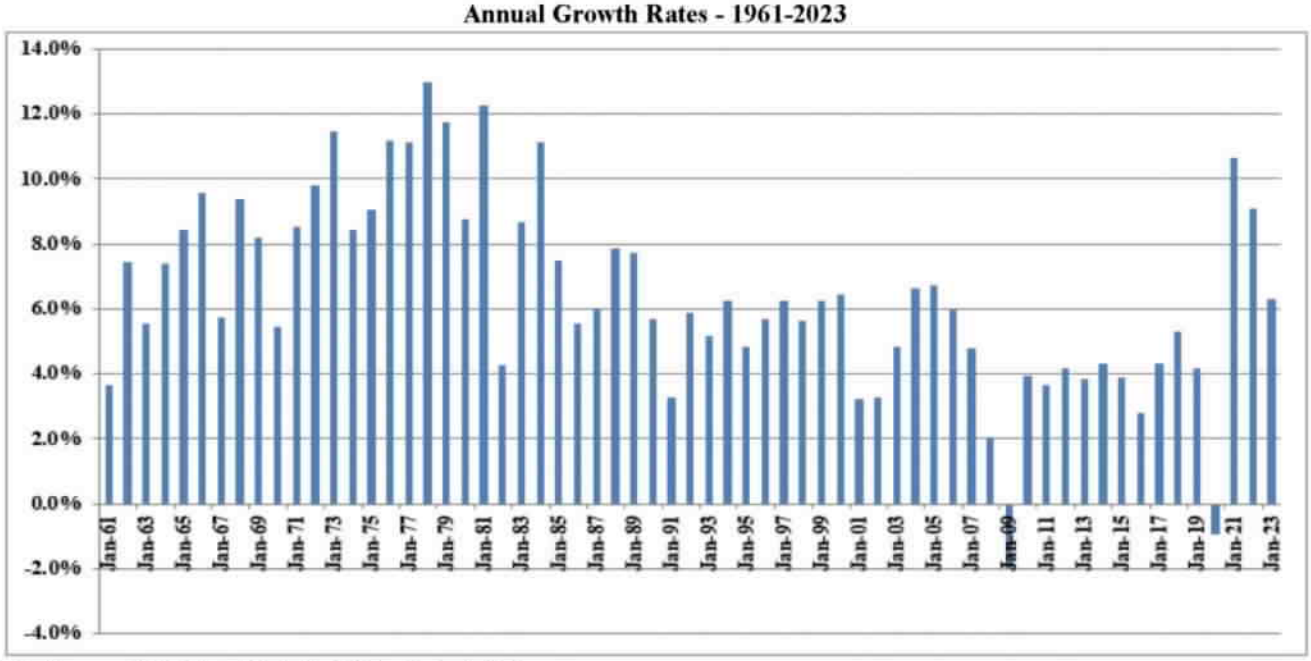
GDP and S&P 500 Growth Rates

Growth Rates
GDP, S&P 500 Price, EPS, and DPS

	GDP	S&P 500	S&P 500 EPS	S&P 500 DPS	
1960	542.38	58.11	3.10	1.98	
1961	562.21	71.55	3.37	2.04	
1962	603.92	63.10	3.67	2.15	
1963	637.45	75.02	4.13	2.35	
1964	684.46	84.75	4.76	2.58	
1965	742.29	92.43	5.30	2.83	
1966	813.41	80.33	5.41	2.88	
1967	859.96	96.47	5.46	2.98	
1968	940.65	103.86	5.72	3.04	
1969	1,017.62	92.06	6.10	3.24	
1970	1,073.30	92.15	5.51	3.19	
1971	1,164.85	102.09	5.57	3.16	
1972	1,279.11	118.05	6.17	3.19	
1973	1,425.38	97.55	7.96	3.61	
1974	1,545.24	68.56	9.35	3.72	
1975	1,684.90	90.19	7.71	3.73	
1976	1,873.41	107.46	9.75	4.22	
1977	2,081.83	95.10	10.87	4.86	
1978	2,351.60	96.11	11.64	5.18	
1979	2,627.33	107.94	14.55	5.97	
1980	2,857.31	135.76	14.99	6.44	
1981	3,207.04	122.55	15.18	6.83	
1982	3,343.79	140.64	13.82	6.93	
1983	3,634.04	164.93	13.29	7.12	
1984	4,037.61	167.24	16.84	7.83	
1985	4,338.98	211.28	15.68	8.20	
1986	4,579.63	242.17	14.43	8.19	
1987	4,855.22	247.08	16.04	9.17	
1988	5,236.44	277.72	24.12	10.22	
1989	5,641.58	353.40	24.32	11.73	
1990	5,963.14	330.22	22.65	12.35	
1991	6,158.13	417.09	19.30	12.97	
1992	6,520.33	435.71	20.87	12.64	
1993	6,858.56	466.45	26.90	12.69	
1994	7,287.24	459.27	31.75	13.36	
1995	7,639.75	615.93	37.70	14.17	
1996	8,073.12	740.74	40.63	14.89	
1997	8,577.55	970.43	44.09	15.52	
1998	9,062.82	1,229.23	44.27	16.20	
1999	9,631.17	1,469.25	51.68	16.71	
2000	10,250.95	1,320.28	56.13	16.27	
2001	10,581.93	1,148.09	38.85	15.74	
2002	10,929.11	879.82	46.04	16.08	
2003	11,456.45	1,111.91	54.69	17.88	
2004	12,217.20	1,211.92	67.68	19.407	
2005	13,039.20	1,248.29	76.45	22.38	
2006	13,815.58	1,418.30	87.72	25.05	
2007	14,474.23	1,468.36	82.54	27.73	
2008	14,769.86	903.25	65.39	28.05	
2009	14,478.07	1,115.10	59.65	22.31	
2010	15,048.97	1,257.64	83.66	23.12	
2011	15,599.73	1,257.60	97.05	26.02	
2012	16,253.97	1,426.19	102.47	30.44	
2013	16,843.20	1,848.36	107.45	36.28	
2014	17,550.69	2,058.90	113.01	39.44	
2015	18,206.02	2,043.94	106.32	43.16	
2016	18,695.11	2,238.83	108.86	45.03	
2017	19,479.62	2,673.61	124.94	49.73	
2018	20,527.16	2,506.85	148.34	53.61	
2019	21,372.58	3,230.78	162.35	58.80	
2020	20,893.75	3,756.07	139.76	56.70	
2021	22,997.50	4,766.18	206.38	59.20	
2022	25,461.34	3,839.50	219.49	68.34	
2023	27,750.00	4769.83	219.70	69.69	Average
Growth Rates	**6.45**	**7.25**	**7.00**	**5.81**	**6.63**

research.stlouisfed.org/fred2/series/GDPA/downloaddata
DPS - http://pages.stern.nyu.edu/~adamodar/

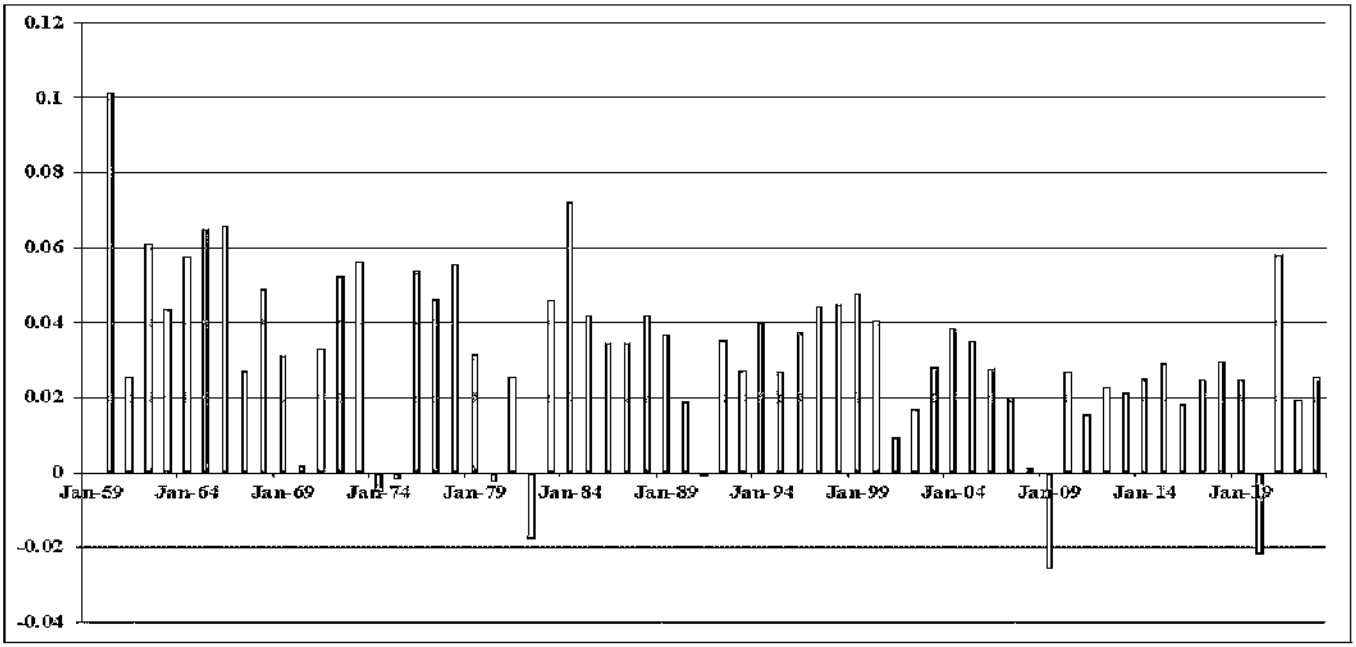
Annual Nominal GDP Growth Rates



Data Sources: GDPA -https://fred.stlouisfed.org/series/GDPA

Real GDP Growth Rates

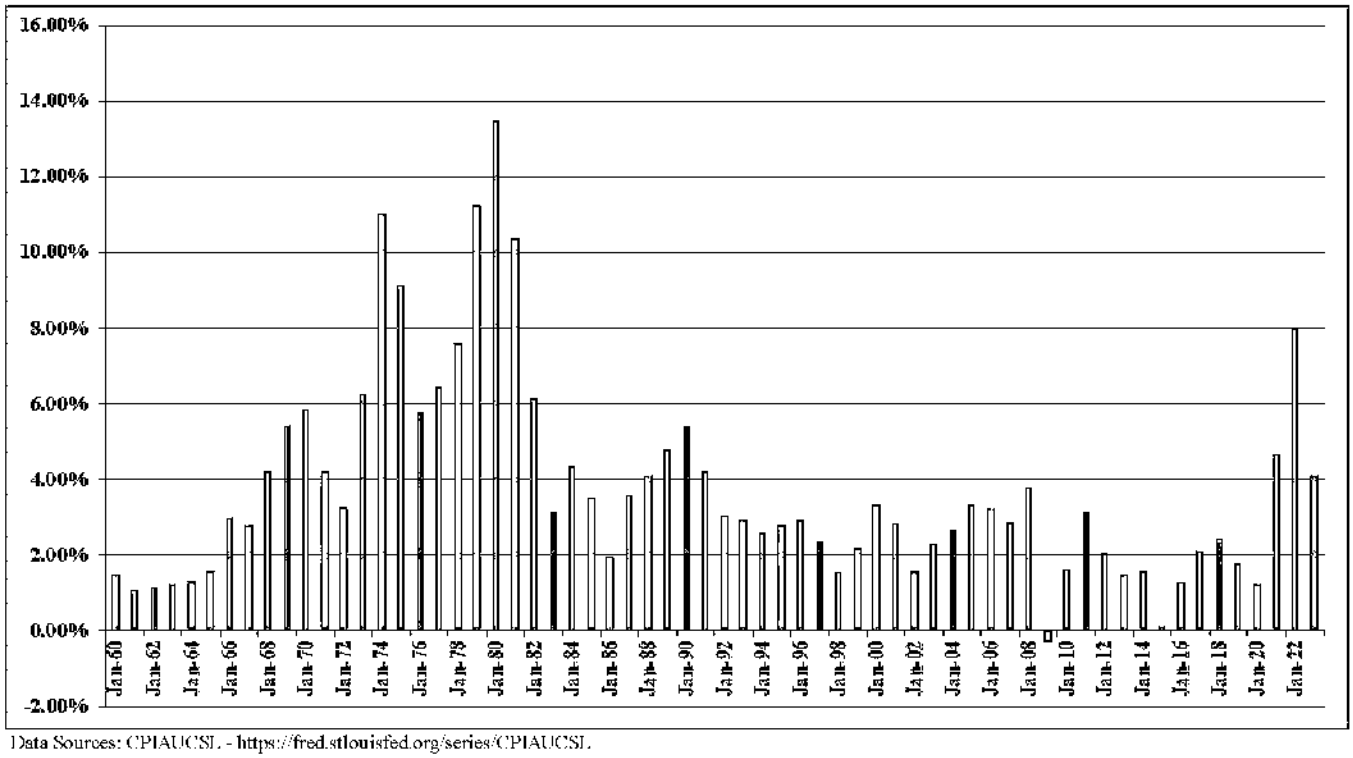
Annual Average Real GDP Growth Rates
1961-2023



Data Sources: GDPC1 - https://fred.stlouisfed.org/series/GDPCA

Inflation Rates

Annual CPI Inflation Rates
1961-2023



Data Sources: CPIAUCSL - https://fred.stlouisfed.org/series/CPIAUCSL

Historical and Projected Nominal GDP Growth Rates

Panel A
Historic GDP Growth Rates

10-Year Average	**4.59%**
20-Year Average	**4.32%**
30-Year Average	**4.65%**
40-Year Average	**5.21%**
50-Year Average	**6.16%**

Calculated using GDP data on Page 1 of Exhibit JRW-9

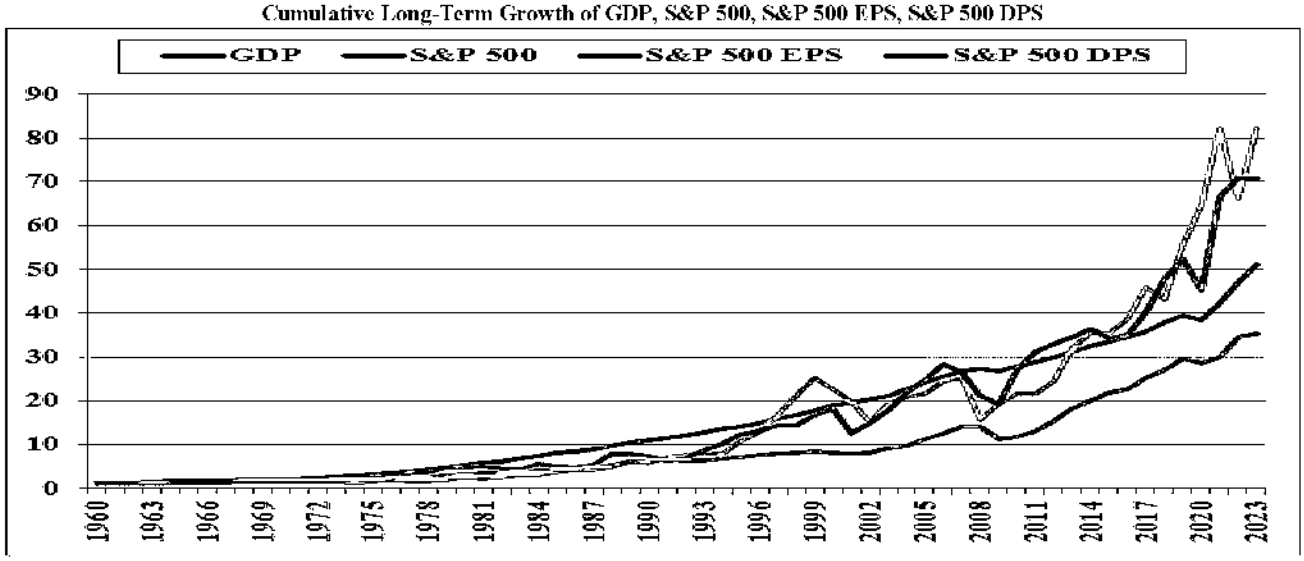
Panel B
Projected GDP Growth Rates

	Time Frame	Projected Nominal GDP Growth Rate
Congressional Budget Office	**2023-2053**	**3.8%**
Survey of Financial Forecasters	**Ten Year**	**4.4%**
Social Security Administration	**2023-2100**	**4.1%**
Energy Information Administration	**2023-2050**	**4.3%**
Sources:	**Average**	**4.15%**

Congressional Budget Office,The *2023 Long-Term Budget Outlook*, July 15, 2023.
U.S. Energy Information Administration, *Annual Energy Outlook 2023*, Table: Macroeconomic Indicators,
Social Security Administration, 2023 Annual Report of the Board of Trustees of the Old-Age,
Survivors, and Disability Insurance (OASDI) Program, Table VI.G4,
The 4.1% growth rate is the growth in projected GDP from 26 trillion in 2023 to $582 trillion in 2100.
https://www.philadelphiafed.org/research-and-data/real-time-center/survey-of-professional-forecasters/

GDP and S&P 500 Growth

Cumulative Long-Term Growth of GDP, S&P 500, S&P 500 EPS, S&P 500 DPS



	GDP	S&P 500	S&P 500 EPS	S&P 500 DPS
Growth Rates	6.45	7.25	7.00	5.81

Data Sources: GDPA -http://research.stlouisfed.org/fred2/series/GDPA/downloaddata
S&P 500, EPS and DPS - http://pages.stern.nyu.edu/~adamodar/

SOAH DOCKET NO. 473-24-13232
PUC DOCKET NO. 56211

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DIRECT TESTIMONY AND EXHIBITS

OF J. RANDALL WOOLRIDGE, PH.D.

EXHIBIT JRW-10: J. Randall Wooldridge, Ph.D. Invoices

INVOICE

FROM: **J. Randall Woolridge, Ph.D.**
120 Haymaker Circle
State College, PA 16801

TO: **Herrera Law & Associates, PLLC**
P.O. Box 302799
Austin, TX 78703

RE: **CEHE Rate Case**
PUC Docket No. 56211

DATE: **6/17/2024**
First Billing

I. PROFESSIONAL SERVICES AND OVERHEAD A. J. RANDALL WOOLRIDGE			Issue Code	Phase Code	
DATE		**DESCRIPTION**			**HOURS**
3 / 18 / 2024		Review Case Documents and Filing	6	A	1.00
		Review Company Backgrounnd	6	D	0.50
	20	Review Testimonies	6	D	1.00
	22	Prepare -Send Interrogatories	6	B	1.00
	24	Review Recent Bulkley ROE Testimonies	6	D	1.00
Various		Review Email and Related Documents	6	D	0.50
Various		Research Rate of Return Issues	6	D	2.00
Various		Review Case with Counsel and Consultants	6	D	0.00
HOURS					7.00
4 / 15 / 2024		Update Electric Utility Financial Statitics	6	D	1.50
	17	Updated Capital Market Indicators	6	D	1.00
	22	Review Data Responses	6	B	1.25
	24	Review Data Responses	6	B	1.50
	26	Review Utility Credit Reports	6	D	0.75
	28	Update EB/E/S Projected vs Actual EPS Study	6	D	1.00
	30	Update Market Risk Premium Study	6	D	1.00
Various		Review Email and Related Documents	6	D	0.50
Various		Research Rate of Return Issues	6	D	2.00
Various		Review Case with Counsel and Consultants	6	D	0.00
HOURS					10.50
5 / 10 / 2024		Review Data Responses	6	B	1.25
	14	Update Rebuttal Testimony	6	E	1.00
	16	Prepare Proxy Groups	6	E	1.00
		Update Financials for Proxy Groups	6	E	1.75
	18	Update Electric Utility Financial Statistics	6	E	1.25
		Update Exhibits	6	E	1.00
		Update VL Risk Metrics Study	6	E	1.00
	20	Update US ROE Rate Case Study	6	E	0.50
		Prepare TX ROE Study	6	E	0.50
	22	Update GDP-S&P 500 EPS Study	6	E	1.00
		Prepare Exhibits	6	E	1.25
		Prepare Testimony	6	E	0.50
	24	Collect Cost of Capital Data	6	E	1.50
		Initial DCF Study - Proxy Groups	6	E	1.25
		Initial CAPM Study - Proxy Groups	6	E	1.00
	25	Update Utility Projected vs Actual EPS Study	6	D	1.00
		Update Interest Rate - Authorized ROE Study	6	D	0.50
	27	Collect Cost of Capital Data	6	E	1.00
		Prepare Exhibits	6	E	1.00
		Prepare Testimony	6	E	0.50
	29	Update Capital Market Summary	6	E	1.00
		Update Capital Market Data	6	D	0.50
		Update Capital Market Conditions Testimony	6	E	0.50
	31	Update Testimony Figures	6	E	0.75
		Update Testimony Tables	6	E	0.50
Various		Review Email and Related Documents	6	D	0.50
Various		Research Rate of Return Issues	6	D	2.00
Various		Review Case with Counsel and Consultants	6	D	0.00
HOURS					25.50
TOTAL HOURS					43.00
PROFESSIONAL SERVICES @ $325.00/HOUR					**$13,975.00**
II. EXPENSES					
a Travel					
b. 1. Office Expenses (Fed Ex)					
TOTAL EXPENSES					$0.00
III. TOTAL BILLING					
TOTAL PROFESSIONAL SERVICES PLUS EXPENSES					$13,975.00
EXPENSES					$0.00
TOTAL BILLING					**$13,975.00**

SOAH DOCKET NO. 473-24-13232
PUC DOCKET NO. 56211

APPLICATION OF CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC FOR AUTHORITY TO CHANGE RATES	**§** **§** **§** **§**	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

DIRECT TESTIMONY AND EXHIBITS

OF J. RANDALL WOOLRIDGE, PH.D.

WORKPAPERS

The following files are not convertible:

56211 Native Exhibits to the Direct Testimony & Exhibits of J. Randall Woolridge Ph.D..xlsx
Article 1.xlsx

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Contact centralrecords@puc.texas.gov if you have any questions.

SURVEY OF PROFESSIONAL FORECASTERS

Release Date: February 10, 2023

FIRST QUARTER 2023

Forecasters See Higher Growth and Stronger Labor Market in 2023

The outlook for the U.S. economy in 2023 looks somewhat better now than it did three months ago, according to 37 forecasters surveyed by the Federal Reserve Bank of Philadelphia. The forecasters predict the economy will expand at an annual rate of 0.6 percent this quarter and 1.0 percent in the second quarter of 2023, up from the previous predictions of 0.2 percent in each quarter. On an annual-average over annual-average basis, the forecasters expect real GDP to increase 1.3 percent in 2023, up from the projection of 0.7 percent in the survey of three months ago.

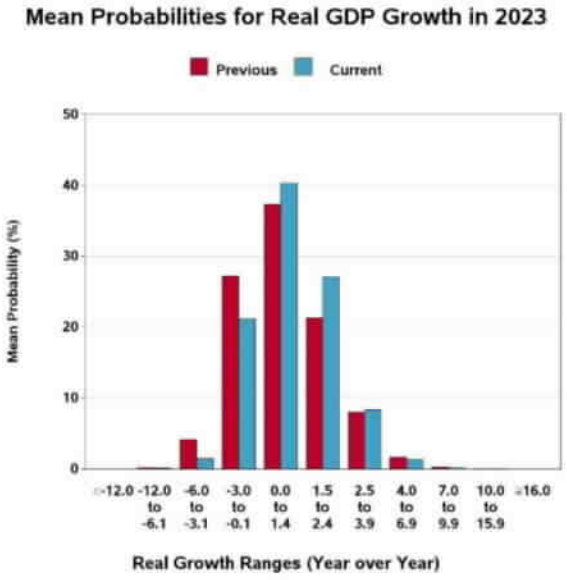
A downward revision to the path for the unemployment rate accompanies the outlook for growth. The forecasters predict the unemployment rate will increase from 3.5 percent this quarter to 4.1 percent in the fourth quarter of 2023. In the previous survey, the unemployment rate was forecast to rise from 3.8 percent to 4.4 percent over the same period. On an annual-average basis, the forecasters expect the unemployment rate to average 3.8 percent this year, marking a downward revision from the previous estimate of 4.2 percent.

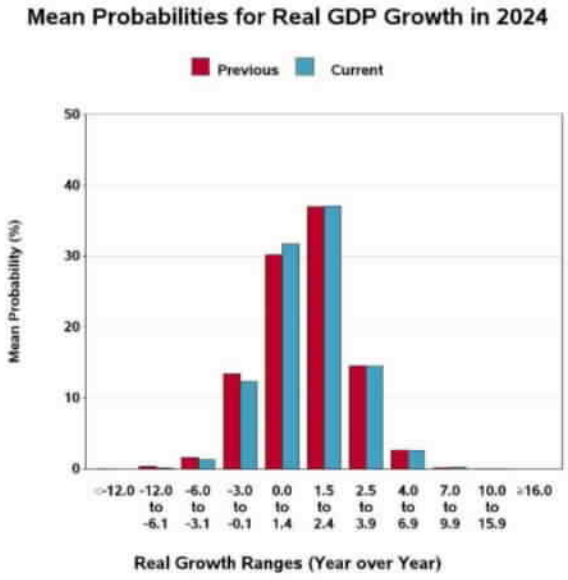
On the employment front, the panelists have revised upward their estimates for job gains in 2023. The projections for the annual-average level of nonfarm payroll employment suggest job gains at a monthly rate of 217,800 in 2023, up from 143,600 projected three months ago.

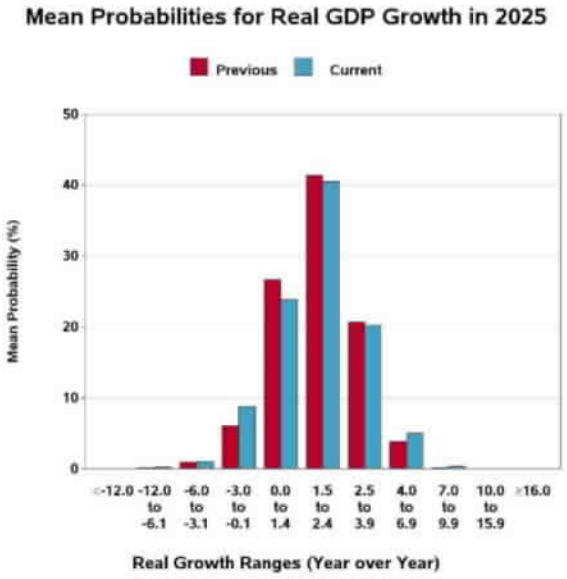
Median Forecasts for Selected Variables in the Current and Previous Surveys

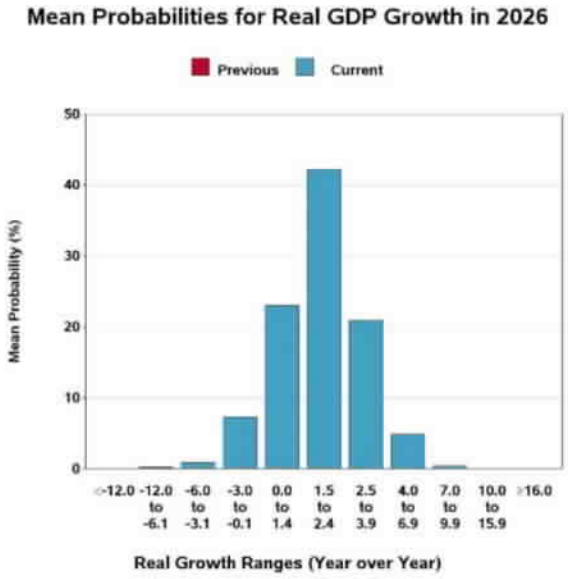
	Real GDP (%)		Unemployment Rate (%)		Payrolls (000s/month)	
	Previous	New	Previous	New	Previous	New
Quarterly data:						
2023:Q1	0.2	0.6	3.8	3.5	79.0	281.9
2023:Q2	0.2	1.0	4.0	3.7	35.8	0.5
2023:Q3	0.9	-0.1	4.3	3.9	41.8	47.5
2023:Q4	2.1	1.2	4.4	4.1	-14.5	62.7
2024:Q1	N.A.	1.3	N.A.	4.2	N.A.	60.8
Annual data (projections are based on annual-average levels):						
2023	0.7	1.3	4.2	3.8	143.6	217.8
2024	1.8	1.4	4.3	4.2	N.A.	43.3
2025	2.2	2.2	4.2	4.2	N.A.	N.A.
2026	N.A.	1.5	N.A.	4.1	N.A.	N.A.

The charts below provide some insight into the degree of uncertainty the forecasters have about their projections for the rate of growth in the annual-average level of real GDP. Each chart presents the forecasters' previous and current estimates of the probability that growth will fall into each of 11 ranges. For 2023, the forecasters see a higher probability that growth will fall into the positive ranges than they did in the previous survey. For 2024 and 2025, the forecasters see few changes to the probability estimates they projected in the survey of three months ago.

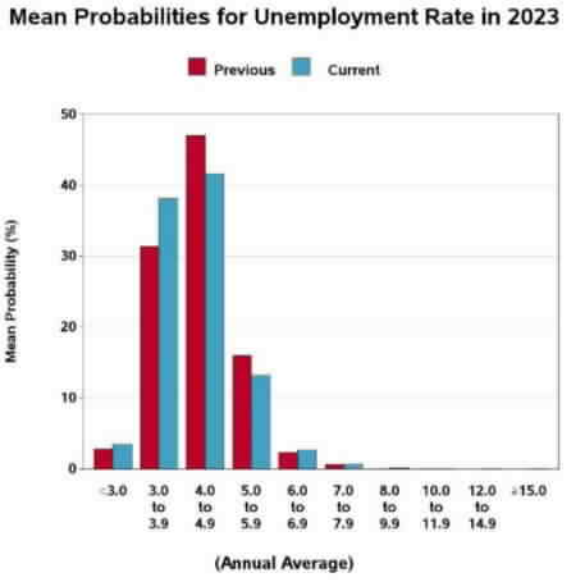


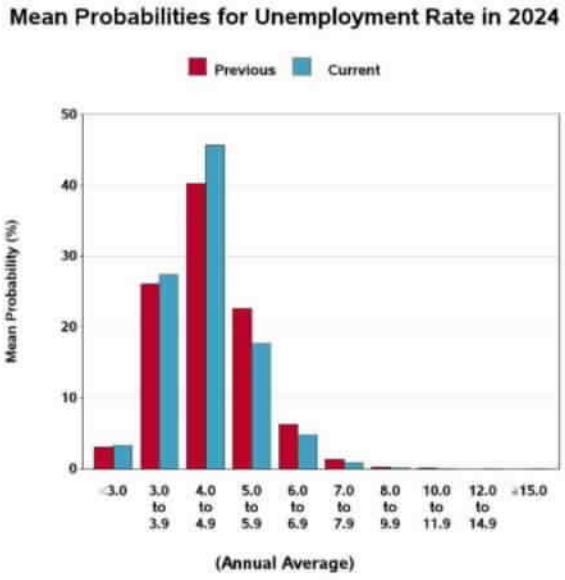


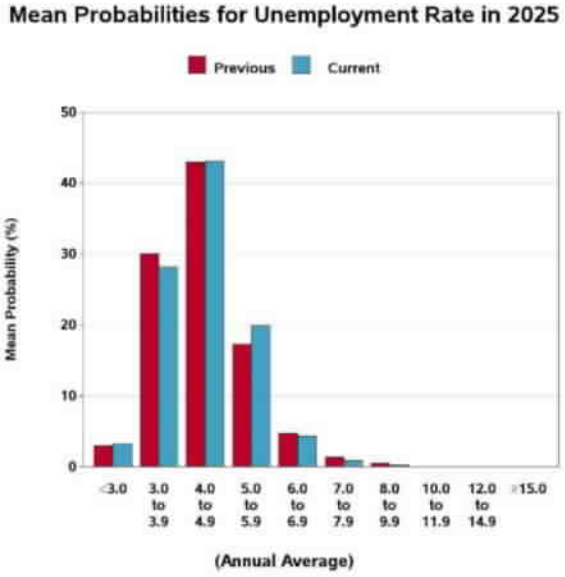


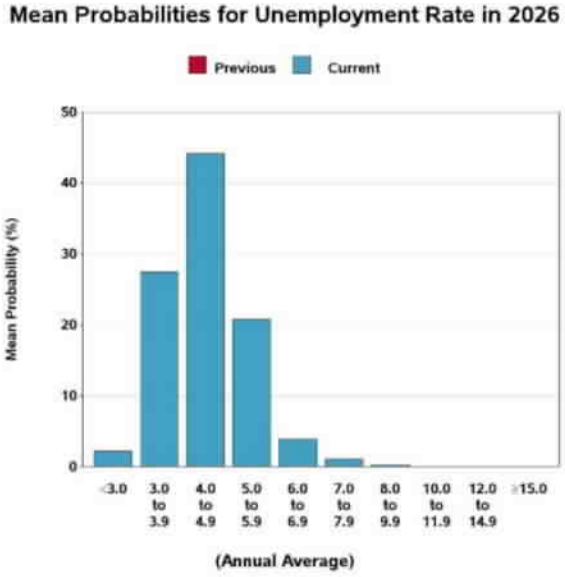


The forecasters' density projections for unemployment, shown below, shed light on uncertainty about the labor market over the next four years. Each chart presents the forecasters' current and previous estimates of the probability that unemployment will fall into each of 10 ranges. For 2023 and 2024, the forecasters are raising their probability estimates from the previous survey for an unemployment rate below 4.0 percent.









Forecasters Predict Lower Inflation

The forecasters expect current-quarter headline CPI inflation will average 3.3 percent at an annual rate, down from the prediction of 4.5 percent in the survey of three months ago. Headline PCE inflation over the current quarter will also be lower at an annual rate of 3.2 percent, down from the previous estimate of 3.8 percent.

Projections for headline and core CPI and PCE inflation at all other forecast horizons have also been revised downward or remain unchanged, compared with those of the previous survey.

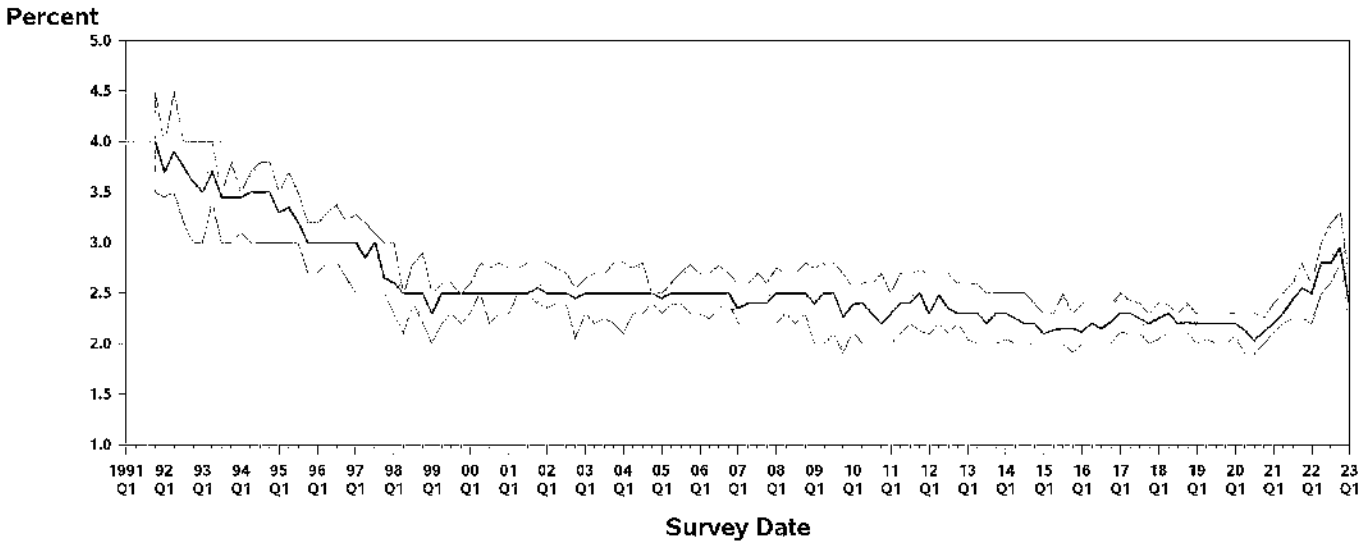
Over the next 10 years, 2023 to 2032, the forecasters predict headline CPI inflation will be at an annual-average rate of 2.37 percent. The corresponding estimate for 10-year annual-average PCE inflation is 2.15 percent. Notably, these 10-year projections are 0.58 percentage point and 0.43 percentage point lower than those of the previous survey, which covered the 10-year horizon from 2022 to 2031.

Median Short-Run and Long-Run Projections for Inflation (Annualized Percentage Points)

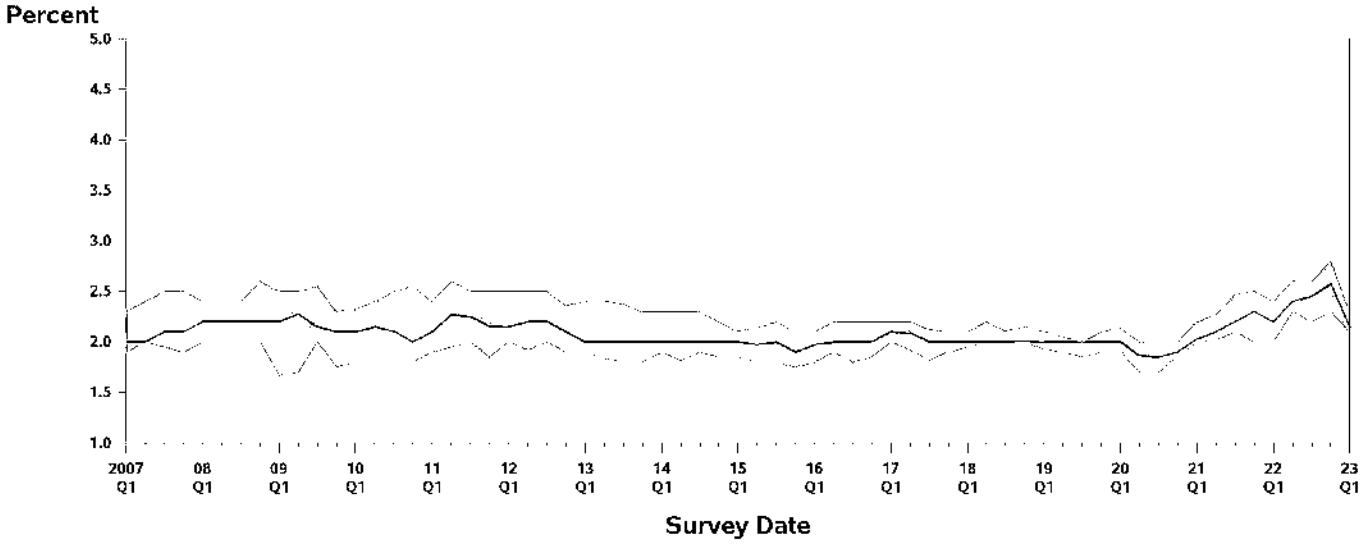
	Headline CPI		Core CPI		Headline PCE		Core PCE	
	Previous	Current	Previous	Current	Previous	Current	Previous	Current
Quarterly								
2023:Q1	4.5	3.3	4.5	3.8	3.8	3.2	3.8	3.6
2023:Q2	3.5	3.4	3.7	3.6	3.1	3.0	3.2	3.1
2023:Q3	3.1	3.1	3.2	3.1	2.7	2.6	2.8	2.7
2023:Q4	2.9	2.8	2.9	2.9	2.7	2.6	2.7	2.5
2024:Q1	N.A.	2.6	N.A.	2.8	N.A.	2.3	N.A.	2.5
Q4/Q4 Annual Averages								
2023	3.4	3.1	3.5	3.4	2.9	2.8	3.0	3.0
2024	2.5	2.5	2.6	2.6	2.3	2.2	2.4	2.3
2025	N.A.	2.4	N.A.	2.4	N.A.	2.2	N.A.	2.1
Long-Term Annual Averages								
2022-2026	3.75	N.A.	N.A.	N.A.	3.23	N.A.	N.A.	N.A.
2023-2027	N.A.	2.50	N.A.	N.A.	N.A.	2.30	N.A.	N.A.
2022-2031	2.95	N.A.	N.A.	N.A.	2.58	N.A.	N.A.	N.A.
2023-2032	N.A.	2.37	N.A.	N.A.	N.A.	2.15	N.A.	N.A.

The charts below show the median projections (the red line) and the associated interquartile ranges (gray areas around the red line) for 10-year annual-average CPI and PCE inflation. The charts provide perspective on the lower 10-year inflation expectations in the current survey.

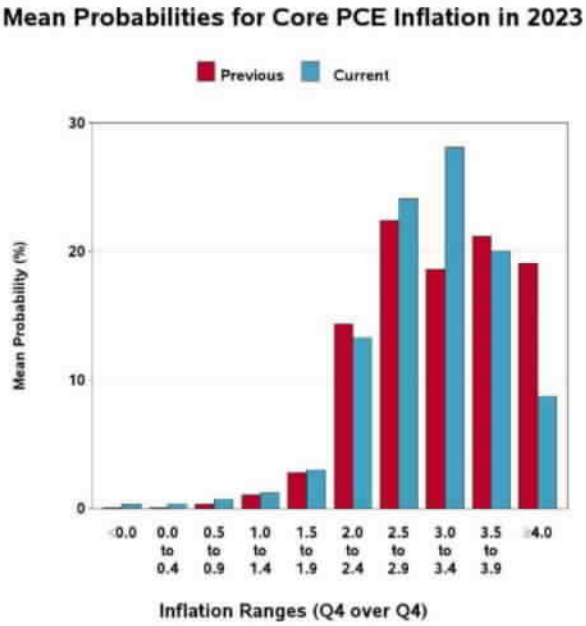
Projections for the 10-Year Annual-Average Rate of CPI Inflation
(Median and Interquartile Range)

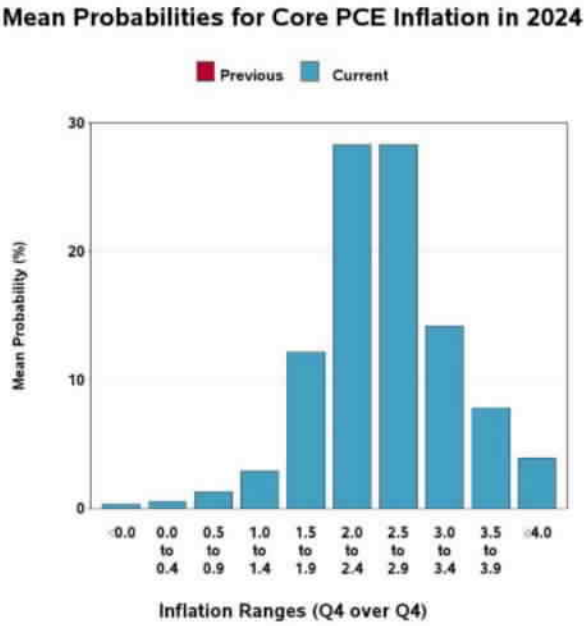


Projections for the 10-Year Annual-Average Rate of PCE Inflation
(Median and Interquartile Range)



The figures below show the probabilities that the forecasters are assigning to each of 10 possible ranges for fourth-quarter over fourth-quarter core PCE inflation in 2023 and 2024. The forecasters have reduced their estimates for the probability that core PCE inflation in 2023 will be 3.5 percent or higher compared with their prediction in the last survey.





Lower (but Significant) Risk of Negative Real GDP Growth in 2023

The forecasters have revised downward the chance of a contraction in real GDP in any of the next four quarters. For the current quarter, the forecasters predict a 40.4 percent chance of negative growth, down from 47.2 percent in the previous survey. The forecasters have also made downward revisions to their probability estimates for the following three quarters.

Risk of a Negative Quarter (%)
Survey Means

Quarterly data:	Previous	New
2023:Q1	47.2	40.4
2023:Q2	49.4	42.4
2023:Q3	46.1	44.9
2023:Q4	43.5	40.6
2024:Q1	N.A.	31.8

Forecasters State Their Views on House Price Growth over the Next Two Years

In a special question in this survey, panelists were asked to provide their forecasts for fourth-quarter over fourth-quarter growth in house prices, as measured by a number of alternative indices. The panelists were allowed to choose their measure from a list of indices or to write in their own index. For each index of their choosing, the panelists provided forecasts for growth in 2023 and 2024.

Fourteen panelists answered the special question. Some panelists provided projections for more than one index. The table below provides a summary of the forecasters' responses. The number of responses (N) is low for each index. The median estimates for the six house price indices listed in the table below range from -4.4 percent to 0.0 percent in 2023 and from -3.0 percent to 4.0 percent in 2024.

Projections for Growth in Various Indices of House Prices
Q4/Q4, Percentage Points

Index	2023 (Q4/Q4 Percent Change)			2024 (Q4/Q4 Percent Change)		
	N	Mean	Median	N	Mean	Median
S&P CoreLogic Case-Shiller: U.S. National	5	-4.0	-4.2	5	-1.1	0.6
S&P CoreLogic Case-Shiller: Composite 10	1	0.0	0.0	1	4.0	4.0
S&P CoreLogic Case-Shiller: Composite 20	4	-3.6	-4.4	4	1.0	1.7
FHFA: Purchase Only (U.S. Total)	8	0.3	-1.5	8	2.0	2.2
CoreLogic: National HPI, incl. Distressed Sales (Single Family Combined)	2	-3.6	-3.6	1	-3.0	-3.0
NAR Median: Total Existing	2	-2.3	-2.3	2	1.4	1.4

Lower Long-Term Output and Productivity Growth but Higher Returns on Financial Assets

In our first-quarter surveys, the forecasters provide their 10-year annual-average projections for an expanded set of variables, including growth in output and productivity, as well as returns on financial assets.

As the table below shows, the forecasters expect real GDP to grow at an annual-average rate of 2.00 percent over the next 10 years, lower than their projection of 2.28 percent in the first-quarter survey of 2022. Ten-year annual-average productivity growth is now expected to be 1.30 percent, down from 1.60 percent previously.

Higher returns on financial assets over the next 10 years accompany the current long-term outlook for real GDP and productivity. The forecasters predict the S&P 500 returning an annual-average 7.50 percent over the next 10 years, up from the previous estimate of 6.73 percent in the first-quarter survey of 2022. The forecasters see the rate on 10-year Treasuries averaging 3.35 percent over the next 10 years, up from 3.07 percent in last year's first-quarter survey. Three-month Treasury bills will return an annual-average 2.65 percent over the next 10 years, up from 2.25 percent previously.

Median Long-Term (10-Year) Forecasts (%)

	First Quarter 2022	*Current Survey*
Real GDP Growth	2.28	2.00
Productivity Growth	1.60	1.30
Stock Returns (S&P 500)	6.73	7.50
Rate on 10-Year Treasury Bonds	3.07	3.35
Bill Returns (3-Month)	2.25	2.65

Technical Notes

Moody's Aaa and Baa Historical Rates
The historical values of Moody's Aaa and Baa rates are proprietary and, therefore, not available in the data files on the Bank's website or on the tables that accompany the survey's complete write-up in the PDF.

The Federal Reserve Bank of Philadelphia thanks the following forecasters for their participation in recent surveys:

Scott Anderson, Bank of the West (BNP Paribas Group); **Anwiti Bahuguna** and **Ed Al-Hussainy**, Columbia Threadneedle Investments; **Robert J. Barbera**, Johns Hopkins University Center for Financial Economics; **Peter Bernstein**, RCF Economic and Financial Consulting, Inc.; **Wayne Best** and **Michael Brown**, Visa, Inc.; **Jay Bryson**, Wells Fargo; **Christine Chmura, Ph.D.**, and **Xiaobing Shuai, Ph.D.**, Chmura Economics & Analytics; **Gary Ciminero, CFA**, GLC Financial Economics; **Grant Collins**, AIM Research, LLC; **Rajeev Dhawan**, Georgia State University; **Bill Diviney**, ABN AMRO Bank NV; **Gabriel Ehrlich**, **Daniil Manaenkov**, and **Tereza Ranosova**, RSQE, University of Michigan; **Michael R. Englund**, Action Economics, LLC; **Sacha Gelfer**, Bentley University; **James Glassman**, JPMorgan Chase & Co.; **Jan Hatzius**, Goldman Sachs; **Steve Kihm**, Citizens Utility Board of Wisconsin; **Oren Klachkin** and **Ryan Sweet**, Oxford Economics USA, Inc.; **Jack Kleinhenz**, Kleinhenz & Associates, Inc.; **Yaniv Konchitchki**, University of California, Berkeley; **Thomas Lam**, Sim Kee Boon Institute, Singapore Management University; **Brian Martin**, Australia New Zealand Bank (ANZ); **Robert McNab**, Old Dominion University; **R. Anthony Metz**, Pareto Optimal Economics; **R. M. Monaco**, TitanRM; **Joel L. Naroff**, Naroff Economic Advisors; **Nomura Securities International**; **Brendon Ogmundson**, BC Real Estate Association; **Perc Pineda, Ph.D.**, Plastics Industry Association; **Joel Prakken** and **Chris Varvares**, S&P Global Market Intelligence; **Jason Prole**, Capital Risk Management; **Michael Roberts**, Roberts Capital Advisors, LLC; **Alfredo A. Romero**, North Carolina A&T State University; **Philip Rothman**, East Carolina University; **Allen Sinai** and **Lu Yu**, Decision Economics, Inc.; **Sean Snaith**, University of Central Florida; **Stephen Stanley**, Santander Capital Markets; **Charles Steindel**, Editor, NABE *Business Economics*; **Susan M. Sterne**, Economic Analysis Associates, Inc.; **Edward Sullivan**, Portland Cement Association; **James Sweeney**, Credit Suisse; **Jordan Vickers** and **Marie Dempsey**, Eaton Corporation; **Lawrence Werther**, Daiwa Capital Markets America; **Mark Zandi**, Moody's Analytics; **Ellen Zentner**, Morgan Stanley.

This is a partial list of participants. We also thank those who wish to remain anonymous.

SUMMARY TABLE
SURVEY OF PROFESSIONAL FORECASTERS
MAJOR MACROECONOMIC INDICATORS

	2023 Q1	2023 Q2	2023 Q3	2023 Q4	2024 Q1	2023	2024	2025	2026
						(YEAR-OVER-YEAR)			
PERCENT GROWTH AT ANNUAL RATES									
1. REAL GDP (BILLIONS, CHAIN WEIGHTED)	0.6	1.0	-0.1	1.2	1.3	1.3	1.4	2.2	1.5
2. GDP PRICE INDEX (PERCENT CHANGE)	3.2	2.9	2.8	2.6	2.4	3.6	2.3	N.A.	N.A.
3. NOMINAL GDP ($ BILLIONS)	4.0	3.4	3.5	3.9	4.2	5.0	3.8	N.A.	N.A.
4. NONFARM PAYROLL EMPLOYMENT									
(PERCENT CHANGE)	2.2	0.0	0.4	0.5	0.5	1.7	0.3	N.A.	N.A.
(AVG MONTHLY CHANGE)	281.9	0.5	47.5	62.7	60.8	217.8	43.3	N.A.	N.A.
VARIABLES IN LEVELS									
5. UNEMPLOYMENT RATE (PERCENT)	3.5	3.7	3.9	4.1	4.2	3.8	4.2	4.2	4.1
6. 3-MONTH TREASURY BILL (PERCENT)	4.7	5.0	4.9	4.9	4.5	4.9	4.1	3.1	2.8
7. 10-YEAR TREASURY BOND (PERCENT)	3.6	3.8	3.9	3.7	3.6	3.8	3.5	3.5	3.3

	2023 Q1	2023 Q2	2023 Q3	2023 Q4	2024 Q1	2023	2024	2025
						(Q4-OVER-Q4)		
INFLATION INDICATORS								
8. CPI (ANNUAL RATE)	3.3	3.4	3.1	2.8	2.6	3.1	2.5	2.4
9. CORE CPI (ANNUAL RATE)	3.8	3.6	3.1	2.9	2.8	3.4	2.6	2.4
10. PCE (ANNUAL RATE)	3.2	3.0	2.6	2.6	2.3	2.8	2.2	2.2
11. CORE PCE (ANNUAL RATE)	3.6	3.1	2.7	2.5	2.5	3.0	2.3	2.1

Note: The figures on each line are medians of 37 forecasters.

Source: Research Department, Federal Reserve Bank of Philadelphia.
Survey of Professional Forecasters, First Quarter 2023.

SURVEY OF PROFESSIONAL FORECASTERS

First Quarter 2023

Tables

Note: Data in these tables listed as "actual" are the data that were available to the forecasters when they were sent the survey questionnaire on January 26, 2023; the tables do not reflect subsequent revisions to the data. All forecasts were received on or before February 7, 2023.

TABLE ONE
MAJOR MACROECONOMIC INDICATORS
MEDIANS OF SURVEY FORECASTER PREDICTIONS

	NUMBER OF FORECASTERS	ACTUAL 2022 Q4	FORECAST 2023 Q1	2023 Q2	2023 Q3	2023 Q4	2024 Q1	ACTUAL 2022 ANNUAL	FORECAST 2023 ANNUAL	2024 ANNUAL	2025 ANNUAL	2026 ANNUAL
1. GROSS DOMESTIC PRODUCT (GDP) ($ BILLIONS)	33	26138	26381	26612	26839	27094	27375	25463	26795	27550	N.A.	N.A.
2. GDP PRICE INDEX (2012=100)	33	129.37	130.40	131.34	132.25	133.10	133.90	127.19	131.81	132.79	N.A.	N.A.
3. CORPORATE PROFITS AFTER TAXES ($ BILLIONS)	15	N.A.	2580.7	2619.9	2616.9	2620.9	2660.4	N.A.	2629.2	2612.6	N.A.	N.A.
4. UNEMPLOYMENT RATE (PERCENT)	38	3.6	3.5	3.7	3.9	4.1	4.2	3.6	3.8	4.0	4.0	4.0
5. NONFARM PAYROLL EMPLOYMENT (MO AVGS)	30	153609	154355	154356	154299	154387	154369	152021	154600	155172	N.A.	N.A.
6. INDUSTRIAL PRODUCTION (2017=100)	27	104.1	104.0	103.7	103.8	104.0	104.1	103.9	103.9	104.0	N.A.	N.A.
7. NEW PRIVATE HOUSING STARTS (ANNUAL AVG, MILLIONS)	30	1.40	1.38	1.35	1.33	1.35	1.37	1.56	1.35	1.40	N.A.	N.A.
8. 3-MONTH TREASURY BILL RATE (PERCENT)	38	4.04	4.70	4.95	4.92	4.89	4.59	2.07	4.87	4.07	3.10	2.80
9. MOODY'S AAA CORP BOND YIELD * (PERCENT)	24	N.A.	4.90	4.90	4.89	5.05	4.94	N.A.	4.94	4.84	N.A.	N.A.
10. MOODY'S BAA CORP BOND YIELD * (PERCENT)	21	N.A.	5.69	6.06	6.25	6.25	6.12	N.A.	6.09	5.95	N.A.	N.A.
11. 10-YEAR TREASURY BOND YIELD (PERCENT)	34	3.83	3.84	3.78	3.80	3.89	3.55	2.95	3.76	3.50	3.45	3.32
12. REAL GDP (BILLIONS, CHAIN WEIGHTED)	33	20198	20227	20279	20273	20321	20395	20019	20277	20361	21004	21316
13. TOTAL CONSUMPTION EXPENDITURES (BILLIONS, CHAIN WEIGHTED)	31	14259.2	14295.4	14337.9	14390.9	14437.5	14473.4	14139.7	14337.3	14548.2	N.A.	N.A.
14. NONRESIDENTIAL FIXED INVESTMENT (BILLIONS, CHAIN WEIGHTED)	29	2964.7	2975.0	2986.8	2995.0	3004.6	3021.6	2938.7	2992.2	3047.6	N.A.	N.A.
15. RESIDENTIAL FIXED INVESTMENT (BILLIONS, CHAIN WEIGHTED)	30	573.6	558.7	551.2	544.5	544.5	551.3	642.3	549.5	563.6	N.A.	N.A.
16. FEDERAL GOVERNMENT C & I (BILLIONS, CHAIN WEIGHTED)	29	1374.1	1382.6	1391.2	1396.3	1396.8	1398.2	1355.6	1391.3	1404.3	N.A.	N.A.
17. STATE AND LOCAL GOV C & I (BILLIONS, CHAIN WEIGHTED)	30	2068.3	2076.0	2084.5	2090.0	2093.8	2104.0	2052.8	2088.1	2110.6	N.A.	N.A.
18. CHANGE IN PRIVATE INVENTORIES (BILLIONS, CHAIN WEIGHTED)	30	129.9	96.0	69.1	57.7	42.1	43.1	123.3	66.6	62.9	N.A.	N.A.
19. NET EXPORTS (BILLIONS, CHAIN WEIGHTED)	30	-1232.4	-1235.4	-1234.7	-1229.8	-1224.5	-1224.3	-1355.1	-1208.2	-1216.0	N.A.	N.A.

* The historical values of Moody's Aaa and Baa rated are proprietary and therefore not available to the general public.

Source: Research Department, Federal Reserve Bank of Philadelphia. Survey of Professional Forecasters, First Quarter 2023.

TABLE 2C
MAJOR MACROECONOMIC INDICATORS
PERCENT AGE CHANGE AT ANNUAL RATES

	NUMBER OF FORECASTERS	Q4 2022 TO Q1 2023	Q1 2023 TO Q2 2023	Q2 2023 TO Q3 2023	Q3 2023 TO Q4 2023	Q4 2023 TO Q1 2024	2022 TO 2023	2023 TO 2024	2024 TO 2025	2025 TO 2026
1. GROSS DOMESTIC PRODUCT (GDP) ($ BILLIONS)	32	4.0	3.4	4.9	4.9	4.2	2.0	3.8	N.A.	N.A.
2. GDP PRICE INDEX (2012=100)	33	3.2	2.9	2.8	2.6	2.4	3.6	2.9	N.A.	N.A.
3. CORPORATE PROFITS AFTER TAX ($ BILLIONS)	15	-0.4	-4.7	-0.5	0.6	4.8	0.9	3.7	N.A.	N.A.
4. UNEMPLOYMENT RATE (PERCENT)	36	-0.1	0.2	0.2	0.1	0.2	0.2	0.4	0.0	-0.1
5. NONFARM PAYROLL EMPLOYMENT										
(PERCENT CHANGE)	30	2.2	0.0	0.4	0.5	0.5	1.7	0.8	N.A.	N.A.
(AVG MONTHLY CHANGE)	30	387.9	0.5	47.5	62.7	60.8	217.8	48.8	N.A.	N.A.
6. INDUSTRIAL PRODUCTION (2017=100)	27	-0.0	-1.3	0.5	0.6	0.0	-0.0	0.8	N.A.	N.A.
7. NEW PRIVATE HOUSING STARTS (ANNUAL TOTAL, MILLIONS)	30	-7.3	-7.5	-4.9	4.1	5.0	-12.2	3.7	N.A.	N.A.
8. 3-MONTH TREASURY BILL RATE (PERCENT)	36	0.60	0.25	-0.03	-0.04	-0.37	2.35	-0.80	-0.97	-0.30
9. MOODY'S AAA CORP BOND YIELD * (PERCENT)	23	N.A.	0.20	-0.01	0.16	-0.11	N.A.	0.10	N.A.	N.A.
10. MOODY'S BAA CORP BOND YIELD * (PERCENT)	21	N.A.	0.37	0.19	0.00	-0.13	N.A.	-0.14	N.A.	N.A.
11. 10-YEAR TREASURY BOND YIELD (PERCENT)	34	-0.19	0.13	0.09	-0.16	-0.14	0.87	-0.04	-0.07	-0.13
12. REAL GDP (BILLIONS, CHAIN WEIGHTED)	37	0.6	1.0	-0.1	1.2	1.3	1.3	1.4	2.2	1.9
13. TOTAL CONSUMPTION EXPENDITURES (BILLIONS, CHAIN WEIGHTED)	31	1.2	1.0	1.7	1.3	1.0	1.6	1.2	N.A.	N.A.
14. NONRESIDENTIAL FIXED INVESTMENT (BILLIONS, CHAIN WEIGHTED)	29	1.4	1.5	1.2	1.3	2.2	1.8	1.8	N.A.	N.A.
15. RESIDENTIAL FIXED INVESTMENT (BILLIONS, CHAIN WEIGHTED)	30	-10.0	-5.3	-4.7	0.0	5.7	-14.4	2.6	N.A.	N.A.
16. FEDERAL GOVERNMENT C & I (BILLIONS, CHAIN WEIGHTED)	29	2.5	2.5	1.9	0.1	0.4	2.6	0.9	N.A.	N.A.
17. S&L GOVT & LOCAL GOVT C & I (BILLIONS, CHAIN WEIGHTED)	30	1.5	1.0	1.4	1.3	1.0	1.3	1.1	N.A.	N.A.
18. CHANGE IN PRIVATE INVENTORIES (BILLIONS, CHAIN WEIGHTED)	30	-54.0	-26.8	-11.1	4.1	1.0	-96.7	-9.8	N.A.	N.A.
19. NET EXPORTS (BILLIONS, CHAIN WEIGHTED)	30	-1.0	-1.3	5.1	5.7	-0.3	108.9	12.0	N.A.	N.A.

* No historical values of Moody's Aaa and Baa rates are proprietary and therefore not available to the general public.

Note: Figures for unemployment rate, 3-month Treasury bill rate, Moody's Aaa corporate bond yield, Moody's Baa corporate bond yield, and 10-year Treasury bond yield are changes in these rates, in percentage points. Figures for change in private inventories and net exports are changes in billions of chain-weighted dollars. All others are percentage changes at annual rates.

Source: Research Department, Federal Reserve Bank of Philadelphia, Survey of Professional Forecasters, First Quarter 2023.

TABLE 3

MAJOR PRICE INDICATORS

MEDIANS OF SURVEY RESPONDENTS

	NUMBER OF FORECASTERS	ACTUAL 2022 Q4	FORECAST (Q/Q) 2023 Q1	2023 Q2	2023 Q3	2023 Q4	2024 Q1	AC AL 2022 ANNUAL	FORECAST (Q4/Q4) 2023 ANNUAL	2024 ANNUAL	2025 ANNUAL
1. CONSUMER PRICE INDEX (ANNUAL RATE)	36	3.1	3.3	3.4	3.1	2.9	2.6	7.1	3.1	2.5	2.4
2. CORE CONSUMER PRICE INDEX (ANNUAL RATE)	34	4.4	3.8	3.6	3.1	2.9	2.8	6.0	3.2	2.6	2.4
3. PCE PRICE INDEX (ANNUAL RATE)	31	3.2	3.2	3.0	2.6	2.6	2.3	5.6	2.8	2.2	2.2
4. CORE PCE PRICE INDEX (ANNUAL RATE)	34	3.9	3.6	3.1	2.7	2.5	2.5	4.7	3.0	2.3	2.1

Source: Research Department, Federal Reserve Bank of Philadelphia, Survey of Professional Forecasters, First Quarter 2023.

TABLE FOUR
YIELD SPREADS
MEDIANS OF FORECASTER PREDICTIONS

	NUMBER OF FORECASTERS	ACTUAL	FORECAST					ACTUAL	FORECAST			
		2022 Q4	2023 Q1	2023 Q2	2023 Q3	2023 Q4	2024 Q1	2022 ANNUAL	2023 ANNUAL	2024 ANNUAL	2025 ANNUAL	2026 ANNUAL
1. TBOND MINUS TBILL (PERCENTAGE POINTS)	34	[illegible]	-1.09	-0.98	-0.87	-0.82	-0.65	0.93	-0.95	-0.43	0.25	0.50
2. AAA MINUS TBOND (PERCENTAGE POINTS)	23	N.A.	0.92	1.00	1.04	1.09	1.09	N.A.	1.00	1.02	N.A.	N.A.
3. BAA MINUS TBOND (PERCENTAGE POINTS)	21	N.A.	2.00	2.20	2.28	2.28	2.25	N.A.	2.20	2.21	N.A.	N.A.
4. BAA MINUS AAA (PERCENTAGE POINTS)	21	N.A.	1.07	1.10	1.10	1.10	1.08	N.A.	1.09	1.07	N.A.	N.A.

Notes:

TBOND is the rate on 10-year Treasury bonds.
TBILL is the rate on 3-month Treasury bills.
AAA is the rate on Moody's Aaa corporate bonds.
BAA is the rate on Moody's Baa corporate bonds.

The historical values for interest rate spreads for Moody's Aaa and Baa rates are proprietary and therefore not available to the general public.

Each interest rate spread is computed as the median value of the forecasters' spreads. These median values may differ from those computed as the difference between the median values of each interest rate in the spread.

Source: Research Department, Federal Reserve Bank of Philadelphia. Survey of Professional Forecasters, First Quarter 2023.

TABLE FIVE
ESTIMATED PROBABILITY OF DECLINE IN REAL GDP

ESTIMATED PROBABILITY (CHANCES IN 100)	Q4 2022 TO Q1 2023	Q1 2023 TO Q2 2023	Q2 2023 TO Q3 2023	Q3 2023 TO Q4 2023	Q4 2023 TO Q1 2024
			NUMBER OF FORECASTERS		
10 OR LESS	3	1	0	2	3
11 TO 20	5	4	5	3	7
21 TO 30	2	7	3	6	8
31 TO 40	7	6	9	5	3
41 TO 50	4	2	1	4	2
51 TO 60	2	2	3	2	4
61 TO 70	1	2	3	5	0
71 TO 80	3	2	3	1	1
81 TO 90	0	2	1	0	0
91 AND OVER	1	0	0	0	0
NOT REPORTING	9	9	9	9	9
MEAN AND MEDIAN					
MEDIAN PROBABILITY	40.00	36.25	39.00	35.00	30.00
MEAN PROBABILITY	40.39	42.41	44.85	40.61	31.78

Note: Total number of forecasters reporting is 28.

Source: Research Department, Federal Reserve Bank of Philadelphia.
Survey of Professional Forecasters, First Quarter 2023.

TABLE SIX
MEAN PROBABILITIES

MEAN PROBABILITY ATTACHED TO POSSIBLE
CIVILIAN UNEMPLOYMENT RATES:
(ANNUAL AVERAGE)

	2023	2024	2025	2026
15.0 PERCENT OR MORE	0.03	0.04	0.00	0.00
12.0 TO 14.9 PERCENT	0.03	0.04	0.00	0.00
10.0 TO 11.9 PERCENT	0.03	0.04	0.00	0.00
8.0 TO 9.9 PERCENT	0.14	0.21	0.23	0.34
7.0 TO 7.9 PERCENT	0.69	0.89	0.88	1.10
6.0 TO 6.9 PERCENT	2.64	4.86	4.37	3.92
5.0 TO 5.9 PERCENT	13.19	17.63	19.91	20.83
4.0 TO 4.9 PERCENT	41.66	45.63	43.13	44.16
3.0 TO 3.9 PERCENT	38.09	27.36	28.17	27.45
LESS THAN 3.0 PERCENT	3.48	3.32	3.31	2.22

MEAN PROBABILITY ATTACHED TO POSSIBLE
PERCENT CHANGES IN REAL GDP:
(ANNUAL-AVERAGE OVER ANNUAL-AVERAGE)

	2022-2023	2023-2024	2024-2025	2025-2026
16.0 PERCENT OR MORE	0.00	0.00	0.00	0.00
10.0 TO 15.9 PERCENT	0.03	0.04	0.00	0.00
7.0 TO 9.9 PERCENT	0.17	0.23	0.38	0.43
4.0 TO 6.9 PERCENT	1.33	2.55	5.01	4.93
2.5 TO 3.9 PERCENT	8.32	14.55	20.29	20.97
1.5 TO 2.4 PERCENT	27.14	37.06	40.48	42.20
0.0 TO 1.4 PERCENT	40.28	31.79	23.85	23.05
-3.0 TO -0.1 PERCENT	21.20	12.28	8.77	7.33
-6.0 TO -3.1 PERCENT	1.42	1.39	1.00	0.85
-12.0 TO -6.1 PERCENT	0.10	0.11	0.23	0.25
LESS THAN -12.0 PERCENT	0.00	0.00	0.00	0.00

MEAN PROBABILITY ATTACHED TO POSSIBLE
PERCENT CHANGES IN GDP PRICE INDEX:
(ANNUAL-AVERAGE OVER ANNUAL-AVERAGE)

	2022-2023	2023-2024
4.0 PERCENT OR MORE	19.94	4.09
3.5 TO 3.9 PERCENT	26.79	8.77
3.0 TO 3.4 PERCENT	22.96	16.64
2.5 TO 2.9 PERCENT	12.36	22.17
2.0 TO 2.4 PERCENT	7.33	26.54
1.5 TO 1.9 PERCENT	6.55	13.42
1.0 TO 1.4 PERCENT	2.45	5.92
0.5 TO 0.9 PERCENT	0.97	1.42
0.0 TO 0.4 PERCENT	0.43	0.66
LESS THAN 0.0 PERCENT	0.21	0.36

Source: Research Department, Federal Reserve Bank of Philadelphia.
Survey of Professional Forecasters, First Quarter 2023.

TABLE SEVEN
MEAN PROBABILITY OF CORE CPI AND CORE PCE INFLATION (Q4/Q4)

MEAN PROBABILITY ATTACHED TO CORE CPI INFLATION:

	22Q4 TO 23Q4	23Q4 TO 24Q4
4.0 PERCENT OR MORE	18.22	6.07
3.5 TO 3.9 PERCENT	26.19	10.77
3.0 TO 3.4 PERCENT	22.64	16.82
2.5 TO 2.9 PERCENT	18.23	25.84
2.0 TO 2.4 PERCENT	7.27	25.54
1.5 TO 1.9 PERCENT	1.66	7.70
1.0 TO 1.4 PERCENT	0.90	1.94
0.5 TO 0.9 PERCENT	0.86	0.83
0.0 TO 0.4 PERCENT	0.74	1.16
LESS THAN 0.0 PERCENT	3.30	3.34

MEAN PROBABILITY ATTACHED TO CORE PCE INFLATION:

	22Q4 TO 23Q4	23Q4 TO 24Q4
4.0 PERCENT OR MORE	8.73	3.96
3.5 TO 3.9 PERCENT	20.08	7.85
3.0 TO 3.4 PERCENT	28.11	14.18
2.5 TO 2.9 PERCENT	24.12	28.30
2.0 TO 2.4 PERCENT	13.30	28.31
1.5 TO 1.9 PERCENT	3.02	12.20
1.0 TO 1.4 PERCENT	1.21	2.94
0.5 TO 0.9 PERCENT	0.70	1.31
0.0 TO 0.4 PERCENT	0.38	0.57
LESS THAN 0.0 PERCENT	0.35	0.38

Source: Research Department, Federal Reserve Bank of Philadelphia.
Survey of Professional Forecasters, First Quarter 2023.

TABLE EIGHT
LONG-TERM (5-YEAR AND 10-YEAR) INFLATION FORECASTS

ANNUAL AVERAGE OVER THE NEXT 5 YEARS: 2023-2027

CPI INFLATION RATE		PCE INFLATION RATE	
MINIMUM	2.14	MINIMUM	1.59
LOWER QUARTILE	2.40	LOWER QUARTILE	2.20
MEDIAN	2.50	MEDIAN	2.30
UPPER QUARTILE	2.80	UPPER QUARTILE	2.50
MAXIMUM	3.75	MAXIMUM	3.25
MEAN	2.65	MEAN	2.37
STD. DEVIATION	0.43	STD. DEVIATION	0.36
N	29	N	28
MISSING	8	MISSING	9

ANNUAL AVERAGE OVER THE FOLLOWING 5 YEARS: 2028-2032

CPI INFLATION RATE		PCE INFLATION RATE	
MINIMUM	1.70	MINIMUM	1.26
LOWER QUARTILE	2.00	LOWER QUARTILE	1.90
MEDIAN	2.20	MEDIAN	2.00
UPPER QUARTILE	2.33	UPPER QUARTILE	2.25
MAXIMUM	3.70	MAXIMUM	3.29
MEAN	2.21	MEAN	2.07
STD. DEVIATION	0.38	STD. DEVIATION	0.39
N	28	N	27
MISSING	9	MISSING	10

ANNUAL AVERAGE OVER THE NEXT 10 YEARS: 2023-2032

CPI INFLATION RATE		PCE INFLATION RATE	
MINIMUM	1.96	MINIMUM	1.79
LOWER QUARTILE	2.20	LOWER QUARTILE	2.09
MEDIAN	2.37	MEDIAN	2.15
UPPER QUARTILE	2.60	UPPER QUARTILE	2.30
MAXIMUM	3.70	MAXIMUM	3.00
MEAN	2.44	MEAN	2.23
STD. DEVIATION	0.35	STD. DEVIATION	0.30
N	28	N	27
MISSING	9	MISSING	10

Note: The summary statistics for each forecast horizon are computed on a sample of panelists that may differ from one horizon to the next. The usual identity linking the 10-year horizon to the two underlying five-year horizons may not hold in the results.

Source: Research Department, Federal Reserve Bank of Philadelphia.
Survey of Professional Forecasters, First Quarter 2023.

TABLE NINE
ADDITIONAL LONG-TERM (10-YEAR) FORECASTS

ANNUAL AVERAGE OVER THE NEXT 10 YEARS: 2023-2032

REAL GDP GROWTH RATE	
MINIMUM	1.50
LOWER QUARTILE	1.75
MEDIAN	2.00
UPPER QUARTILE	2.16
MAXIMUM	2.80
MEAN	1.96
STD. DEVIATION	0.33
N	25
MISSING	12

PRODUCTIVITY GROWTH RATE	
MINIMUM	0.50
LOWER QUARTILE	1.00
MEDIAN	1.30
UPPER QUARTILE	1.40
MAXIMUM	3.00
MEAN	1.33
STD. DEVIATION	0.58
N	17
MISSING	20

STOCK RETURNS (S&P 500)	
MINIMUM	1.80
LOWER QUARTILE	5.00
MEDIAN	7.50
UPPER QUARTILE	8.00
MAXIMUM	10.50
MEAN	6.82
STD. DEVIATION	2.31
N	13
MISSING	24

BOND RATE (10-YEAR)	
MINIMUM	2.40
LOWER QUARTILE	2.80
MEDIAN	3.35
UPPER QUARTILE	3.51
MAXIMUM	4.25
MEAN	3.28
STD. DEVIATION	0.51
N	22
MISSING	15

BILL RETURNS (3-MONTH)	
MINIMUM	1.10
LOWER QUARTILE	2.40
MEDIAN	2.65
UPPER QUARTILE	3.23
MAXIMUM	4.00
MEAN	2.75
STD. DEVIATION	0.66
N	22
MISSING	15

Source: Research Department, Federal Reserve Bank of Philadelphia.
Survey of Professional Forecasters, First Quarter 2023.

Congressional Budget Office
Nonpartisan Analysis for the U.S. Congress

The 2023 Long-Term Budget Outlook
By the Numbers

JUNE | 2023

Long-Term Budget Outlook, by Fiscal Year

Percentage of Gross Domestic Product

	Average, 1993–2022	Actual, 2022	2023	2033	2043	2053
Revenues, Total	**17.2**	**19.6**	**18.4**	**18.1**	**18.6**	**19.1**
Individual income taxes	8.0	10.5	9.6	9.7	10.1	10.7
Payroll taxes	6.1	5.9	6.0	5.9	5.8	5.8
Corporate income taxes	1.7	1.7	1.8	1.4	1.4	1.4
Other	1.4	1.4	1.0	1.1	1.2	1.3
Outlays, Total	**21.0**	**24.8**	**24.2**	**24.4**	**26.7**	**29.1**
Mandatory, subtotal	12.0	16.3	15.1	15.3	16.5	16.9
Social Security	4.5	4.8	5.1	6.0	6.2	6.2
Major health care programs	4.3	5.6	5.8	6.6	8.0	8.6
Medicare, net of offsetting receipts	2.6	2.8	3.1	4.0	5.1	5.5
Medicaid, CHIP, and marketplace subsidies	1.7	2.8	2.7	2.6	2.9	3.1
Other	3.3	5.8	4.2	2.6	2.4	2.1
Discretionary	7.1	6.6	6.5	5.6	5.4	5.4
Net interest	1.8	1.9	2.5	3.6	4.8	6.7
Deficit, Total	**-3.7**	**-5.2**	**-5.8**	**-6.4**	**-8.1**	**-10.0**
Deficit, Primary	-1.9	-3.3	-3.3	-2.8	-3.4	-3.3
Debt Held by the Public	57	97	98	115	144	181

See Chapter 1 and Chapter 2 of the report. Deficits and outlays have been adjusted to exclude the effects of shifts in the timing of certain payments when October 1, the first day of the fiscal year, falls on a weekend.

Long-Term Economic Outlook, by Calendar Year

Percent

	Average, 1993–2022	Actual, 2022	2023	2033	2043	2053
Growth of Real (Inflation-Adjusted) GDP	2.4	2.1	0.3	1.7	1.5	1.5
Inflation						
PCE price index	2.0	6.3	3.8	1.9	1.9	1.9
Consumer price index	2.5	8.0	4.8	2.3	2.2	2.3
Labor Force Participation Rate	65.0	62.2	62.2	61.3	60.7	60.3
Unemployment Rate	5.7	3.6	4.7	4.5	4.2	4.1
Interest Rates						
On 10-year Treasury notes	3.9	3.0	3.9	3.8	4.1	4.5
On all federal debt held by the public (By fiscal year)	4.0	2.1	2.7	3.3	3.5	4.0

See Chapter 3 and Appendix C of the report.

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THE 2023 ANNUAL REPORT OF THE BOARD OF TRUSTEES OF THE FEDERAL OLD-AGE AND SURVIVORS INSURANCE AND FEDERAL DISABILITY INSURANCE TRUST FUNDS

COMMUNICATION

FROM

THE BOARD OF TRUSTEES, FEDERAL OLD-AGE AND SURVIVORS INSURANCE AND FEDERAL DISABILITY INSURANCE TRUST FUNDS

TRANSMITTING

THE 2023 ANNUAL REPORT OF THE BOARD OF TRUSTEES OF THE FEDERAL OLD-AGE AND SURVIVORS INSURANCE AND FEDERAL DISABILITY INSURANCE TRUST FUNDS

LETTER OF TRANSMITTAL

BOARD OF TRUSTEES OF THE
FEDERAL OLD-AGE AND SURVIVORS INSURANCE AND
FEDERAL DISABILITY INSURANCE TRUST FUNDS,
Washington, D.C., March 31, 2023

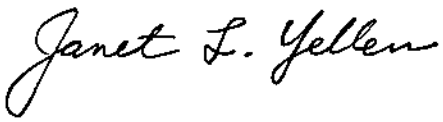
HON. KEVIN MCCARTHY,
Speaker of the House of Representatives.

HON. KAMALA D. HARRIS,
President of the Senate.

DEAR MR. SPEAKER AND MADAM PRESIDENT:

We have the honor of transmitting to you the 2023 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds, the 83rd such report.

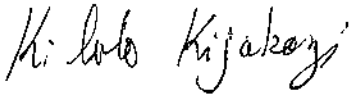
Respectfully,



JANET YELLEN,
Secretary of the Treasury,
and Managing Trustee of the Trust Funds.

JULIE A. SU,
Acting Secretary of Labor,
and Trustee.

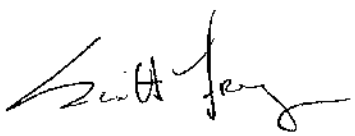
XAVIER BECERRA,
Secretary of Health and Human Services,
and Trustee.



KILOLO KIJAKAZI,
Acting Commissioner of
Social Security, and Trustee.

VACANT,
Public Trustee.

VACANT,
Public Trustee.



SCOTT L. FREY,
Chief of Staff, Social Security Administration,
and Acting Secretary, Board of Trustees.

CONTENTS

THE 2023 ANNUAL REPORT OF THE BOARD OF TRUSTEES OF THE FEDERAL OLD-AGE AND SURVIVORS INSURANCE AND FEDERAL DISABILITY INSURANCE TRUST FUNDS

I. INTRODUCTION

The Old-Age, Survivors, and Disability Insurance (OASDI) program makes monthly income available to insured workers and their families at retirement, death, or disability. The OASDI program consists of two parts. Retired workers, their families, and survivors of deceased workers receive monthly benefits under the Old-Age and Survivors Insurance (OASI) program. Disabled workers and their families receive monthly benefits under the Disability Insurance (DI) program.

The Social Security Act established the Board of Trustees to oversee the financial operations of the OASI and DI Trust Funds. The Board is composed of six members. Four members serve by virtue of their positions in the Federal Government: the Secretary of the Treasury, who is the Managing Trustee; the Secretary of Labor; the Secretary of Health and Human Services; and the Commissioner of Social Security. The President appoints and the Senate confirms the other two members to serve as public representatives. These two positions are currently vacant. The Deputy Commissioner of the Social Security Administration serves as Secretary of the Board.

The Social Security Act requires that the Board, among other duties, report annually to the Congress on the actuarial status and financial operations of the OASI and DI Trust Funds. The 2023 report is the 83rd such report. The intermediate (best estimate) assumptions for this report were set in December 2022. The Trustees will continue to monitor future developments and modify the projections in later reports as appropriate.

II. OVERVIEW

A. HIGHLIGHTS

This section summarizes the report's major findings.

Now, more than 3 years after the start of the COVID-19 pandemic, the acute stage of the pandemic appears to be over, but the Trustees expect there will be residual effects on the population and the economy for years to come. Since the assumptions for last year's report were set, the Trustees have reassessed their expectations for the economy in light of recent developments, including updated data on inflation and output, and have revised down the levels of gross domestic product (GDP) and labor productivity by about 3 percent over the projection period. Assumptions for growth are largely unchanged after the first 10 years of the projection period. The intermediate (best estimate) assumptions for this report were set in December 2022. The Trustees will continue to monitor developments and modify the projections in later reports.

In 2022

At the end of 2022, the OASDI program was providing benefit payments[1] to about 66 million people: 51 million retired workers and dependents of retired workers, 6 million survivors of deceased workers, and 9 million disabled workers and dependents of disabled workers. During the year, an estimated 181 million people had earnings covered by Social Security and paid payroll taxes on those earnings. The total cost of the program in 2022 was $1,244 billion. Total income was $1,222 billion, which consisted of $1,155 billion in non-interest income and $66 billion in interest earnings. Asset reserves held in special issue U.S. Treasury securities declined from $2,852 billion at the beginning of the year to $2,830 billion at the end of the year.

Short-Range Results (2023-32)

Under the Trustees' intermediate assumptions, Social Security's total cost is projected to be higher than its total income in 2023 and all later years. Total cost began to be higher than total income in 2021. Social Security's cost has exceeded its non-interest income since 2010.

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[1] The definitions of "benefit payments" and other terms appear in the Glossary.

To illustrate the actuarial status of the Social Security program as a whole, the operations of the OASI and DI Trust Funds are often shown on a combined basis as OASDI. However, by law, the two funds are separate entities and therefore the combined fund operations and reserves are hypothetical. The combined reserves are projected to decrease from $2,830 billion at the beginning of 2023 to $590 billion at the end of 2032, the last year of the short-range period.

The reserves of the combined OASI and DI Trust Funds along with projected program income are sufficient to cover projected program cost over the next 10 years under the intermediate assumptions. However, the ratio of reserves to annual cost is projected to decline from 204 percent at the beginning of 2023 to 96 percent at the beginning of 2029 and remain below 100 percent for the remainder of the 10-year short-range period. Because this ratio falls below 100 percent by the end of the 10th projection year, the combined OASI and DI Trust Funds fail the Trustees' test of short-range financial adequacy. Considered separately, the OASI Trust Fund fails this test, but the DI Trust Fund satisfies the test. For last year's report, the combined reserves were projected to be 211 percent of annual cost at the beginning of 2023 and 57 percent at the beginning of 2032.

Long-Range Results (2023-97)

Under the Trustees' intermediate assumptions, OASDI cost is projected to exceed total income in 2023, and the dollar level of the hypothetical combined trust fund reserves declines until reserves become depleted in 2034, one year earlier than projected in last year's report. Figure II.D2 shows the implications of reserve depletion for the combined OASI and DI Trust Funds. Considered separately, the OASI Trust Fund reserves become depleted in 2033, one year earlier than projected in last year's report, and, as in last year's report, the DI Trust Fund reserves do not become depleted within the 75-year long-range projection period.[1]

The DI program continued to have low levels of disability applications and benefit awards through 2022. Disability applications have declined substantially since 2010, and the total number of disabled-worker beneficiaries in current payment status has been falling since 2014. For this report, disability applications are assumed to rise gradually from current low levels, resulting

[1] If the OASI Trust Fund reserves were to become depleted in 2033 as is currently projected, the operations of the hypothetical combined OASI and DI Trust Funds would not reflect the aggregated operation of the OASI Trust Fund and the DI Trust Fund because part of the OASI benefits could not be paid without a change in the law. The values shown for the hypothetical combined trust funds assume the law will have been changed to permit the transfer of resources between funds as needed.

in a rise in the age-sex-adjusted disability incidence rate to an ultimate rate of 4.8 per thousand exposed by the end of the short-range projection period.

OASDI cost has been generally increasing much more rapidly than non-interest income since 2008 and is projected to continue to do so through about 2040. In this period, the retirement of the baby-boom generation is increasing the number of beneficiaries much faster than the increase in the number of covered workers, as subsequent lower-birth-rate generations replace the baby-boom generation at working ages. Between about 2040 and 2055, OASDI cost and non-interest income are projected to generally increase at more similar rates as the cost rate (the ratio of program cost to taxable payroll) roughly stabilizes, reflecting the return to birth rates above 2 children per woman between 1990 and 2008. Between 2055 and 2078, OASDI cost is projected to grow significantly faster than income because of the period of historically low birth rates starting with the recession of 2007-09. From 2078 to 2097, cost is projected to grow somewhat slower than income, as birth rates are assumed to return to a level of 2 children per woman for 2056 and thereafter.

Over the 75-year long-range period 2023-97, the projected OASDI annual cost rate increases from 14.53 percent of taxable payroll for 2023 to 18.50 percent for 2078, and then decreases generally to 17.75 percent for 2097. The projected cost rate for 2097 is 4.35 percent of taxable payroll more than the projected income rate (the ratio of non-interest income to taxable payroll) for 2097. For last year's report, projected OASDI cost for 2097 was 17.65 percent, or 4.26 percent of payroll more than the annual income rate for that year. Expressed in relation to the projected gross domestic product (GDP), OASDI cost generally rises from 5.2 percent of GDP for 2023 to a peak of about 6.3 percent for 2076, and then declines to 6.0 percent by 2097.

The actuarial deficit is 3.61 percent of taxable payroll for the 75-year projection period through 2097, increased from 3.42 percent of taxable payroll for the 75-year projection period through 2096 in last year's report. The closely-related open-group unfunded obligation for OASDI is 3.42 percent of taxable payroll over the 75-year projection period through 2097, increased from 3.24 percent of payroll over the 75-year projection period through 2096 in last year's report. The open-group unfunded obligation for OASDI is $22.4 trillion in present value over the 75-year projection period through 2097 and is $2.0 trillion more than the measured level of $20.4 trillion over the 75-year projection period through 2096 in last year's report. The actuarial deficit rounds to 1.3 percent and the unfunded obligation rounds to 1.2 percent of GDP over the 75-year projection period through 2097, compared to 1.2 percent for the actuarial deficit and 1.1 percent for the unfunded

obligation over the 75-year projection period through 2096 in last year's report.

If the assumptions, methods, starting values, and the law had all remained unchanged, the actuarial deficit would have increased to 3.48 percent of taxable payroll, and the unfunded obligation would have risen to 3.29 percent of taxable payroll and $21.2 trillion in present value due to the change in the valuation date and the extension of the valuation period through an additional year, 2097. The actuarial deficit increased significantly in this year's report primarily due to recent economic experience and changes in near-term economic assumptions, as described in detail in section IV.B.6 of this report. In particular, the level of potential GDP is assumed to be about 0.9 percent lower than the level estimated in last year's report for 2020, widening to about 3.0 percent lower by 2026 and for all years thereafter. This shift was made as the Trustees lowered the levels of GDP and total economy labor productivity in response to recent economic developments, including higher-than-expected inflation rates and lower-than-expected output growth.

To illustrate the magnitude of the 75-year actuarial deficit, consider that for the combined OASI and DI Trust Funds to remain fully solvent throughout the 75-year projection period ending in 2097: (1) revenue would have to increase by an amount equivalent to an immediate and permanent payroll tax rate increase of 3.44 percentage points[1] to 15.84 percent beginning in January 2023; (2) scheduled benefits would have to be reduced by an amount equivalent to an immediate and permanent reduction of 21.3 percent applied to all current and future beneficiaries effective in January 2023, or 25.4 percent if the reductions were applied only to those who become initially eligible for benefits in 2023 or later; or (3) some combination of these approaches would have to be adopted.

If substantial actions are deferred for several years, the changes necessary to maintain Social Security solvency would be concentrated on fewer years and fewer generations. Significantly larger changes would be necessary if action is deferred until the combined trust fund reserves become depleted in 2034. For example, maintaining 75-year solvency through 2097 with changes that begin in 2034 would require: (1) an increase in revenue by an amount equivalent to a permanent 4.15 percentage point payroll tax rate increase to 16.55 percent starting in 2034, (2) a reduction in scheduled benefits by an

[1] The 3.44 percentage point increase in the payroll tax rate required to achieve 75-year solvency through 2097 differs somewhat from the 3.61 percent actuarial deficit. This is primarily because the rate increase required to achieve 75-year solvency reflects a zero trust fund reserve at the end of the period in 2097, whereas the 3.61 percent actuarial deficit incorporates an ending trust fund reserve equal to one year's cost. While such an increase in the payroll tax rate would cause some behavioral changes in earnings and ensuing changes in benefit levels, such changes are not included in these calculations because they are assumed to have roughly offsetting effects on OASDI actuarial status over the 75-year long-range period as a whole.

amount equivalent to a permanent 25.2 percent reduction in all benefits starting in 2034, or (3) some combination of these approaches.

Conclusion

Under the intermediate assumptions, the projected hypothetical combined OASI and DI Trust Fund asset reserves become depleted and unable to pay scheduled benefits in full on a timely basis in 2034. At the time of depletion of these combined reserves, continuing income to the combined trust funds would be sufficient to pay 80 percent of scheduled benefits. The OASI Trust Fund reserves are projected to become depleted in 2033, at which time OASI income would be sufficient to pay 77 percent of OASI scheduled benefits. DI Trust Fund asset reserves are not projected to become depleted during the 75-year period ending in 2097.

Lawmakers have a broad continuum of policy options that would close or reduce Social Security's long-term financing shortfall. Estimates for many such policy options are available at ssa.gov/OACT/solvency/provisions/.

The Trustees recommend that lawmakers address the projected trust fund shortfalls in a timely way in order to phase in necessary changes gradually and give workers and beneficiaries time to adjust to them. Implementing changes sooner rather than later would allow more generations to share in the needed revenue increases or reductions in scheduled benefits. Social Security will play a critical role in the lives of 67 million beneficiaries and 180 million covered workers and their families during 2023. With informed discussion, creative thinking, and timely legislative action, Social Security can continue to protect future generations.

B. TRUST FUND FINANCIAL OPERATIONS IN 2022

Table II.B1 shows the income, cost, and asset reserves for the OASI, the DI, and the combined OASI and DI Trust Funds in calendar year 2022.

Table II.B1.—Summary of 2022 Trust Fund Financial Operations
[In billions]

	OASI	DI	OASDI
Asset reserves at the end of 2021	$2,752.6	$99.4	$2,852.0
Total income in 2022[a]	1,056.7	165.1	1,221.8
Net payroll tax contributions[b]	945.9	160.7	1,106.6
Interest	63.5	2.8	66.4
Taxation of benefits	47.1	1.6	48.6
Total cost in 2022	1,097.5	146.5	1,243.9
Benefit payments	1,088.1	143.6	1,231.7
Administrative expenses	4.0	2.7	6.7
Railroad Retirement financial interchange	5.3	.2	5.5
Net increase in asset reserves in 2022	-40.7	18.6	-22.1
Asset reserves at the end of 2022	2,711.9	118.0	2,829.9

[a] Includes $0.2 billion in reimbursements from the General Fund of the Treasury and less than $50 million in gifts. See section III.A for details.
[b] Includes adjustments for prior calendar years.

Note: Components may not sum to totals because of rounding.

In 2022, net payroll tax contributions accounted for 90.6 percent of total trust fund income. Net payroll tax contributions consist of taxes paid by employees, employers, and the self-employed on earnings covered by Social Security. These taxes are paid on covered earnings up to a specified maximum annual amount, which was $147,000 in 2022. Table II.B2 shows the payroll tax rates for 2022.

Table II.B2.—Payroll Tax Contribution Rates for 2022
[In percent]

	OASI	DI	OASDI
Payroll tax contribution rate for employees	5.3	0.9	6.2
Payroll tax contribution rate for employers	5.3	.9	6.2
Payroll tax contribution rate for self-employed persons	10.6	1.8	12.4

Interest earned on invested trust fund asset reserves accounted for 5.4 percent of OASI and DI combined trust fund income in 2022. Revenue from subjecting up to 50 percent of Social Security benefits to Federal personal income taxation for beneficiaries with income (including half of bene-

fits and all non-taxable interest received) exceeding specified levels accounted for 4.0 percent of OASDI income.

The Department of the Treasury invests all trust fund income in interest-bearing securities issued by the U.S. Government. In 2022, the combined trust fund reserves (the excess of all past income over all past cost) earned interest at an effective annual rate of 2.4 percent.

Retirement, survivor, and disability benefits accounted for 99.0 percent of OASI and DI combined trust fund cost in 2022. The expenses for administering the Social Security program were 0.5 percent of total cost. The net payment to the Railroad Retirement Social Security Equivalent Benefit Account from the combined OASI and DI Trust Funds accounted for 0.4 percent of total OASDI cost.

Trust fund reserves provide the basis for paying benefits. Combined trust fund reserves decreased by $22.1 billion during 2022 because income to the combined funds, including interest earned on trust fund reserves, was less than total cost. In last year's report, combined reserves were projected to decrease by $46.8 billion in 2022. At the end of 2022, the combined reserves of the OASI and the DI Trust Funds were $2,829.9 billion, or 204 percent of estimated cost[1] for 2023. In comparison, the combined reserves at the end of 2021 were 229 percent of actual cost for 2022.

[1] Estimated cost is based on the intermediate set of assumptions.

C. ASSUMPTIONS ABOUT THE FUTURE

The future income and cost of the OASI and DI Trust Funds will depend on many factors, including the size and characteristics of the population receiving benefits, the level of monthly benefit amounts, the size of the workforce, and the level of covered workers' earnings. These factors will depend in turn on future birth rates, death rates, immigration, marriage and divorce rates, retirement-age patterns, disability incidence and termination rates, employment rates, productivity gains, wage increases, inflation, interest rates, and many other demographic, economic, and program-specific factors.

The Trustees set key demographic, economic, and programmatic assumptions for three alternative scenarios. The intermediate assumptions reflect the Trustees' best estimates of future experience. Therefore, most of the results presented in this overview indicate outcomes under the intermediate assumptions only. Any projection of the future is, of course, uncertain. For this reason, results are also presented under low-cost and high-cost alternatives to provide a range of possible future experience. The actual future costs are unlikely to be as extreme as those portrayed by the low-cost or high-cost projections. A separate section on the uncertainty of the projections, beginning on page 19, highlights the implications of these alternative scenarios.

The Trustees reexamine the assumptions each year in light of recent experience and new information. This annual review helps to ensure that the Trustees' assumptions provide the best estimate of future possibilities.

There are several important assumptions about near-term growth rates and parameter levels that have significant effects over both the short-range (10-year) and long-range (75-year) projection periods. The most significant change in the results presented in this year's report derives from a change in the assumed levels of productivity and GDP in the first several years of the projection. Section IV.B.6 provides additional details about this change.

For each of the three alternative scenarios, Table II.C1 presents key demographic, economic, and programmatic assumptions used for projections beyond the tenth projection year.

Table II.C1.—Key Assumptions[a] and Summary Measures for the Last 65 Years of the Long-Range (75-Year) Projection Period

Assumption	Intermediate	Low-cost	High-cost
Demographic:			
Average annual total fertility rate (children per woman)[b]	1.99	2.19	1.69
Average annual percentage reduction in total age-sex-adjusted death rates	.74	.28	1.24
Average annual net lawful permanent resident (LPR) immigration (in thousands)	788	1,000	595
Average annual net other-than-LPR immigration (in thousands)	457	683	234
Economic:			
Average annual percentage change in:			
Productivity (total U.S. economy)	1.63	1.93	1.33
Average wage in covered employment (nominal)	3.56	4.79	2.35
Average wage in covered employment (real)	1.14	1.74	.54
Consumer Price Index (CPI-W)	2.40	3.00	1.80
Unemployment rate (percent, age-sex-adjusted)	4.5	3.5	5.5
Annual trust fund real interest rate (percent)	2.3	2.8	1.8
Programmatic:			
Average annual disability incidence rate (per 1,000 exposed, age-sex-adjusted)	4.8	3.8	5.8
Average annual disability recovery rate (per 1,000 beneficiaries, age-sex-adjusted)	10.4	12.5	8.3

[a] See chapter V for details, including historical and projected values.
[b] The ultimate total fertility rate is 2.00 for the intermediate assumptions, 2.20 for the low-cost assumptions, and 1.70 for the high-cost assumptions. The ultimate rate is reached on a cohort basis over the lifetime of girls attaining age 14 in 2021 and later, so that the ultimate rate on an annual (or period) basis is reached in 2056. See section V.A.1 for additional details.

D. PROJECTIONS OF FUTURE FINANCIAL STATUS

Short-Range Actuarial Estimates

For the short-range period (2023 through 2032), the Trustees measure financial adequacy using trust fund ratios, which compare projected asset reserves at the beginning of a year to projected program cost for the year. Maintaining a trust fund ratio of 100 percent or more—that is, reserves at the beginning of a year at least equal to projected cost for the year—is a good indication that the trust fund can cover most short-term contingencies. The Trustees' test of short-range financial adequacy is met if under the intermediate assumptions (1) the estimated trust fund ratio is at least 100 percent at the beginning of the period and remains at or above 100 percent throughout the 10-year short-range period (from the beginning of 2023 through the end of 2032, which is indicated by the trust fund ratio at the beginning of 2033) or (2) the ratio is initially less than 100 percent, but reaches at least 100 percent within five years and remains at or above 100 percent throughout the remainder of the 10-year short-range period.

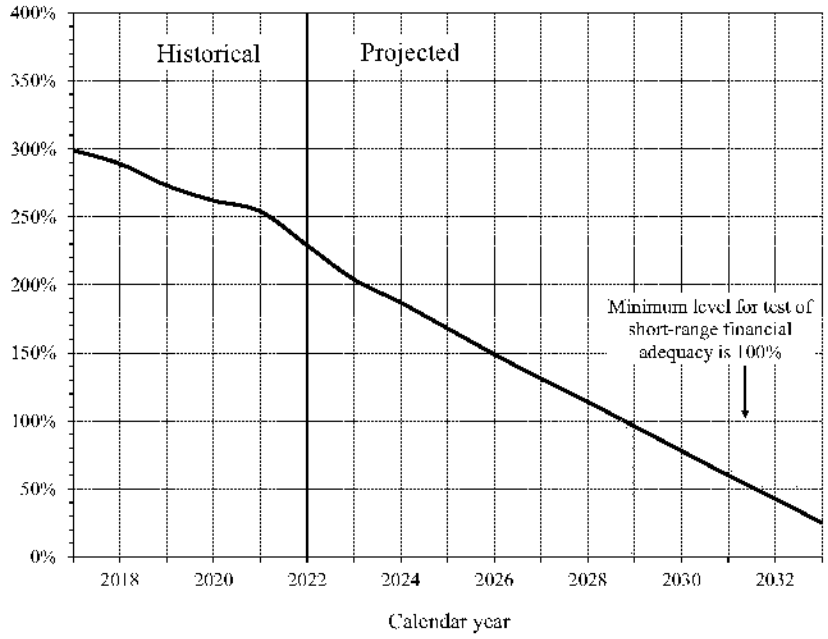
The projected trust fund ratio under the intermediate assumptions for the OASI Trust Fund declines to 91 percent by the beginning of 2029 and remains below 100 percent for the remainder of the short-range period. Therefore, OASI fails the test of short-range financial adequacy.

The DI Trust Fund satisfies the test of short-range financial adequacy because the trust fund ratio, while below 100 percent at the beginning of the projection period, reaches 100 percent within five years and stays above 100 percent throughout the remainder of the 10-year period. The DI trust fund ratio is estimated to be 77 percent at the beginning of 2023. The projected DI trust fund ratio then increases to 107 percent by the beginning of 2026 and continues to increase for the remainder of the short-range period.

On a combined basis, OASDI fails the test of short-range financial adequacy because the OASDI trust fund ratio declines to 96 percent by the beginning of 2029 and remains below 100 percent for the remainder of the short-range period. Figure II.D1 shows that the trust fund ratio for the combined OASI and DI Trust Funds declines steadily after 2010.

For this report, combined reserves are projected to decline in 2023, as they did beginning in 2021, and to continue to decline throughout the remainder of the short-range period.

Figure II.D1.—Short-Range OASI and DI Combined Trust Fund Ratio
[Asset reserves at beginning of year as a percentage of annual cost for the year, under intermediate assumptions]



Long-Range Actuarial Estimates

The Trustees use three types of measures to assess the actuarial status of the program over the long-range period (2023 through 2097): (1) annual cash-flow measures, including income rates, cost rates, and balances; (2) trust fund ratios; and (3) summary measures such as actuarial balances and open-group unfunded obligations. These measures are expressed as percentages of taxable payroll, as percentages of gross domestic product (GDP), or in dollars. Appendix F also presents summary measures over the infinite horizon. The infinite horizon values provide an additional indication of Social Security's very-long-run financial condition.

The Trustees also apply a test of long-range close actuarial balance each year. To satisfy the test, a trust fund must meet two conditions: (1) the trust fund satisfies the test of short-range financial adequacy, and (2) the trust fund ratio stays above zero throughout the 75-year projection period, such that benefits would be payable in a timely manner throughout the period. Under the intermediate assumptions, the OASI Trust Fund and the combined OASI

and DI Trust Funds fail the test of long-range close actuarial balance, while the DI Trust Fund satisfies the test.

Annual Income Rates, Cost Rates, and Balances

Figure II.D2 illustrates the year-by-year relationship among OASDI income (excluding interest), cost (including scheduled benefits), and expenditures (including payable benefits) starting in 2000 and for the full 75-year projection period (2023 through 2097). The figure shows all values as percentages of taxable payroll. Under the intermediate assumptions, demographic factors by themselves cause the projected cost rate to rise rapidly for the next two decades, level off somewhat in about 2040 through 2055, rise temporarily between 2055 and 2078, and then decline somewhat through 2097. The projected income rate is relatively stable at about 13 percent throughout the 75-year period ending in 2097.

Annual OASDI cost has exceeded non-interest income every year beginning with 2010. Cost is projected to continue to exceed non-interest income throughout the 75-year valuation period. Cost is projected to exceed total income in 2023, as it has each year beginning in 2021, and combined OASI and DI Trust Fund reserves decline until they become depleted in 2034. After trust fund reserve depletion, continuing income is sufficient to support expenditures at a level of 80 percent of program cost for the rest of 2034, declining to 74 percent for 2097. Figure II.D2 depicts OASDI operations as a combined whole. However, under current law, the differences between scheduled and payable benefits for OASI would begin in 2033, when the OASI Trust Fund is projected to become depleted. Scheduled benefits equal payable benefits for DI throughout the entire 75-year projection period, because the DI Trust Fund is not projected to become depleted during the period.

Figure II.D2.—OASDI Income, Cost, and Expenditures as Percentages of Taxable Payroll
[Under intermediate assumptions]

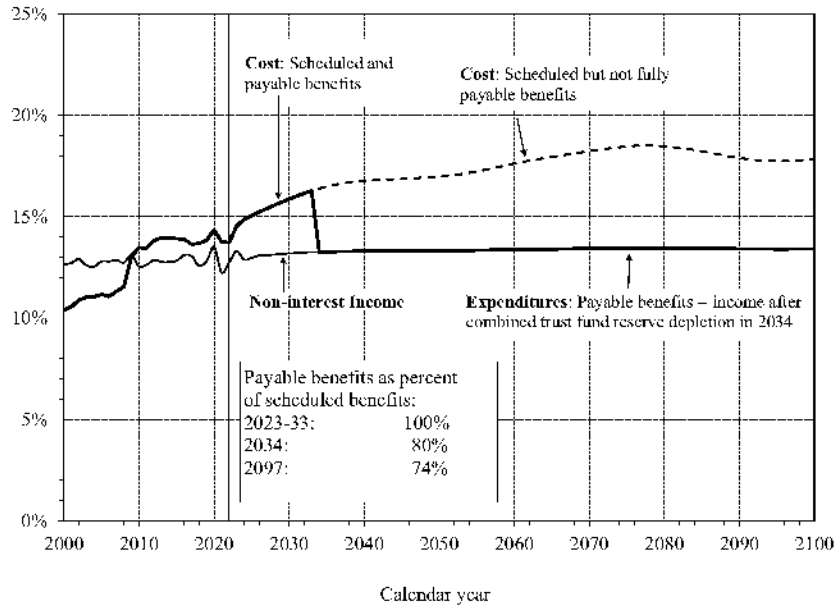
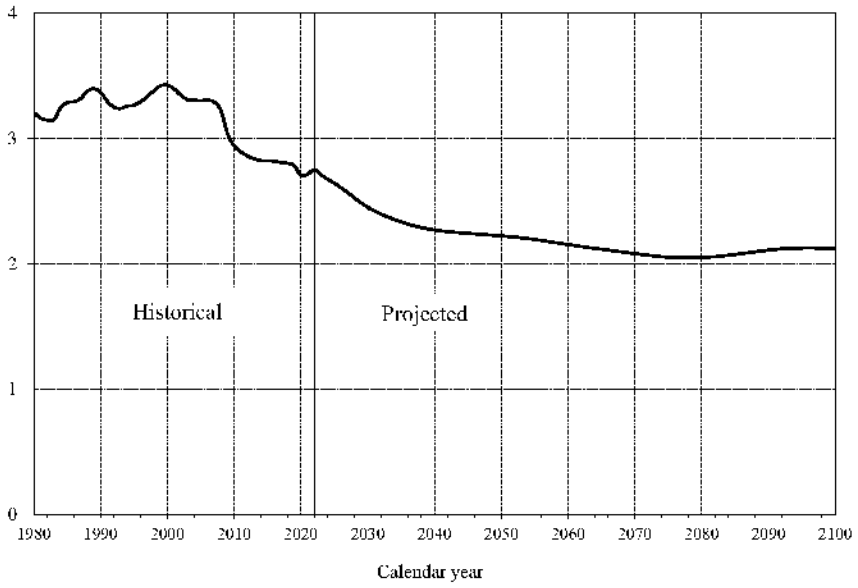


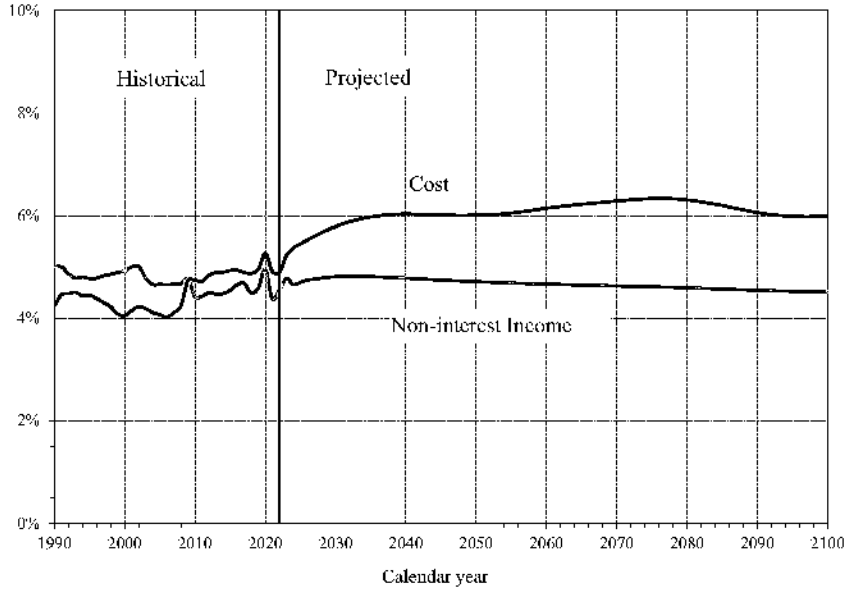
Figure II.D3 shows the estimated number of covered workers per OASDI beneficiary. Figures II.D2 and II.D3 illustrate the inverse relationship between cost rates and the number of workers per beneficiary. In particular, the projected future increase in the cost rate reflects a projected decline in the number of covered workers per beneficiary. There were about 2.8 workers for every OASDI beneficiary in 2022. This ratio had been stable, remaining between 3.2 and 3.4 from 1974 through 2008, and has generally declined since then, initially due to the economic recession of 2007-09 and the beginning of a notable demographic shift. This shift causes the ratio of workers to beneficiaries to decline, as workers of lower-birth-rate generations replace workers of the baby-boom generation. The decline in the ratio slowed substantially between 2013 and 2019 as the recovery of the economy largely offset the demographic shift during that period. The ratio declined slightly in 2020 and then increased slightly by 2022, due to effects of the pandemic-induced recession and recovery on the number of workers. The underlying demographic shift will continue to drive this ratio down over the next 10 to 15 years. The ratio of workers to beneficiaries reaches 2.3 by 2035 when the baby-boom generation will have largely retired, and will generally decline very gradually thereafter due to increasing longevity.

Figure II.D3.—Number of Covered Workers Per OASDI Beneficiary
[Under intermediate assumptions]



Another important way to look at Social Security's future actuarial status is to view its annual cost and non-interest income as a share of U.S. economic output (GDP). As shown in figure II.D4, Social Security's cost as a percent of GDP is generally projected to grow from 5.2 percent in 2023 to a peak of about 6.3 percent for 2076, and then decline to 6.0 percent by 2097. Social Security's non-interest income is projected to decrease from 4.8 percent of GDP in 2023 to 4.7 percent in 2024, and then rise gradually to a peak of about 4.8 percent by 2032. Thereafter, non-interest income as a percent of GDP declines gradually, to about 4.5 percent for 2097.

Figure II.D4.—OASDI Cost and Non-Interest Income as a Percentage of GDP
[Under intermediate assumptions]



Trust Fund Ratios

The trust fund ratio is defined as the asset reserves at the beginning of a year expressed as a percentage of the cost during the year. The trust fund ratio thus represents the proportion of a year's cost which could be paid solely with the accumulated reserves at the beginning of the year. Table II.D1 displays the projected maximum trust fund ratios during the long-range period for the OASI, DI, and combined OASI and DI funds. The table also shows the year of maximum projected trust fund ratio during the long-range projection period (2023 through 2097) and the year of trust fund asset reserve depletion. Trust fund ratios for OASI and combined OASI and DI are projected to decline from their current levels until reserve depletion. For DI, the trust fund ratio is projected to rise to 267 percent of cost in 2043, and then generally decline to 159 percent of cost by 2097.

Table II.D1.—Projected Maximum Trust Fund Ratios During the Long-Range Period and Trust Fund Reserve Depletion Dates
[Under Intermediate Assumptions]

	OASI	DI	OASDI
Maximum projected trust fund ratio (percent)	220	267	204
Year attained	2023	2043	2023
Projected year of trust fund reserve depletion	2033	[a]	2034

[a] The trust fund is not projected to become depleted during the 75-year period ending in 2097.

Summary Measures

The actuarial balance is a summary measure of the program's financial status through the end of the 75-year valuation period. The actuarial balance measure includes the trust fund asset reserves at the beginning of the period, all cost and income during the valuation period, and the cost of reaching a target trust fund reserve of one year's cost by the end of the period. Therefore, the actuarial balance is essentially the difference between the present values of income and cost from 1937 through the end of the valuation period, expressed as a percentage of the taxable payroll for the 75-year valuation period. A negative actuarial balance is called an actuarial deficit. The actuarial deficit represents the average amount of change in income or cost that is needed throughout the valuation period in order to achieve actuarial balance.

In this report, the actuarial deficit for the combined OASI and DI Trust Funds under the intermediate assumptions is 3.61 percent of taxable payroll. The actuarial deficit was 3.42 percent of payroll in the 2022 report. If the assumptions, methods, starting values, and the law had all remained unchanged from last year, the actuarial deficit would have increased to 3.48 percent of payroll solely due to advancing the valuation period by 1 year, from 2022 through 2096 for last year's report to 2023 through 2097 for this year's report. The actuarial deficit is 1.3 percent of GDP in this year's report, increased from 1.2 percent in last year's report.

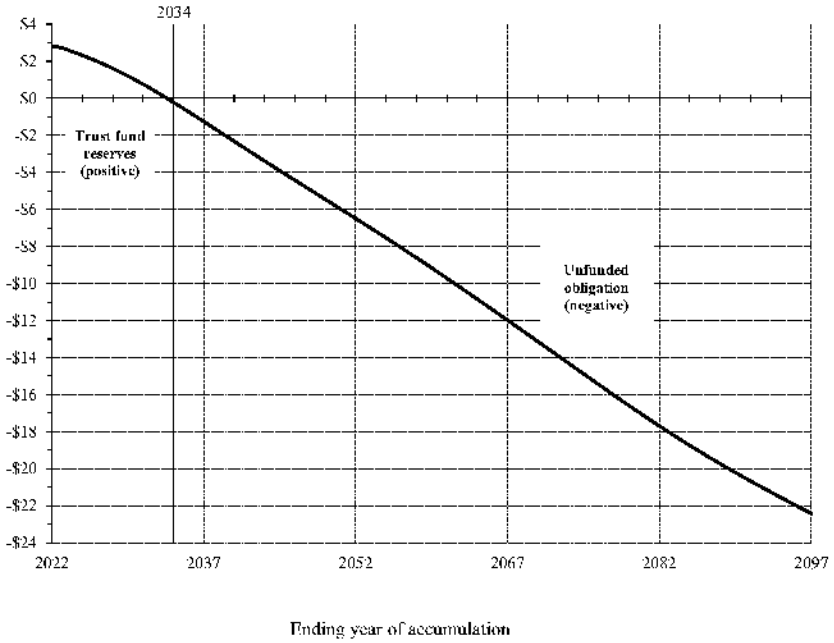
Another way to illustrate the projected financial shortfall of the OASDI program is to examine the cumulative present value of scheduled income less cost. Figure II.D5 shows the present value of cumulative OASDI income less cost from the inception of the program through each of the years from 2022 to 2097. A positive value represents the present value of trust fund reserves at the end of the selected year. A negative value is the unfunded obligation through the selected year. The asset reserves of the combined trust funds were about $2.83 trillion at the end of 2022. The combined trust fund reserves decline on a present value basis after 2022, but remain positive through 2033. However, after 2033 this cumulative amount becomes negative in 2034, which means that the combined OASI and DI Trust Funds have a net unfunded obligation through the end of each year after 2033. Through the end of 2097, the combined funds have a present-value unfunded obligation of $22.4 trillion. If the assumptions, methods, starting values, and the law had all remained unchanged from last year, the unfunded obligation in this year's report would have risen to about $21.2 trillion due to the change in the valuation date and the extension of the valuation period through an additional year, 2097.

This unfunded obligation through 2097 represents 3.42 percent of taxable payroll for 2023 through 2097 (increased from an unfunded obligation through 2096 of 3.24 percent of taxable payroll for 2022 through 2096 in last year's report) and 1.2 percent of GDP over the 75-year valuation period ending in 2097 (increased from 1.1 percent of GDP over the 75-year period ending in 2096 in last year's report). The unfunded obligation as a share of taxable payroll over the period (3.42 percent) and the actuarial deficit (3.61 percent) are similar measures, but differ because the actuarial deficit includes the cost of having an ending trust fund reserve equal to one year's cost.

Figures II.D2, II.D4, and II.D5 show that the program's actuarial status will deteriorate throughout the projection period if current law is not altered. Negative annual balances and increasing cumulative shortfalls toward the end of the 75-year period provide an indication of the additional change that will be needed by that time in order to maintain solvency beyond 75 years. Consideration of summary measures alone for a 75-year period can lead to incorrect perceptions and to policy prescriptions that do not achieve sustainable solvency.[1]

[1] Sustainable solvency for the financing of the program under a specified set of assumptions has been achieved when the projected trust fund ratio is positive throughout the 75-year projection period and is either stable or rising at the end of the period.

Figure II.D5.—Cumulative Scheduled OASDI Income Less Cost, From Program Inception Through Years 2022-2097
[Present value as of January 1, 2023, in trillions, under intermediate assumptions]



Appendix F presents summary measures over the infinite horizon. The infinite horizon values provide an additional indication of Social Security's actuarial status extending indefinitely into the future, but results are subject to much greater uncertainty. Extending the horizon beyond 75 years increases the measured unfunded obligation. Through the infinite horizon, the unfunded obligation, or shortfall, is equivalent to 4.6 percent of future taxable payroll or 1.4 percent of future GDP.

Uncertainty of the Projections

Significant uncertainty surrounds the intermediate assumptions. The Trustees use several methods to help illustrate that uncertainty.

A first approach uses alternative scenarios reflecting intermediate (alternative II), low-cost (alternative I) and high-cost (alternative III) sets of assumptions. The intermediate alternative represents the Trustees' best estimates of future experience. The low-cost alternative includes a higher ultimate total fertility rate, slower improvement in mortality, higher real wage growth, a higher ultimate real interest rate, a higher ultimate annual change in the CPI,

and a lower unemployment rate. The high-cost alternative, in contrast, includes a lower ultimate total fertility rate, more rapid improvement in mortality, lower real wage growth, a lower ultimate real interest rate, a lower ultimate annual change in the CPI, and a higher unemployment rate. These alternatives are not intended to suggest that all parameters would be likely to differ from the intermediate values in the specified directions, but are intended to illustrate the effect of clearly defined scenarios that are, on balance, very favorable or very unfavorable for the program's actuarial status. Actual future costs are unlikely to be as extreme as those portrayed by the low-cost or high-cost projections. The method for constructing the low-cost and high-cost projections does not lend itself to estimating the probability that actual experience will lie within or outside the range they define.

Figure II.D6. shows the projected trust fund ratios for the combined OASI and DI Trust Funds under the intermediate, low-cost, and high-cost assumptions. The figure indicates that the combined trust funds are projected to become depleted in 2034 under the intermediate alternative and in 2031 under the high-cost alternative. Under the low-cost alternative, trust fund reserves are projected to become depleted in 2067, but the trust funds would have sufficient income by the end of 2092 to permit full payment of scheduled benefits thereafter and also to pay in arrears the temporary shortfalls between 2067 and 2092.

Figure II.D6.—Long-Range OASI and DI Combined Trust Fund Ratios Under Alternative Scenarios
[Asset reserves as a percentage of annual cost]

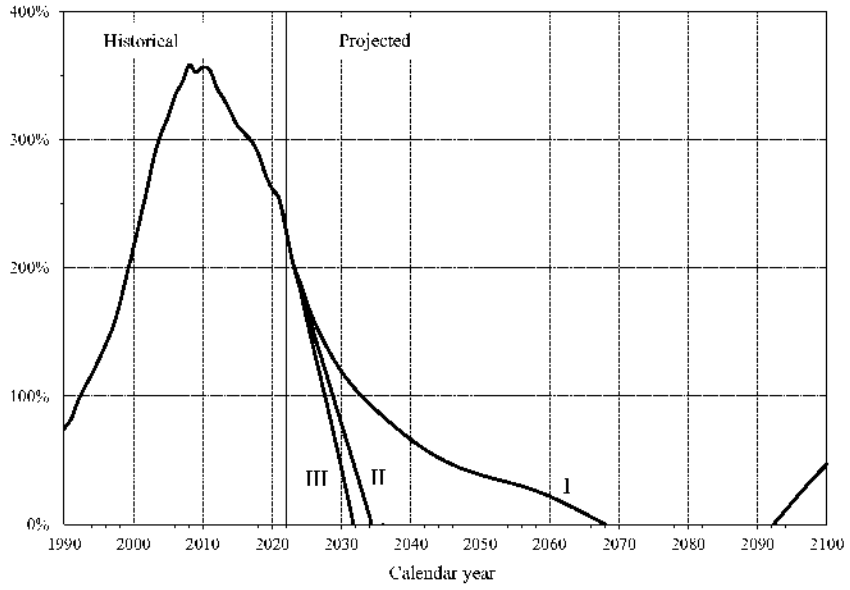
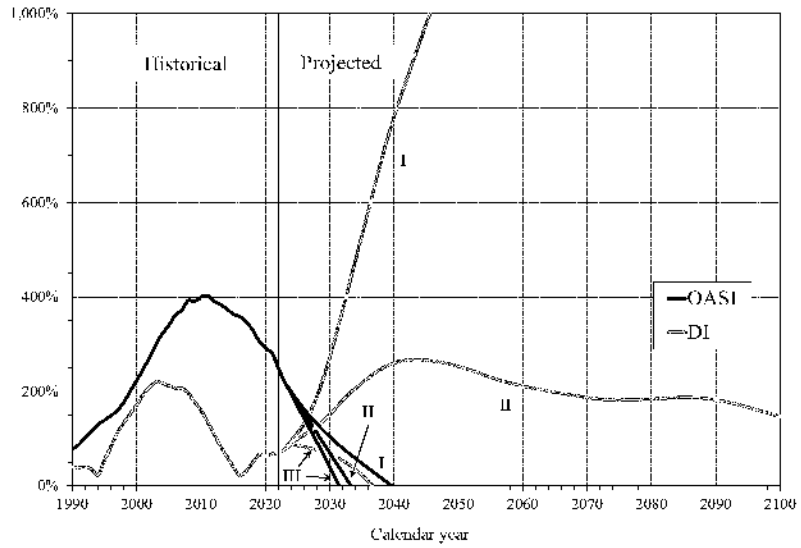


Figure II.D7 shows the projected trust fund ratios separately for OASI and DI Trust Funds under the intermediate, low-cost, and high-cost assumptions. The figure indicates that the OASI reserves are projected to become depleted in 2033 under the intermediate alternative, in 2039 under the low-cost alternative, and in 2031 under the high-cost alternative. The DI reserves are projected to become depleted in 2036 under the high-cost alternative, and are not projected to become depleted under the low-cost and intermediate alternatives. This figure illustrates that OASI reserves are expected to become depleted much sooner than DI reserves, and potentially within the next 10 years.

Figure II.D7.—Long-Range OASI and DI Trust Fund Ratios
[Asset reserves as a percentage of annual cost]



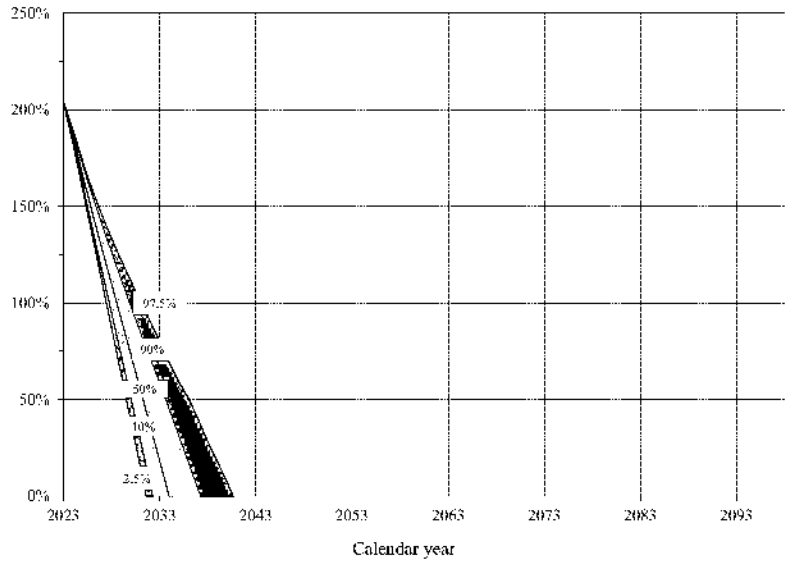
Appendix D of this report presents a second approach using long-range sensitivity analysis for the OASDI program. By varying one parameter at a time, sensitivity analysis provides a second approach for illustrating the uncertainty surrounding projections into the future.

A third approach uses 5,000 independently generated stochastic simulations that reflect randomly assigned annual values and central tendencies for most of the key parameters. These simulations produce a distribution of projected outcomes and corresponding probabilities that future experience will fall

within or outside a given range. The results of the stochastic simulations, discussed in more detail in appendix E, suggest that trust fund reserve depletion (the point at which reserves are insufficient to pay scheduled benefits in full and on time) is very likely before mid-century. In particular, figure II.D8 suggests that based on these stochastic simulations, trust fund reserves will become depleted with 95-percent confidence between 2031 and 2040. In last year's report, this range was between 2031 and 2043. After depletion relatively early in the 75-year projection period, the trust funds are projected not to have sufficient income through 2097 to permit full and timely payment of scheduled benefits.

The stochastic results suggest that trust fund ratios as high as the low-cost alternative or as low as the high-cost alternative are very unlikely.

Figure II.D8.—Long-Range OASI and DI Combined Trust Fund Ratios From Stochastic Modeling



Changes From Last Year's Report

The projected long-range OASDI actuarial deficit increased from 3.42 percent of taxable payroll for last year's report to 3.61 percent of taxable payroll for this year's report. The change in the valuation date and the extension of the 75-year projection period for an additional year, 2097,

would have by itself increased the actuarial deficit to 3.48 percent. Changes in law, methods, starting values, and assumptions combined to increase the actuarial deficit by an additional 0.13 percent of taxable payroll. This increase is mainly attributable to a change in the assumptions for the levels of productivity and GDP in the first several years of the projection. For this year's report, the Trustees assume that the level of potential GDP was about 0.9 percent lower than the level estimated in last year's report for 2020, widening to about 3.0 percent lower by 2026 and for all years thereafter. This shift was made as the Trustees lowered the levels of GDP and total economy labor productivity in response to recent economic developments, including higher-than-expected inflation rates and lower-than-expected output growth. For a detailed description of the specific changes identified in table II.D2, see section IV.B.6.

Table II.D2.—Reasons for Change in the 75-Year Actuarial Balance, Based on Intermediate Assumptions
[As a percentage of taxable payroll]

Item	OASI	DI	OASDI
Shown in last year's report:			
Income rate	11.93	1.85	13.78
Cost rate	15.34	1.86	17.20
Actuarial balance	-3.41	-.01	-3.42
Changes in actuarial balance due to changes in:			
Legislation / Regulation	[a]	[a]	[a]
Valuation period[b]	-.05	-.01	-.05
Demographic data and assumptions	-.03	[a]	-.03
Economic data and assumptions	-.04	[a]	-.04
Disability data and assumptions	[a]	.01	.01
Methods and programmatic data	-.08	.02	-.06
Total change in actuarial balance	-.21	.02	-.19
Shown in this report:			
Actuarial balance	-3.62	.01	-3.61
Income rate	11.93	1.85	13.78
Cost rate	15.54	1.84	17.38

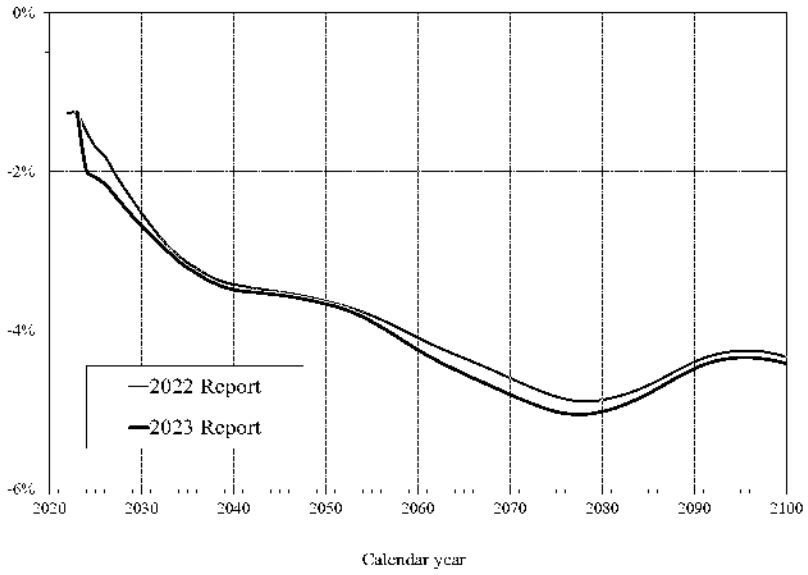
[a] Between -0.005 and 0.005 percent of taxable payroll.

[b] The change in the 75-year valuation period from last year's report to this report means that the 75-year actuarial balance now includes the relatively large negative annual balance for 2097. This change in the valuation period results in a larger long-range actuarial deficit. The actuarial deficit includes the trust fund reserve at the beginning of the projection period.

Note: Components may not sum to totals because of rounding.

Figure II.D9 compares this year's projections of annual balances (non-interest income minus cost) to those in last year's report. The annual balance for 2023 is higher (less negative) in this year's report than it was in last year's report. The annual balances are lower (more negative) in this year's report for all years from 2024 through 2097. For the full 75-year projection period, the annual balances are lower, on average, by 0.13 percentage point.

Figure II.D9.—OASDI Annual Balances: 2022 and 2023 Trustees Reports
[As a percentage of taxable payroll under the intermediate assumptions]



E. CONCLUSION

The data and projections presented in this report continue to include the Trustees' best estimates of the future course of the population, the economy, and all aspects of the OASDI program under current law. Now, more than 3 years after the start of the COVID-19 pandemic, the acute stage of the pandemic appears to be over, but the Trustees expect there will be residual effects on the population and the economy for years to come. Since the assumptions for last year's report were set, the Trustees have reassessed their expectations for the economy in light of recent developments, including updated data on inflation and output, and have revised down the levels of gross domestic product (GDP) and labor productivity by about 3 percent over the projection period. Assumptions for growth are largely unchanged after the first 10 years of the projection period. The intermediate (best estimate) assumptions for this report were set in December 2022. The Trustees will continue to monitor developments and modify the projections in later reports.

Under current law, the projected cost of Social Security generally increases faster than projected income through about 2040 primarily because the ratio of workers paying taxes to beneficiaries receiving benefits will decline as the baby-boom generation continues to retire and is replaced at working ages with subsequent lower birth-rate generations. The effects of the aging baby boom and subsequent lower birth rates will have largely stabilized between about 2040 and 2055, but annual cost is projected to grow significantly faster than income between 2055 and 2078 due to the period of historically low birth rates starting with the recession of 2007-09. Between 2078 and 2097, cost is projected to grow somewhat slower than income, reflecting an assumed return to a stable ultimate birth rate of 2 children per woman for 2056 and thereafter. Based on the Trustees' intermediate assumptions, Social Security's cost exceeds total income in 2023, as it has beginning in 2021, and remains higher throughout the remainder of the 75-year projection period.

The OASI Trust Fund is projected to have sufficient reserves to pay full benefits on time until 2033. The DI Trust Fund is projected to have sufficient reserves to pay full benefits throughout the 75-year projection period ending in 2097. Legislative action will be needed to prevent OASI reserve depletion. In the absence of such legislation, continuing income to the trust funds at the time of reserve depletion would be sufficient to pay 77 percent of OASI benefits.

Social Security's combined trust funds are projected to cover full payment of scheduled benefits on a timely basis until the trust fund reserves become

depleted in 2034. Full payment of benefits until depletion of the hypothetical combined reserves in 2034 implicitly assumes that the law will have been changed to permit the transfer of funds between OASI and DI as needed. At the time of reserve depletion, projected continuing income to the combined trust funds equals about 80 percent of the program cost. By 2097, continuing income equals about 74 percent of the program cost.

The actuarial deficit for the combined trust funds under the intermediate assumptions is 3.61 percent of taxable payroll for the 75-year period through 2097, increased (worsened) from the 3.42 percent deficit for the 75-year period through 2096 in last year's report. To illustrate the magnitude of the deficit, consider that for the combined OASI and DI Trust Funds to remain fully solvent throughout the 75-year projection period ending with 2097: (1) revenue would have to be increased by an amount equivalent to an immediate and permanent payroll tax rate increase of 3.44 percentage points to 15.84 percent; (2) scheduled benefits would have to be reduced by an amount equivalent to an immediate and permanent reduction of 21.3 percent applied to all current and future beneficiaries through 2097, or 25.4 percent if the reductions were applied only to those who become initially eligible for benefits in 2023 or later; or (3) some combination of these approaches would have to be adopted. If actions are deferred for several years, the changes necessary to maintain Social Security solvency through 2097 become concentrated on fewer years and fewer generations.

If lawmakers design legislative solutions only to eliminate the overall actuarial deficit without consideration of year-by-year financing, then a substantial financial imbalance could remain for 2097, the end of the 75-year valuation period. In that case, the long-range sustainability of program financing could still be in doubt. Sustainable solvency for the financing of the program under a specified set of assumptions is achieved when the projected trust fund ratio is positive throughout the 75-year long-range period and is either stable or rising at the end of the period. Making changes now that achieve sustainable solvency could avoid the need for later legislative changes.

Lawmakers have a broad continuum of policy options that would close or reduce Social Security's long-term financing shortfall. Estimates for many such policy options are available at www.ssa.gov/OACT/solvency/provisions/. Broadly speaking, the approaches that lawmakers can take include increasing revenue from workers and employers by raising the tax rate or the maximum level of taxable earnings, or by dedicating revenue from other sources; lowering benefits for some or all beneficiaries by changing certain program parameters; or a combination of these approaches. There

are many variations on these options, including those that vary the timing, magnitude, and other specifics of the changes under consideration.

The Trustees recommend that lawmakers address the projected trust fund shortfalls in a timely way in order to phase in necessary changes gradually and give workers and beneficiaries time to adjust to them. Implementing changes sooner rather than later would allow more generations to share in the needed revenue increases or reductions in scheduled benefits. Social Security will play a critical role in the lives of 67 million beneficiaries and 180 million covered workers and their families during 2023. With informed discussion, creative thinking, and timely legislative action, Social Security can continue to protect future generations.

For further information related to the contents of this report, see the following websites:

- www.ssa.gov/OACT/tr/2023/
- www.ssa.gov/OACT/solvency/provisions/
- www.cms.gov/OACT/TR/2023
- home.treasury.gov/policy-issues/economic-policy/social-security-and-medicare-trustee-reports

III. FINANCIAL OPERATIONS OF THE TRUST FUNDS AND LEGISLATIVE CHANGES IN THE LAST YEAR

A. OPERATIONS OF THE OLD-AGE AND SURVIVORS INSURANCE (OASI) AND DISABILITY INSURANCE (DI) TRUST FUNDS, IN CALENDAR YEAR 2022

This section presents detailed information on the operations of the OASI and DI Trust Funds[1] during calendar year 2022. Chapter IV provides projections for calendar years 2023 through 2100.

1. OASI Trust Fund

Table III.A1 presents a statement of the income and cost of the Federal Old-Age and Survivors Insurance Trust Fund in calendar year 2022, and of the asset reserves in the fund at the beginning and end of the calendar year. As shown in this table, total trust fund income in 2022 amounted to $1,056.7 billion, while cost totaled $1,097.5 billion, resulting in a decrease in trust fund reserves during 2022 of $40.7 billion.

Total income during calendar year 2022 included $950.3 billion in payroll tax contributions. These contributions include initial appropriations of payroll taxes, made on an estimated basis, and adjustments to appropriations for prior years to reflect actual tax income. The OASI fund paid the General Fund $4.4 billion for the estimated amount of employee payroll-tax refunds, partially offsetting these gross contributions. Employees who work for more than one employer during a year and pay contributions on total earnings in excess of the contribution and benefit base are eligible for such refunds. Net payroll tax contributions were therefore $945.9 billion in 2022.

Net reimbursements from the General Fund of the Treasury amounted to $183 million in 2022. As shown in the table, almost all of that amount came from transfers based on Public Law 116-136, the Coronavirus Aid, Relief, and Economic Security Act of 2020 (CARES Act). Section 4003(c) of this act provided for loans to businesses and State and local governments to assist in alleviating losses incurred as a result of the COVID-19 pandemic. This section further specified that a portion of proceeds from repayments of these loans be transferred to the OASI Trust Fund.

Income to the OASI Trust Fund based on the taxation of OASI benefits amounted to $47.1 billion in 2022. As first required by the 1983 Social Security Amendments, this income comes from two separate sources: (1) Federal

[1] See www.ssa.gov/oact/ProgData/fundsQuery.html.

income taxation on up to 50 percent of an individual's or couple's OASI benefits under certain circumstances, and (2) a tax withheld from the benefits paid to certain nonresident alien beneficiaries. For the direct Federal income tax portion, Treasury transfers estimated amounts to the OASI Trust Fund in advance at the beginning of each calendar quarter. Treasury makes subsequent adjustments based on the actual amounts shown on annual income tax records. There were no such adjustments made in 2022. The amount of income from direct Federal income taxation on OASI benefits constituted approximately 99 percent of income from benefit taxation. The remaining one percent of the income from benefit taxation is the amounts withheld from the benefits paid to nonresident aliens.

In 2022, the OASI Trust Fund earned $63.5 billion in net interest, which consisted of: (1) interest earned on the investments held by the trust fund, (2) interest on adjustments in the allocation of administrative expenses between the trust fund and the General Fund account for the Supplemental Security Income program, (3) interest arising from the revised allocation of administrative expenses among the trust funds, and (4) interest on certain reimbursements to the trust fund.

The remaining income, about $18 thousand, consisted of gifts received under the provisions authorizing the deposit of monetary gifts or bequests in the trust funds.

Table III.A1.—Operations of the OASI Trust Fund, Calendar Year 2022
[In millions]

Total asset reserves, December 31, 2021		$2,752,636
Income:		
Net payroll tax contributions:		
Payroll tax contributions[a]	$950,327	
Payments from the General Fund of the Treasury for payroll tax contributions subject to refund[a]	-4,403	
Net payroll tax contributions[a]		945,924
Reimbursements from the General Fund:		
Transfer directed by P.L. 116-136	183	
Reduction in payroll tax contributions due to P.L. 111-312, P.L. 112-78, and P.L. 112-96[a]	b	
Payroll tax credits due to P.L. 98-21[a]	b	
Net General Fund reimbursements[a]		183
Income based on taxation of benefit payments:		
Withheld from benefit payments to nonresident aliens	262	
All other, not subject to withholding	46,809	
Total income from taxation of benefits		47,071
Investment income and interest adjustments:		
Interest on investments	63,539	
Interest adjustments[c]	b	
Total investment income and interest adjustments		63,539
Gifts		b
Total income		1,056,718
Cost:		
Benefit payments:		
Monthly benefits and lump-sum death payments[d]	1,088,170	
Reimbursement from the General Fund for unnegotiated checks	-53	
Payment for costs of vocational rehabilitation services for disabled beneficiaries	23	
Net benefit payments[d]		1,088,140
Financial interchange with the Railroad Retirement "Social Security Equivalent Benefit Account"[e]		5,316
Administrative expenses:		
Costs incurred by:		
Social Security Administration	3,376	
Department of the Treasury	628	
Offsetting miscellaneous receipts	-1	
Demonstration projects		
Miscellaneous reimbursements from the General Fund[e]	-5	
Net administrative expenses		3,999
Total cost		1,097,455
Net increase in asset reserves		-40,737
Total invested assets	2,711,919	
Undisbursed balances[f]	-20	
Total asset reserves, December 31, 2022		2,711,899

[a] Includes adjustments for prior calendar years.

[b] Between -$0.5 and $0.5 million.

[c] Includes: (1) interest on adjustments in the allocation of administrative expenses between the trust fund and the General Fund account for the Supplemental Security Income program, (2) interest arising from the revised allocation of administrative expenses among the trust funds, and (3) interest on certain reimbursements to the trust fund.

[d] Includes net reductions for the recovery of overpayments.

[e] Reimbursements for costs incurred in performing certain legislatively mandated activities not directly related to administering the OASI program.

[f] A negative balance represents a situation where the actual cash payments exceeded the amount of invested securities of the OASI Trust Fund that were redeemed to make such payments. In this situation, future redemption of additional invested securities will be required to pay for this shortfall.

Note: Components may not sum to totals because of rounding.

Of the $1,097.5 billion in total OASI cost in 2022, $1,088.1 billion was for net benefit payments, including recovered overpayments, reimbursements from the General Fund for unnegotiated checks, and the reimbursable costs of vocational rehabilitation services.[1] Net benefit payments increased by 9.6 percent from calendar year 2021 to calendar year 2022. This increase is due primarily to: (1) an increase in the average number of beneficiaries during the year and (2) an increase in the average monthly benefit amount. The increase in the average benefit amount in 2022 was due in part to the automatic cost-of-living benefit increase of 5.9 percent which became effective for December 2021 under the automatic-adjustment provisions in section 215(i) of the Social Security Act. In addition, new beneficiaries tend to have higher monthly benefit amounts than previous beneficiary cohorts, because their initial benefits are based on average wages, which tend to rise faster than the cost of living.

The Railroad Retirement Act requires an annual financial interchange between the Railroad Retirement program and the OASDI program. The purpose of the interchange is to put the OASI and DI Trust Funds in the same financial position in which they would have been had railroad employment always been covered directly by Social Security. The Railroad Retirement Board and the Social Security Administration calculated an interchange of $5.3 billion from the OASI Trust Fund to the Social Security Equivalent Benefit Account for June 2022.

The remaining $4.0 billion of cost for the OASI Trust Fund was for net administrative expenses. The Social Security Administration charges administrative expenses incurred to administer the OASI program directly to the trust fund on an estimated basis. Periodically, as actual expenses are recorded, adjustments are made to the allocations of administrative expenses for prior periods. These adjustments affect the OASI Trust Fund, the DI Trust Fund, the Hospital Insurance (HI) Trust Fund, the Supplementary Medical Insurance (SMI) Trust Fund, and the General Fund account for the Supplemental Security Income program, and include appropriate interest adjustments. As described earlier, the trust fund accounting records such interest adjustments under investment income.

For 2022, the cost incurred by the Social Security Administration to administer the OASI program was 84 percent of OASI net administrative expenses. The Social Security Administration charged such costs to the trust fund in

[1] Vocational rehabilitation services under the OASI program are furnished to disabled widow(er) beneficiaries and to those children of retired or deceased workers who receive benefits based on disabilities that began before age 22. The trust funds reimburse the providers of such services only in those cases where the services contributed to the successful rehabilitation of the beneficiary.

the amount of $3.4 billion in 2022. In addition, the Department of the Treasury charged the trust fund $0.6 billion in 2022 for services provided in administering the OASI program. A relatively small offset to administrative expenses of $1 million in 2022 represents income from miscellaneous receipts due to the trust fund, which may include refunds, penalties, fees, and other receipts.

Finally, the General Fund of the Treasury makes net reimbursements for administrative costs incurred by the Social Security Administration in performing certain legislatively mandated activities that are not directly related to paying OASI benefits. These reimbursements include $3 million in costs associated with union activities related to administering the OASI program and $2 million in costs of providing information to participants in certain pension plans in 2022. These miscellaneous reimbursements totaled $5 million in 2022.

The asset reserves shown for the OASI Trust Fund at the end of calendar year 2022 totaled $2,711.9 billion, consisting of $2,711.9 billion in U.S. Government obligations and, as an offset, an extension of credit totaling $20 million against securities to be redeemed in the first few days of the following year. The effective annual rate of interest earned by the reserves in the OASI Trust Fund during calendar year 2022 was 2.3 percent, slightly lower than the 2.4 percent earned during calendar year 2021. Table VI.A4, presented in appendix A, shows a detailed listing of OASI Trust Fund holdings by type of security, interest rate, and year of maturity at the end of calendar years 2021 and 2022.

By law, the Department of the Treasury must invest trust fund reserves in interest-bearing securities backed by the full faith and credit of the United States Government. The securities currently held by the OASI Trust Fund are entirely special issue securities sold by the Treasury only to the trust funds. These special issues are of two types: short-term certificates of indebtedness and longer-term bonds. Daily trust fund tax income is invested in the short-term certificates of indebtedness which mature on the next June 30 following the date of issue. The trust fund normally acquires long-term special-issue bonds when special issue securities of either type mature on June 30 and must be reinvested. The amount of long-term bonds acquired on June 30 is equal to the amount of special issue securities maturing (including accrued interest earnings), plus tax income for that day, less amounts required to meet cost on that day.

Section 201(d) of the Social Security Act provides that the obligations issued for purchase by the OASI and DI Trust Funds shall have maturities fixed

with due regard for the needs of the funds. Each year, bond purchases for each trust fund are made on June 30, taking into account the projected reserve depletion date in the most recently issued Trustees Report. The usual practice has been to reinvest the maturing special issue securities, as of each June 30, so that the values of the total portfolio of special issue securities maturing in each of the next 15 years are approximately equal. However, as of June 2022, the most recent projections in the 2022 Trustees Report indicated that the reserves in the OASI Trust Fund would become depleted within 15 years. Therefore, the Department of the Treasury, in consultation with the Chief Actuary of the Social Security Administration, selected the amounts and maturity dates of the OASI special-issue bonds purchased on June 30, 2022, so that the maturity dates of the total portfolio of special issue securities would be spread evenly to the extent possible over the 12-year period 2023 through 2034. The bonds purchased on that date have an interest rate of 3.000 percent, reflecting the average market yield, as of the last business day of the prior month, on all of the outstanding marketable U.S. obligations that are due or callable more than 4 years in the future. Table III.A7 shows additional details on the investment transactions during 2022, including the amounts of bonds purchased on June 30, 2022.

2. DI Trust Fund

Table III.A2 presents a statement of the income and cost of the Federal Disability Insurance Trust Fund in calendar year 2022, and of the asset reserves in the fund at the beginning and end of the calendar year.

Line entries in the DI statement are similar to those in the OASI statement. The explanations of the OASI entries generally apply to DI as well.

Of the $165.1 billion in total income, $160.7 billion was net payroll tax contributions.

Of the $146.5 billion of total cost, $143.6 billion was net benefit payments. The total level of net benefit payments increased by 2.5 percent from calendar year 2021 to calendar year 2022, largely due to increases in average monthly benefit amounts and the total amount of retroactive benefits, partially offset by a decrease in the average number of beneficiaries during the year. DI non-interest income, and total income, exceeded total cost in 2022.

Table III.A2.—Operations of the DI Trust Fund, Calendar Year 2022
[In millions]

Total asset reserves, December 31, 2021		$99,394
Income:		
Net payroll tax contributions:		
Payroll tax contributions[a]	$161,424	
Payments from the General Fund of the Treasury for payroll tax contributions subject to refund[a]	-746	
Net payroll tax contributions[a]		160,678
Reimbursements from the General Fund:		
Transfer directed by P.L. 116-136	—	
Reduction in payroll tax contributions due to P.L. 111-312, P.L. 112-78, and P.L. 112-96[a]	b	
Payroll tax credits due to P.L. 98-21[a]	b	
Net General Fund reimbursements[a]		b
Income based on taxation of benefit payments:		
Withheld from benefit payments to nonresident aliens	4	
All other, not subject to withholding	1,549	
Total income from taxation of benefits		1,553
Investment income and interest adjustments:		
Interest on investments	2,831	
Interest adjustments[c]	2	
Total investment income and interest adjustments		2,833
Gifts		b
Total income		165,063
Cost:		
Benefit payments:		
Monthly benefits[d]	143,475	
Reimbursement from the General Fund for unnegotiated checks	-28	
Payment for costs of vocational rehabilitation services for disabled beneficiaries	120	
Net benefit payments[d]		143,567
Financial interchange with the Railroad Retirement "Social Security Equivalent Benefit Account"[e]		156
Administrative expenses:		
Costs incurred by:		
Social Security Administration	2,634	
Department of the Treasury	110	
Offsetting miscellaneous receipts		
Demonstration projects	7	
Miscellaneous reimbursements from the General Fund[c]	-3	
Net administrative expenses		2,747
Total cost		146,470
Net increase in asset reserves		18,594
Total invested assets	118,032	
Undisbursed balances[f]	-44	
Total asset reserves, December 31, 2022		117,988

[a] Includes adjustments for prior calendar years.

[b] Between -$0.5 and $0.5 million.

[c] Includes: (1) interest on adjustments in the allocation of administrative expenses between the trust fund and the General Fund account for the Supplemental Security Income program, (2) interest arising from the revised allocation of administrative expenses among the trust funds, and (3) interest on certain reimbursements to the trust fund.

[d] Includes net reductions for the recovery of overpayments.

[e] Reimbursements for costs incurred in performing legislatively mandated activities not directly related to administering the DI program.

[f] A negative balance represents a situation where the actual cash payments exceeded the amount of invested securities of the DI Trust Fund that were redeemed to make such payments. In this situation, future redemption of additional invested securities will be required to pay for this shortfall.

Note: Components may not sum to totals because of rounding.

During 2022, the reserves in the DI Trust Fund increased by $18.6 billion, from $99.4 billion at the end of 2021 to $118.0 billion at the end of 2022. This $118.0 billion consisted of $118.0 billion in U.S. Government obligations and, as an offset, an extension of credit totaling $44 million against securities to be redeemed in the first few days of the following year. The effective annual rate of interest earned by the asset reserves in the DI Trust Fund during calendar year 2022 was 2.7 percent, slightly lower than the 2.8 percent earned during calendar year 2021. Table VI.A5 shows a detailed listing of DI Trust Fund holdings by type of security, interest rate, and year of maturity at the end of calendar years 2021 and 2022.

Section 201(d) of the Social Security Act provides that the Treasury securities issued for purchase by the OASI and DI Trust Funds shall have maturities fixed with due regard for the needs of the funds. Each year, bond purchases for each trust fund are made on June 30, taking into account the projected reserve depletion date in the most recently issued Trustees Report. The usual practice has been to reinvest the maturing special issue securities, as of each June 30, so that the values of the securities maturing in each of the next 15 years are approximately equal. Accordingly, the Department of the Treasury, in consultation with the Chief Actuary of the Social Security Administration, selected the amounts and maturity dates of the DI special-issue bonds purchased on June 30, 2022, so that the maturity dates of the total portfolio of special issue securities would be evenly spread to the extent possible over the 15-year period 2023-37. The bonds purchased have an interest rate of 3.000 percent, reflecting the average market yield, as of the last business day of the prior month, on the outstanding marketable U.S. obligations that are due or callable more than 4 years in the future. Table III.A7 shows details on investment transactions during 2022.

3. OASI and DI Trust Funds, Combined

Table III.A3 presents a statement of the operations of the OASI and DI Trust Funds on a hypothetical combined basis.[1] The entries in this table represent the sums of the corresponding values from tables III.A1 and III.A2. The two preceding subsections that cover OASI and DI provide a description of the nature of these income and cost transactions.

[1] The OASI and DI Trust Funds are distinct legal entities which operate independently. To illustrate the actuarial status of the program as a whole, the fund operations are often combined on a hypothetical basis.

Table III.A3.—Operations of the Combined OASI and DI Trust Funds, Calendar Year 2022
[In millions]

Total asset reserves, December 31, 2021		$2,852,030
Income:		
Net payroll tax contributions:		
Payroll tax contributions[a]	$1,111,751	
Payments from the General Fund of the Treasury for payroll tax contributions subject to refund[a]	-5,149	
Net payroll tax contributions[a]		1,106,602
Reimbursements from the General Fund:		
Transfer directed by P.L. 116-136	183	
Reduction in payroll tax contributions due to P.L. 111-312, P.L. 112-78, and P.L. 112-96[a]	b	
Payroll tax credits due to P.L. 98-21[a]	b	
Net General Fund reimbursements[a]		183
Income based on taxation of benefit payments:		
Withheld from benefit payments to nonresident aliens	266	
All other, not subject to withholding	48,358	
Total income from taxation of benefits		48,624
Investment income and interest adjustments:		
Interest on investments	66,370	
Interest adjustments[c]	2	
Total investment income and interest adjustments		66,372
Gifts		b
Total income		1,221,782
Cost:		
Benefit payments:		
Monthly benefits and lump-sum death payments[d]	1,231,646	
Reimbursement from the General Fund for unnegotiated checks	-81	
Payment for costs of vocational rehabilitation services for disabled beneficiaries	143	
Net benefit payments[d]		1,231,707
Financial interchange with the Railroad Retirement "Social Security Equivalent Benefit Account"		5,471
Administrative expenses:		
Costs incurred by:		
Social Security Administration	6,010	
Department of the Treasury	738	
Offsetting miscellaneous receipts	-1	
Demonstration projects	7	
Miscellaneous reimbursements from the General Fund[e]	-8	
Net administrative expenses		6,746
Total cost		1,243,925
Net increase in asset reserves		-22,143
Total invested assets	2,829,950	
Undisbursed balances[f]	-63	
Total asset reserves, December 31, 2022		2,829,887

[a] Includes adjustments for prior calendar years.

[b] Between -$0.5 and $0.5 million.

[c] Includes: (1) interest on adjustments in the allocation of administrative expenses between the trust funds and the General Fund account for the Supplemental Security Income program, (2) interest arising from the revised allocation of administrative expenses among the trust funds, and (3) interest on certain reimbursements to the trust funds.

[d] Includes net reductions for the recovery of overpayments.

[e] Reimbursements for costs incurred in performing certain legislatively mandated activities not directly related to administering the OASI and DI programs.

[f] A negative balance represents a situation where the actual cash payments exceeded the amount of invested securities of the combined OASI and DI Trust Funds that were redeemed to make such payments. In this situation, future redemption of additional invested securities will be required to pay for this shortfall.

Note: Components may not sum to totals because of rounding.