# When Forecasts Go Wrong: Budget Stress Testing

October 4, 2023

Federation of Tax Administrators
Revenue Estimation and Tax Research Conference

Kem C. Gardner
POLICY INSTITUTE
THE UNIVERSITY OF UTAH
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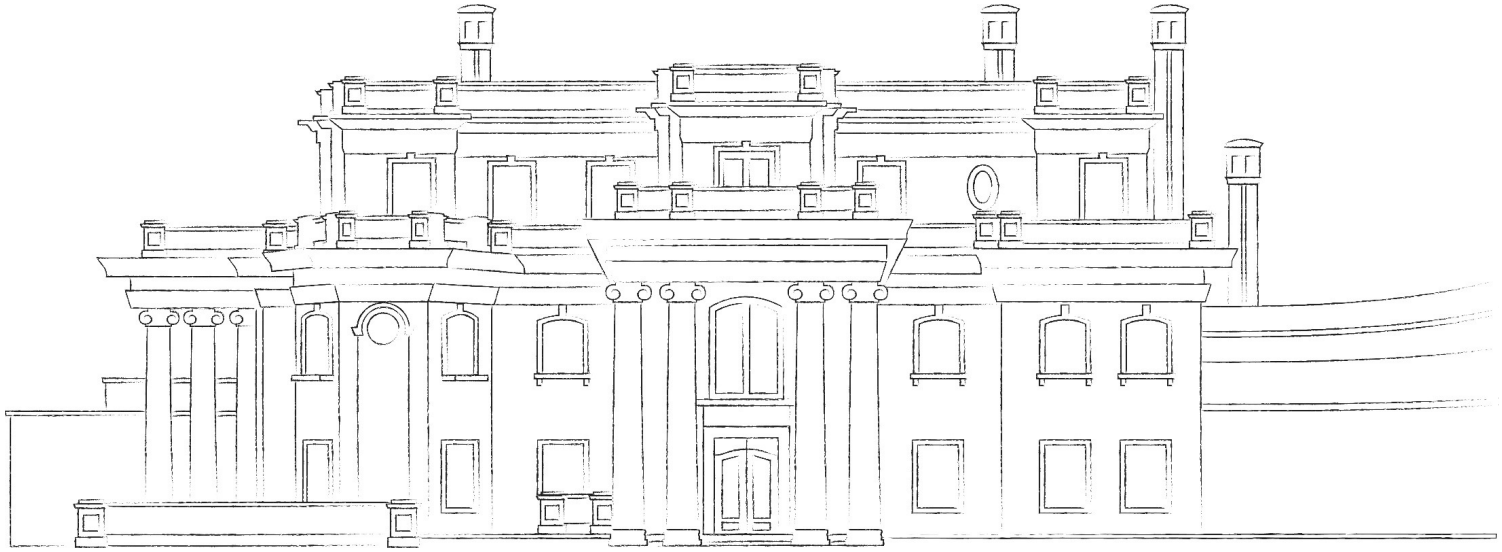
# Kem C. Gardner Policy Institute



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**Our Mission:** *Develop and share economic, demographic, and public policy research that sheds light and helps people make INFORMED DECISIONS™.*

Our purpose is to help people make

# INFORMED DECISIONS™

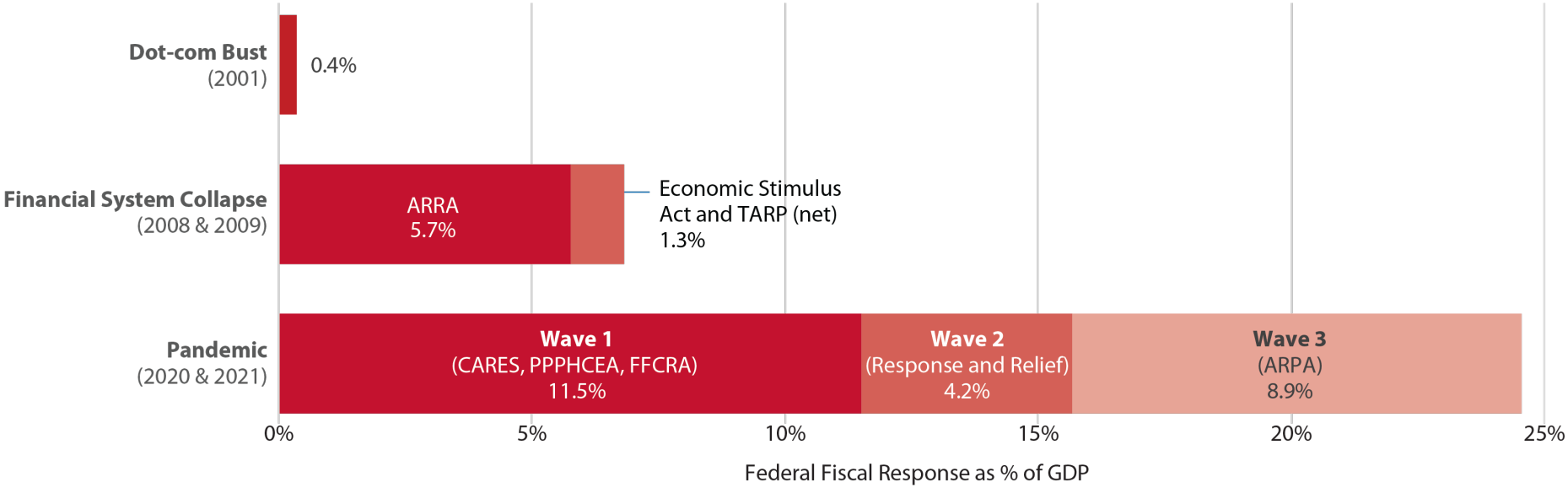
# Stress Testing – Why Should Anyone Care?

1. Forecasts are wrong
2. Spending-side demands often increase during downturns
3. States can choose to be prepared or reactionary during a crisis– make it up on the fly or execute on a playbook developed before
4. Federal government may or may not come through
5. Preparation level can inform forecast risk assumed

# How Many of You Forecast This?


Source: U.S. Employment and Training Administration

# Or This Federal Fiscal Response?



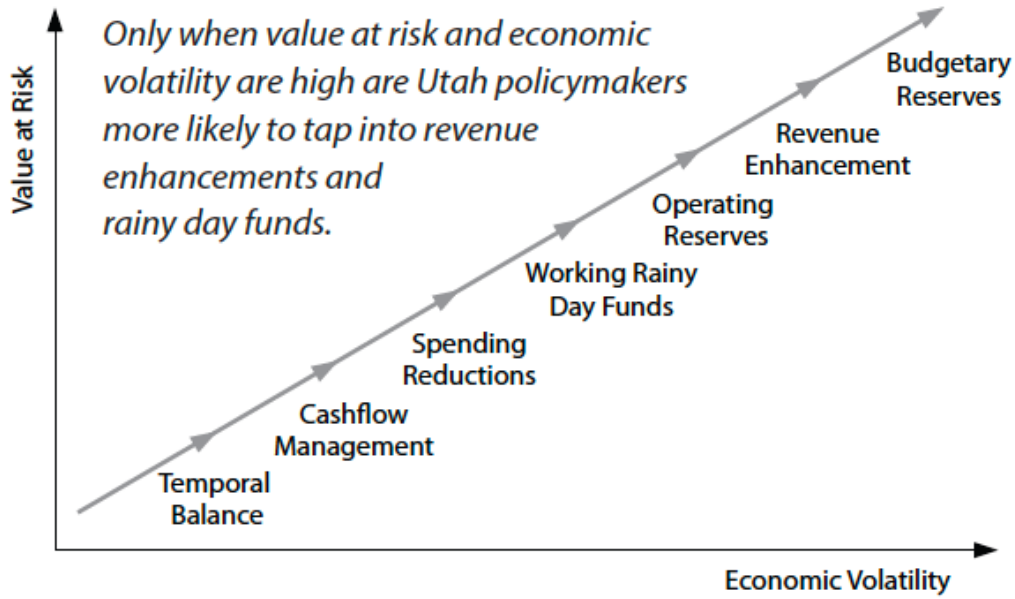

Source: Gardner Policy Institute from CBO and BEA data

# Shifting Focus from Annually-Balanced Budget to Long-Term Fiscal Sustainability

**Utah's fiscal playbook for managing budget over the business cycle**

**Utah's Fiscal Toolkit**

Reserves and Other Budget Contingencies



# Utah Budget Stress Testing Process

1. Define Analysis Period
2. Identify Key Independent and Dependent Forecast Variables
3. Determine Alternative Economic Scenarios
4. Estimate Revenue and Spending at Risk
5. Inventory and Categorize Existing Reserves and Other Budget Contingencies
6. Compare Total Reserves & Budget Contingencies to Total Value at Risk
7. Explain It! Concisely Present Findings

## State Budget Stress Testing User Guide

A collaborative endeavor of the Kem C. Gardner Policy Institute and the Utah Office of the Legislative Fiscal Analyst

**June 2019**

# 1 – Define Analysis Period

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**Considerations:**

- Annual or biennial state
- Time period available under alternative economic scenario(s) selected
- Forecast error acceptability
- Timing sensitivity of major budget drivers (revenue and spending)
- Short-term v. long-term budget impacts

**Phil's Takeaway:**

- 3-5 years probably best
- Review impacts annually over analysis period

# 2 – Identify Key Independent and Dependent Forecast Variables

**Considerations:**

- What are your major revenue streams?
- What are your major spending categories?
- Historically, how sensitive are state revenues and spending to business and demographic cycles?
- What indicators do you use to forecast?

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**Phil's Takeaway:**

- Simpler is better – you could include all revenues and all spending, but is it worth the effort?
- Which are your top 10 (or fewer??) critical forecasting variables?

# Identify Key Revenue and Spending Drivers

## Largest Revenue Streams:

- Individual income tax
- Sales and use tax
- Corporate income tax
- Some states - extraction taxes, tourism taxes, etc.

## Major Spending Drivers:

- Medicaid
- K-12
- Higher education
- Employee compensation
  - Retirement contributions
  - Some states – union contracts

# Scenario Economic Indicators May Misalign With Normal Forecast Process Indicators

February 23

**ECONOMIC INDICATORS FOR UTAH AND THE UNITED STATES: FEBRUARY 2023**

| ECONOMIC INDICATORS | UNITS | 2020 ACTUAL | 2021 ACTUAL | 2022 ESTIMATE | 2023 FORECAST | 2024 FORECAST | PERCENT CHANGE 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|
| **PRODUCTION AND SPENDING** | | | | | | | | | | |
| U.S. Real Gross Domestic Product | Billion Chained $2012 | 18,509 | 19,610 | 20,018 | 20,164 | 20,493 | 5.9 | 2.1 | 0.7 | 1.6 |
| U.S. Real Personal Consumption | Billion Chained $2012 | 12,701 | 13,754 | 14,140 | 14,281 | 14,437 | 8.3 | 2.8 | 1.0 | 1.1 |
| U.S. Real Private Fixed Investment | Billion Chained $2012 | 3,327 | 3,575 | 3,563 | 3,416 | 3,484 | 7.4 | -0.3 | -4.1 | 2.0 |
| U.S. Real Federal Defense Spending | Billion Chained $2012 | 239 | 220 | 205 | 214 | 214 | -8.1 | -7.0 | 4.5 | 0.0 |
| U.S. Real Exports | Billion Chained $2012 | 2,232 | 2,367 | 2,538 | 2,636 | 2,788 | 6.1 | 7.2 | 3.9 | 5.8 |
| Utah Real GDP | Million Chained $2012 | 174,955 | 186,910 | 191,794 | 195,438 | 200,910 | 6.8 | 2.6 | 1.9 | 2.8 |
| Utah Exports | Million Dollars | 17,713 | 18,060 | 16,632 | 19,155 | 20,558 | 2.0 | -7.9 | 15.2 | 7.3 |
| Utah Coal Production | Million Tons | 13.3 | 12.3 | 11.0 | 10.0 | 12.0 | -7.4 | -11.1 | -8.9 | 20.0 |
| Utah Crude Oil Production | Million Barrels | 31.0 | 35.5 | 44.6 | 45.5 | 44.0 | 14.6 | 25.6 | 2.0 | -3.3 |
| Utah Natural Gas Production Sales | Billion Cubic Feet | 243 | 240 | 260 | 245 | 240 | -1.1 | 8.4 | -5.8 | -2.0 |
| Utah Copper Mined Production | Million Pounds | 309 | 351 | 397 | 420 | 450 | 13.6 | 13.1 | 5.8 | 7.1 |
| **SALES AND CONSTRUCTION** | | | | | | | | | | |
| U.S. New Auto and Truck Sales | Millions | 14.5 | 14.9 | 13.8 | 14.8 | 15.9 | 3.3 | -7.7 | 7.4 | 7.2 |
| U.S. Housing Starts | Millions | 1.4 | 1.6 | 1.6 | 1.2 | 1.3 | 15.1 | -3.1 | -23.9 | 5.8 |
| U.S. Private Residential Investment | Billion Dollars | 901 | 1,108 | 1,127 | 988 | 1,066 | 23.0 | 1.7 | -12.3 | 8.0 |
| U.S. Nonresidential Structures | Billion Dollars | 614 | 598 | 645 | 705 | 735 | -2.6 | 7.8 | 9.3 | 4.3 |
| U.S. Home Price Index (FHFA) | 1991Q1 = 100 | 290 | 339 | 386 | 387 | 382 | 16.8 | 13.8 | 0.2 | -1.2 |
| U.S. Nontaxable & Taxable Retail Sales | Billion Dollars | 6,210 | 7,440 | 8,125 | 8,262 | 8,427 | 19.8 | 9.2 | 1.7 | 2.0 |
| Utah New Auto and Truck Sales | Thousands | 116 | 129 | 128 | 138 | 149 | 11.6 | -1.2 | 8.0 | 7.9 |
| Utah Dwelling Permitted Units | Units | 31,797 | 40,144 | 30,000 | 22,750 | 23,500 | 26.3 | -25.3 | -24.2 | 3.3 |
| Utah Residential Permit Value | Million Dollars | 6,330 | 8,850 | 7,217 | 5,300 | 6,000 | 39.8 | -18.5 | -26.6 | 13.2 |
| Utah Nonresidential Permit Value | Million Dollars | 2,508 | 2,930 | 3,256 | 2,800 | 2,200 | 16.8 | 11.1 | -14.0 | -21.4 |
| Utah Additions, Alterations and Repairs | Million Dollars | 1,855 | 1,935 | 1,550 | 1,400 | 1,300 | 4.3 | -19.9 | -9.7 | -7.1 |
| Utah Home Price Index (FHFA) | 1980Q1 = 100 | 540 | 661 | 793 | 798 | 793 | 22.4 | 20.0 | 0.6 | -0.6 |
| Utah Taxable Retail Sales | Million Dollars | 42,656 | 49,729 | 53,610 | 55,990 | 58,200 | 16.6 | 7.8 | 4.4 | 3.9 |
| Utah All Taxable Sales | Million Dollars | 74,731 | 90,105 | 100,532 | 103,764 | 107,770 | 20.6 | 11.6 | 3.2 | 3.9 |
| **DEMOGRAPHICS AND SENTIMENT** | | | | | | | | | | |
| U.S. July 1st Population | Millions | 332 | 332 | 333 | 335 | 337 | 0.1 | 0.3 | 0.6 | 0.6 |
| U.S. Consumer Sentiment (U of M) | Diffusion Index | 81.5 | 77.6 | 59.0 | 63.2 | 80.0 | -4.8 | -24.0 | 7.2 | 26.5 |
| Utah July 1st Population | Thousands | 3,284 | 3,339 | 3,381 | 3,425 | 3,467 | 1.7 | 1.2 | 1.3 | 1.2 |
| Utah Net Migration | Thousands | 23.6 | 31.6 | 18.1 | 20.3 | 18.5 | 33.7 | -42.6 | 11.9 | -8.9 |
| **PROFITS AND RESOURCE PRICES** | | | | | | | | | | |
| U.S. Corporate Before Tax Profits | Billion Dollars | 2,260 | 2,771 | 3,017 | 2,999 | 3,011 | 22.6 | 8.9 | -0.6 | 0.4 |
| West Texas Intermediate Crude Oil | $ Per Barrel | 39.2 | 68.0 | 94.8 | 83.0 | 80.7 | 73.2 | 39.4 | -12.4 | -2.8 |
| U.S. Coal Producer Price Index | 1982 = 100 | 189 | 189 | 280 | 246 | 217 | 0.3 | 47.7 | -11.9 | -11.9 |
| Utah Coal Prices | $ Per Short Ton | 37.2 | 38.4 | 42.0 | 40.0 | 38.0 | 3.2 | 9.3 | -4.8 | -5.0 |
| Utah Oil Prices | $ Per Barrel | 34.9 | 60.7 | 81.5 | 68.0 | 62.0 | 74.0 | 34.2 | -16.6 | -8.8 |
| Utah Natural Gas Prices | $ Per MCF | 1.96 | 4.10 | 7.00 | 3.30 | 4.00 | 109.2 | 70.7 | -52.9 | 21.2 |
| Utah Copper Prices | $ Per Pound | 2.80 | 4.25 | 3.80 | 3.90 | 4.00 | 51.8 | -10.6 | 2.6 | 2.6 |
| **INFLATION AND INTEREST RATES** | | | | | | | | | | |
| U.S. CPI Urban Consumers (BLS) | 1982-84 = 100 | 259 | 271 | 293 | 304 | 311 | 4.7 | 8.0 | 4.0 | 2.3 |
| U.S. GDP Chained Price Index (BEA) | 2012 = 100 | 114 | 119 | 127 | 131 | 134 | 4.5 | 7.0 | 3.3 | 2.4 |
| S&P 500 | Index | 3,219 | 4,267 | 4,101 | 4,132 | 4,063 | 32.6 | -3.9 | 0.8 | -1.7 |
| U.S. Federal Funds Rate (FRB) | Effective Rate | 0.38 | 0.08 | 1.68 | 4.92 | 4.37 | | | | |
| U.S. 3-Month Treasury Bills (FRB) | Discount Rate | 0.37 | 0.04 | 2.02 | 4.78 | 4.04 | | | | |
| U.S. 10-Year Treasury Notes (FRB) | Yield (%) | 0.89 | 1.44 | 2.95 | 3.59 | 3.35 | | | | |
| 30 Year Mortgage Rate (FHLMC) | Percent | 3.18 | 3.03 | 5.38 | 6.25 | 5.61 | | | | |
| **EMPLOYMENT AND WAGES** | | | | | | | | | | |
| U.S. Establishment Employment (BLS) | Millions | 142.2 | 146.3 | 152.6 | 154.6 | 153.8 | 2.9 | 4.3 | 1.3 | -0.5 |
| U.S. Average Annual Pay (BEA) | Dollars | 66,529 | 70,345 | 73,076 | 75,853 | 79,171 | 5.7 | 3.9 | 3.8 | 4.4 |
| U.S. Total Wages & Salaries (BEA) | Billion Dollars | 9,457 | 10,290 | 11,153 | 11,725 | 12,176 | 8.8 | 8.4 | 5.1 | 3.8 |
| Utah Nonagricultural Employment (DWS) | Thousands | 1,539 | 1,616 | 1,684 | 1,718 | 1,747 | 5.0 | 4.2 | 2.1 | 1.7 |
| Utah Average Annual Pay (DWS) | Dollars | 54,079 | 56,944 | 61,288 | 63,667 | 65,085 | 5.3 | 7.6 | 3.9 | 2.2 |
| Utah Total Nonagriculture Wages (DWS) | Million Dollars | 83,223 | 92,010 | 103,180 | 109,400 | 113,720 | 10.6 | 12.1 | 6.0 | 3.9 |
| **INCOME AND UNEMPLOYMENT** | | | | | | | | | | |
| U.S. Personal Income (BEA) | Billion Dollars | 19,832 | 21,295 | 21,733 | 22,644 | 23,640 | 7.4 | 2.1 | 4.2 | 4.4 |
| U.S. Unemployment Rate (BLS) | Percent | 8.1 | 5.4 | 3.6 | 3.9 | 4.6 | | | | |
| Utah Personal Income (BEA) | Million Dollars | 171,385 | 186,991 | 196,811 | 206,619 | 215,699 | 9.1 | 5.3 | 5.0 | 4.4 |
| Utah Unemployment Rate (DWS) | Percent | 4.7 | 2.7 | 2.0 | 2.7 | 3.4 | | | | |

Sources: State of Utah Revenue Assumptions Working Group, Moody's Economy.com, and IHS Markit.

**Focus on the most critical economic variables**

# 3 – Determine Alternative Economic Scenarios

**Considerations:**

- Consider scenario likelihood given your state's economy
- Do you have a large high-risk industry?
- Cost - what economic scenarios are publicly available for free or can be purchased?
- Economic indicator coverage - how does it compare to your variables under #2?

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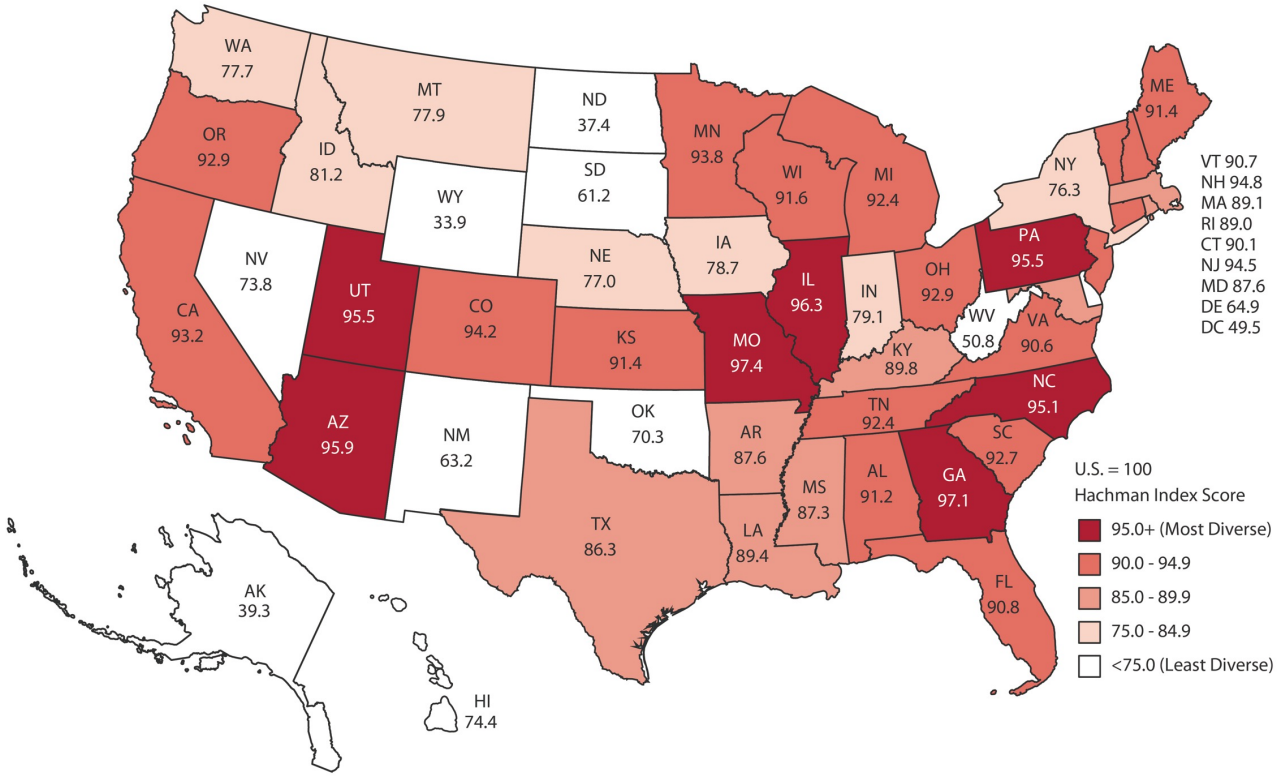
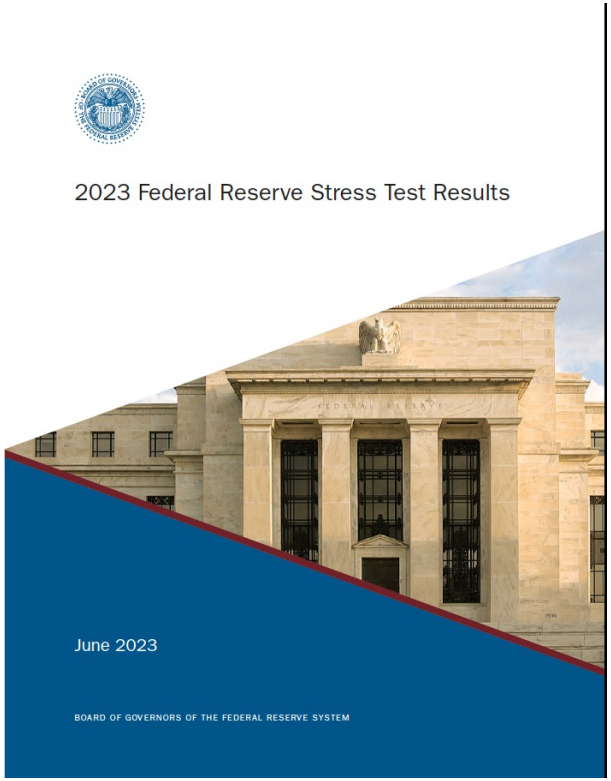
**Phil's Takeaway:**

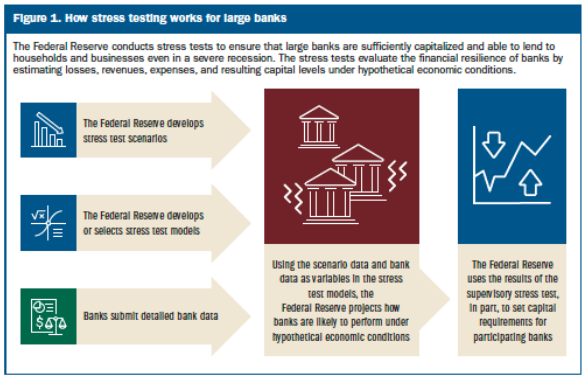
- Simpler is better – this is a directional exercise, not a point estimate for budgeting
- Useful to have at least one less severe and one more severe scenario

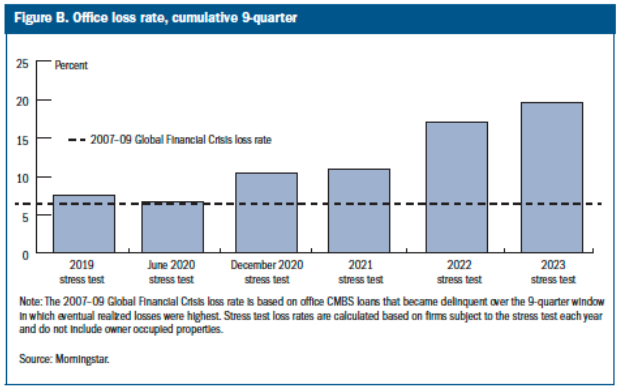
# Economic Diversity or Concentration Should Inform Your Scenarios



# Federal Reserve Alternative Scenarios are Free, but May Be More Applicable to Some States Than Others



# Utah 2022 Stress Test Hypothetical Scenarios

## Moderate Recession

- Moderate recession 2023 Q1
- Triggered by still-high inflation and increasing interest rates
- Recession lasts three quarters
- Peak-to-trough decline in output of 1.4%
- Unemployment peaks at 6.4% in late 2023
- Economy returns to full employment by 2025 Q1

## Severe Recession

- Severe recession 2023 Q1
- Lasts through 2024 Q1, due to inflation, interest rates, and the potential for higher oil prices and additional supply chain issues
- Peak-to-trough decline roughly 4.2%
- Unemployment peaks at nearly 9% in mid-2024
- National economy does not return to full employment until 2032

## Stagflation

- Inflation accelerates, while never reaching full employment
- Weak growth or slight output declines through 2023
- Unemployment rises above 5% by the end of 2023
- Higher-than-expected inflation and resulting Federal Reserve rate hikes put economy into recession in 2024
- Peak-to-trough decline 3.3% and peak unemployment 9% by end of 2024
- Economy begins to recover in 2025, but reduced business investment lowers productivity, such that real GDP remains below the baseline indefinitely

# 4 – Estimate Revenue and Spending at Risk

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**Considerations:**

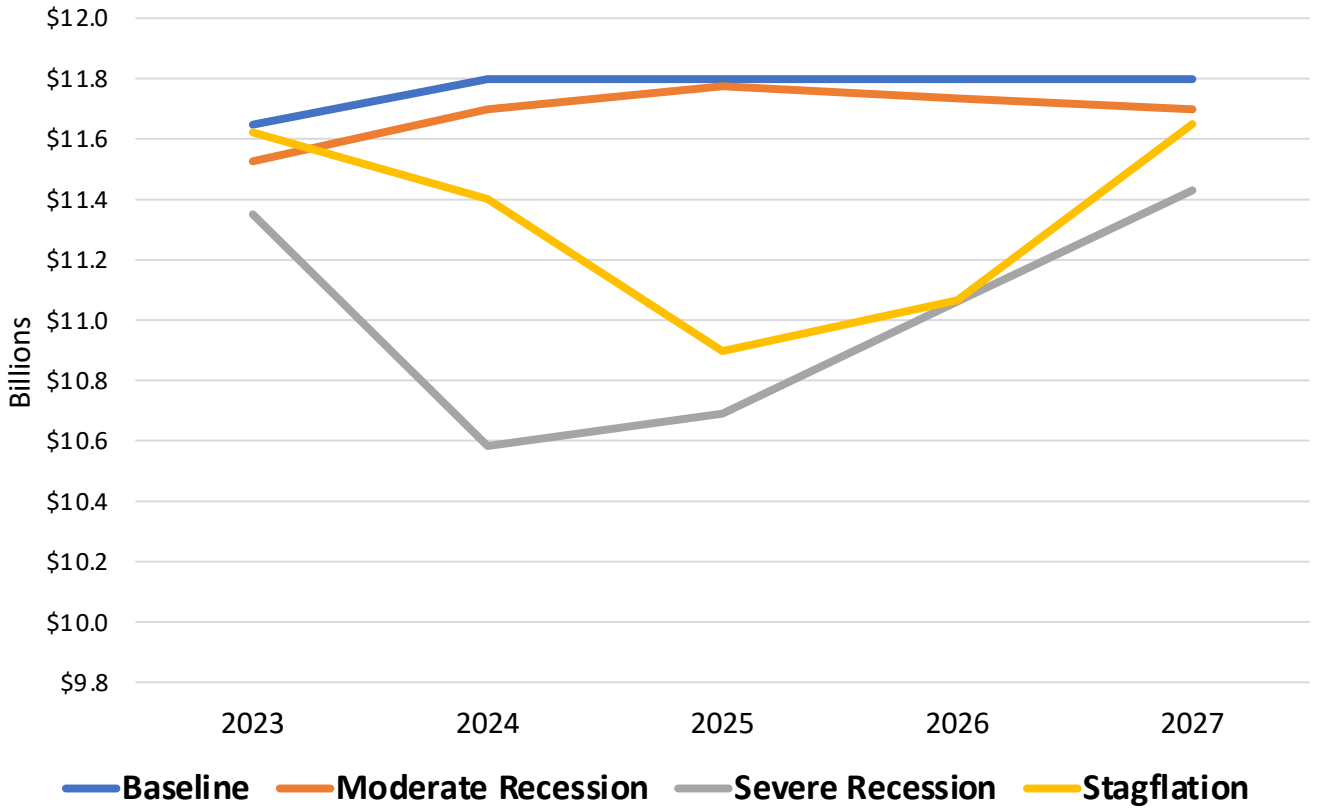
- Model, model, model - Use your standard forecasting models to the extent possible given the economic indicators from your scenarios
- Determine baseline (existing budget v. "but for" scenario)
- Forecast alternative scenario
- Compare baseline and alternative

**Phil's Takeaway:**

- Simpler is better – don't let the perfect be the enemy of the good
- Think carefully about baseline for comparison

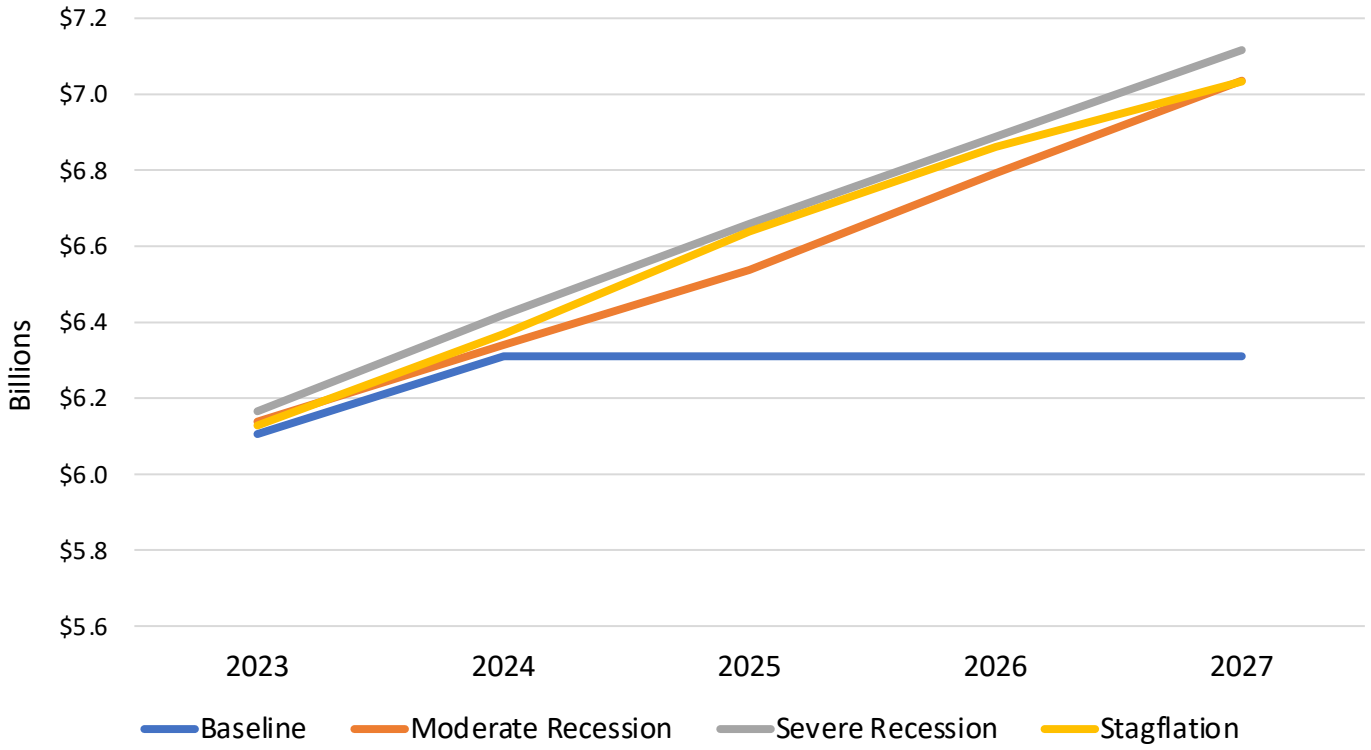
# Utah Revenue Value at Risk, 2022

## Selected Major Sources

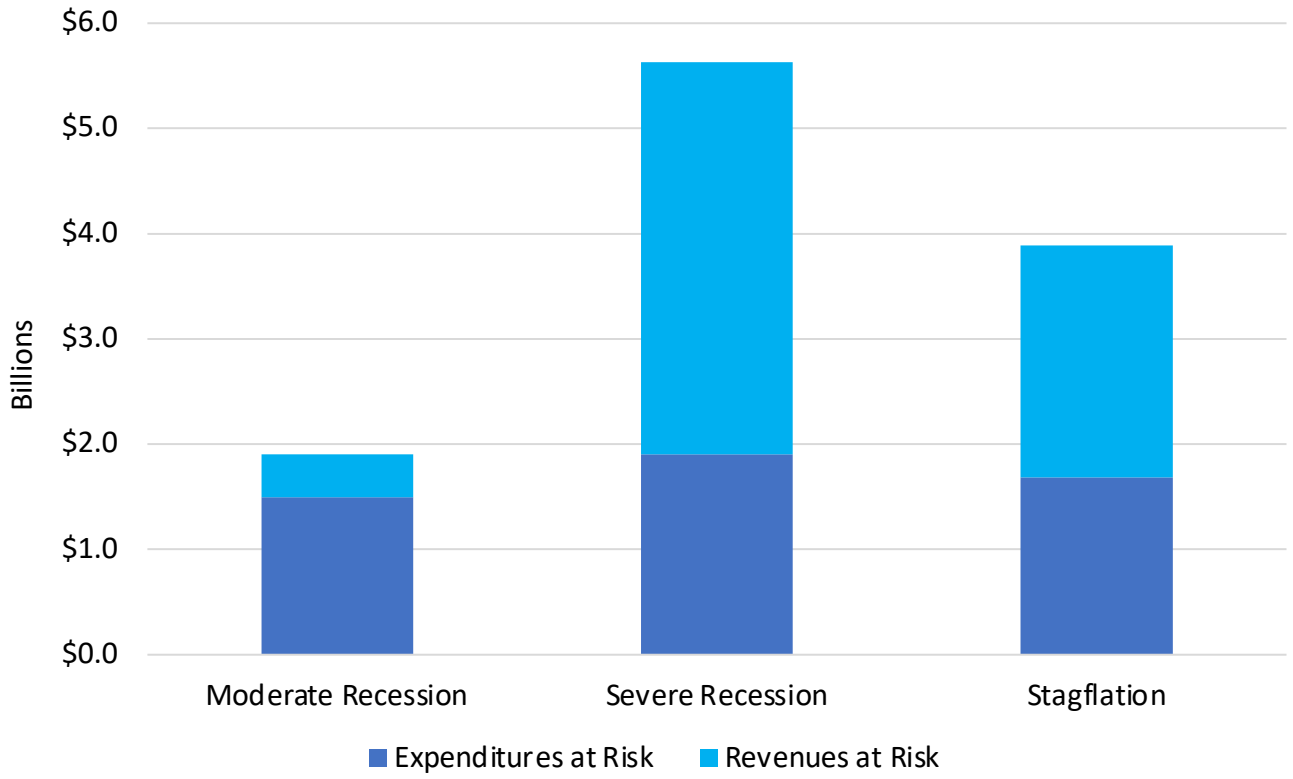


# Utah Spending Value at Risk, 2022

## Selected Major Programs



# Summary Value at Risk, 2022



# 5 – Inventory and Categorize Existing Reserves and Other Budget Contingencies

**Considerations:**

- NOT just the formal rainy day fund
- How did the state handle previous downturns?
- Informal, disaggregated buffers in restricted funds / agency budgets
- Formal / statutory spending relief valves
- Cash-funded infrastructure with ongoing revenue
- Revenue increases and spending cuts
- Trust and agency principal balances
- Evaluate option feasibility

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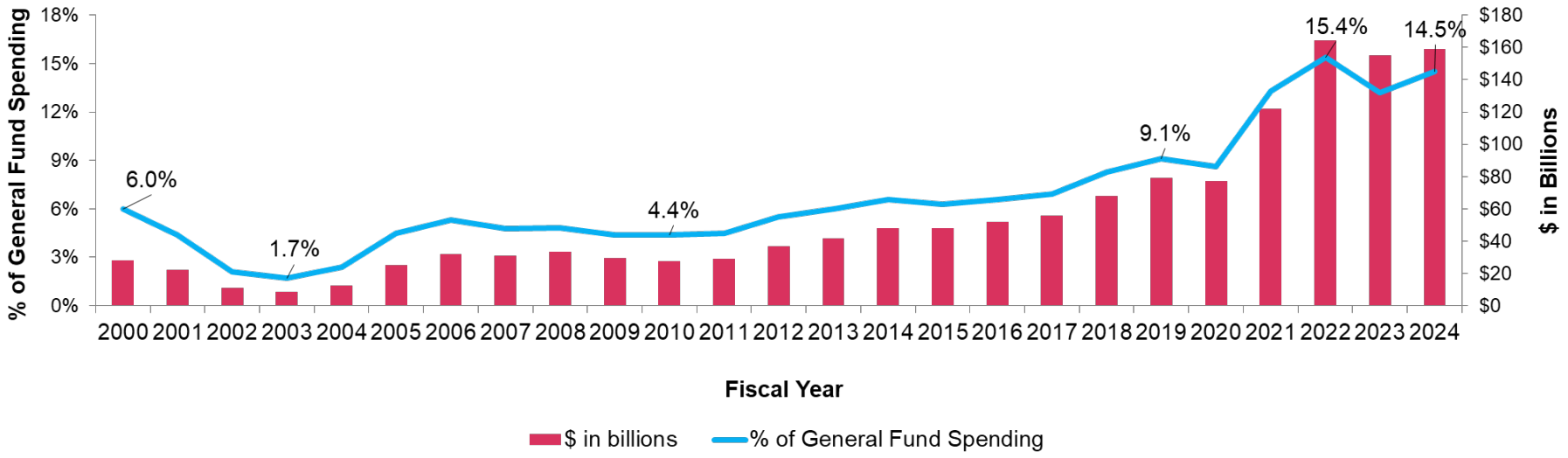
**Phil's Takeaway:**

- Think broadly about reserve and budget contingencies – there's a lot buried in the details of the state budget
- For option feasibility, look at what's been done previously

# Formal State Rainy Day Funds

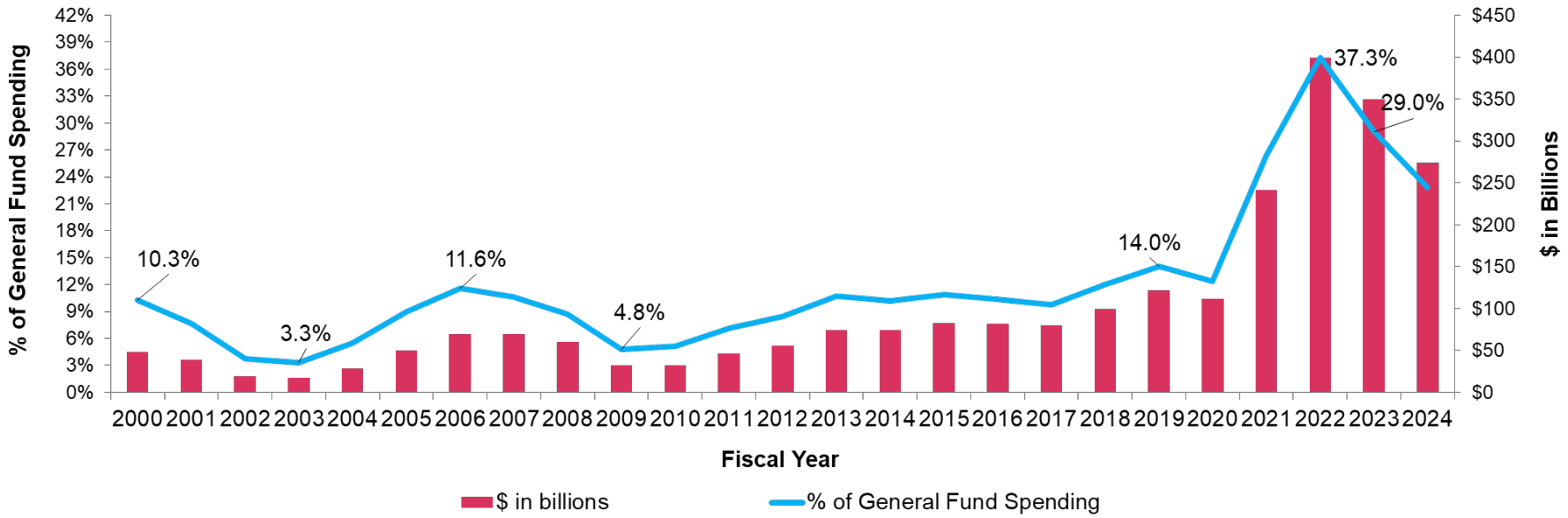
Rainy Day Fund Balances in Dollars and as a Percentage of General Fund Expenditures




Source: National Association of State Budget Officers

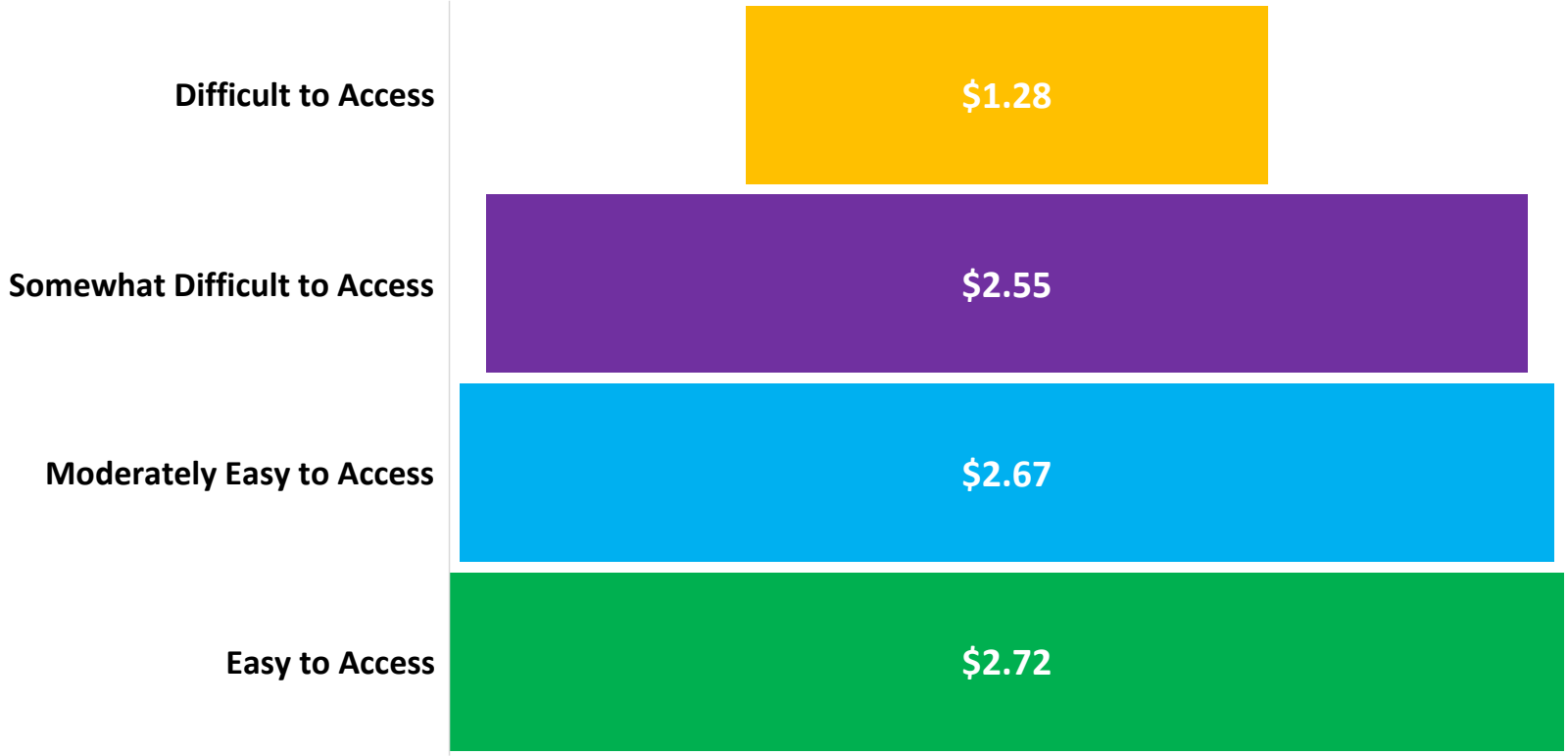
# Formal Rainy Day Funds & General Fund Balance

Total Balances in Dollars and as a Percentage of General Fund Expenditures




Source: National Association of State Budget Officers

# Utah Reserves and Contingencies, 2022



# 6 – Compare Total Reserves & Budget Contingencies to Total Value at Risk

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**Considerations:**

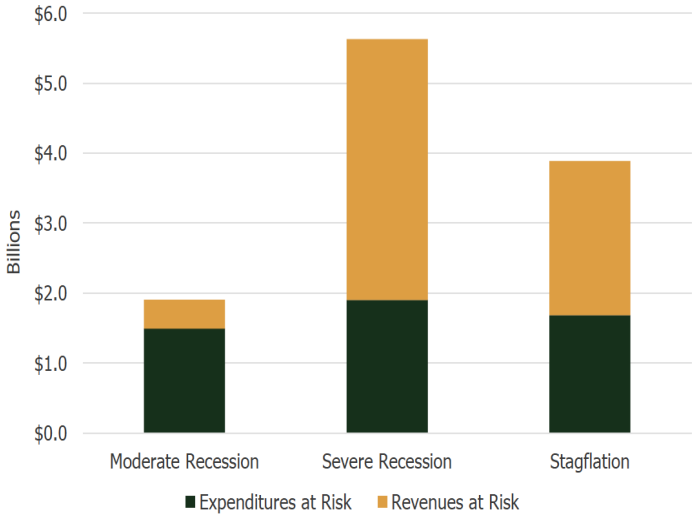
- Pull it all together
- Decide on showing annual or cumulative impacts over the review period

**Phil's Takeaway:**

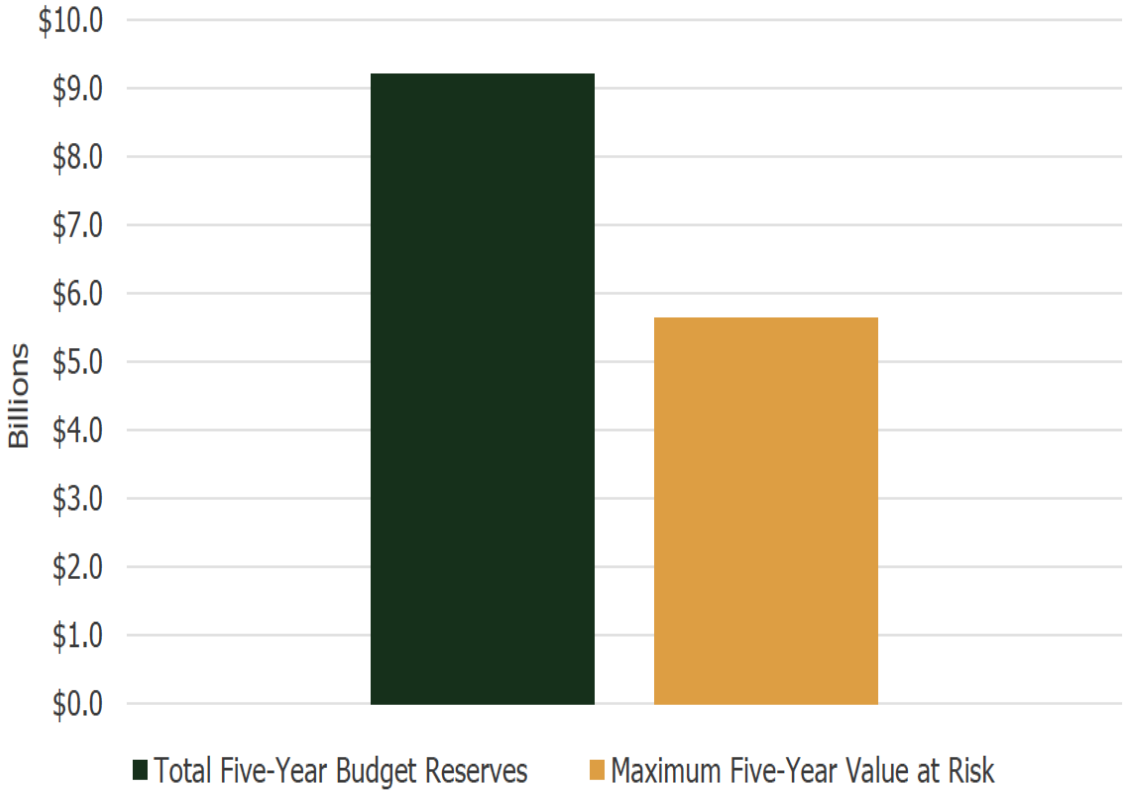
- Remember this is directional
- Contemplate level of preparation and think about any needed budget changes
- Consider using preparation level to inform forecast risk assumed – the next frontier in state forecasting??

# Utah 2022 Stress Test

## Estimate Value At Risk

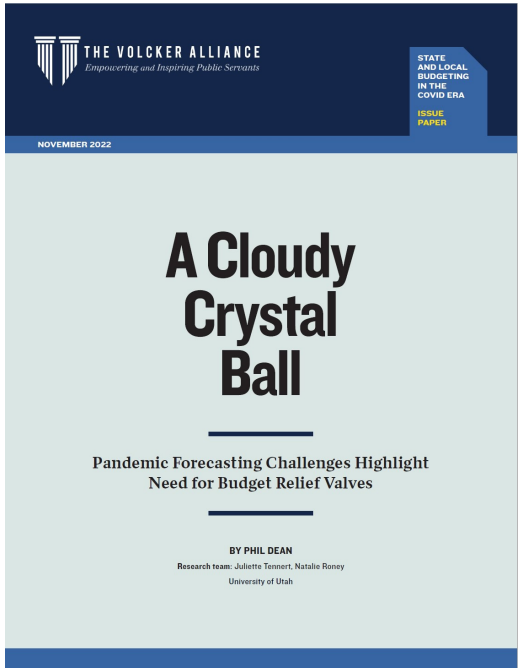



## Compare Reserves/Contingencies to Value at Risk



# A Cloudy Crystal Ball:

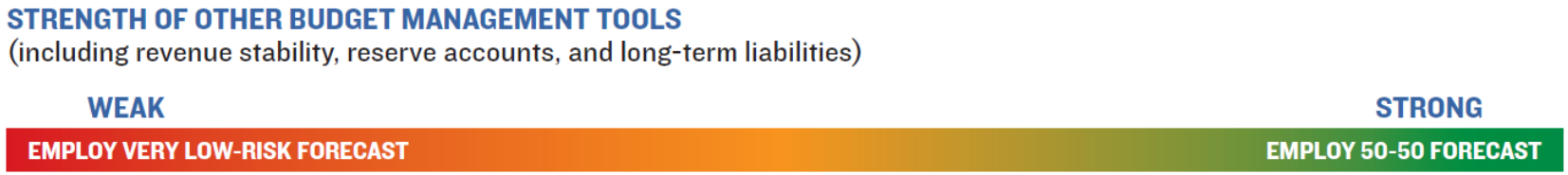
## *Pandemic Forecasting Challenges Highlight Need for Budget Relief Valves*




- Highlights forecasting and budget management lessons learned from the pandemic
- Tool kit on various best practices and how states forecast budgets

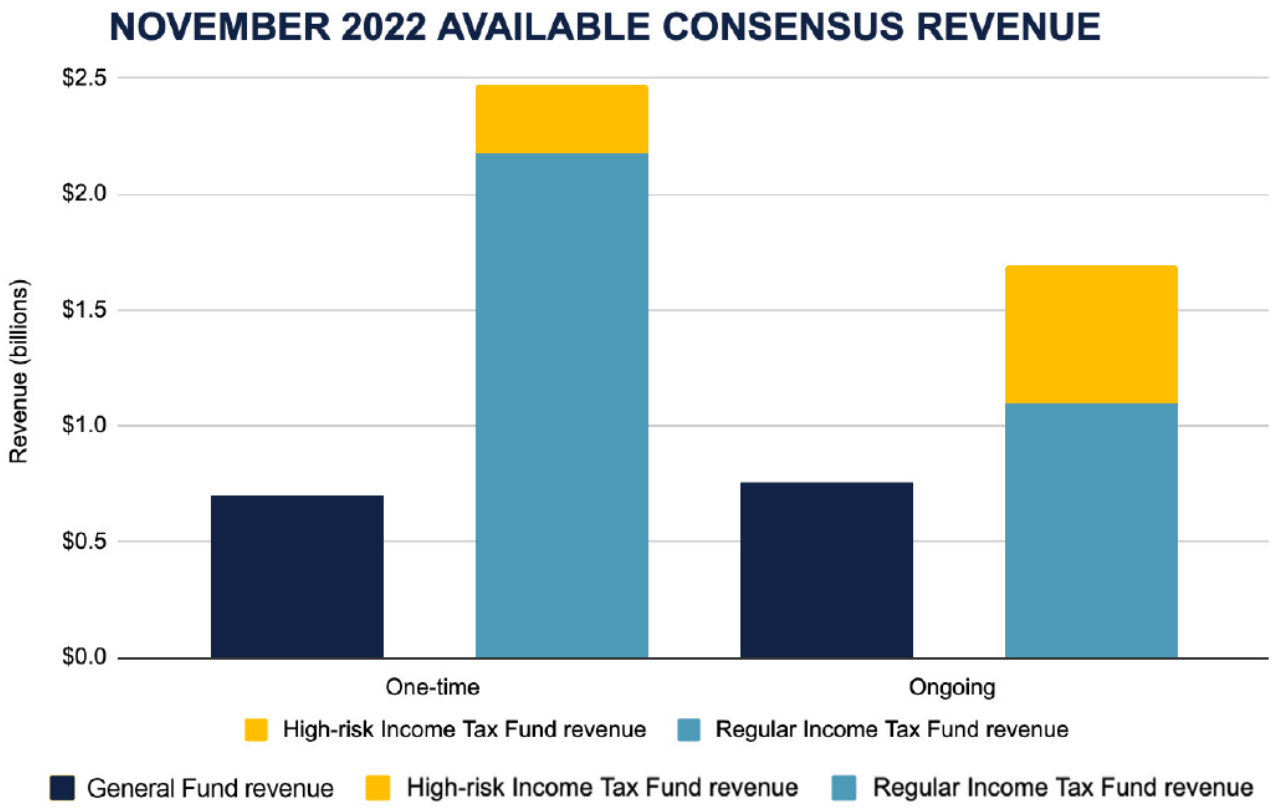
https://www.volckeralliance.org/sites/default/files/2022-11/ACloudyCrystalBall_113022.pdf

# Consider Formally Incorporating Fiscal Preparation Level Into Forecast Risk Assumed




https://www.volckeralliance.org/sites/default/files/2022-11/ACloudyCrystalBall_113022.pdf

# Utah Forecast Formally Highlighted Risk




Source: Utah GOPB

# California LAO Shows Forecast Uncertainty

Figure 7

**How Likely Is the Budget to Break Even?**

General Fund Revenue

The shaded regions show how much revenues might differ from our **main forecast** ●.
The lighter shaded area shows the most likely range of possibilities barring a recession.
The darker shaded area shows how far revenues could fall should a recession occur.
The **breakeven point** ● shows the amount of revenue needed for the budget to stay balanced without further actions.

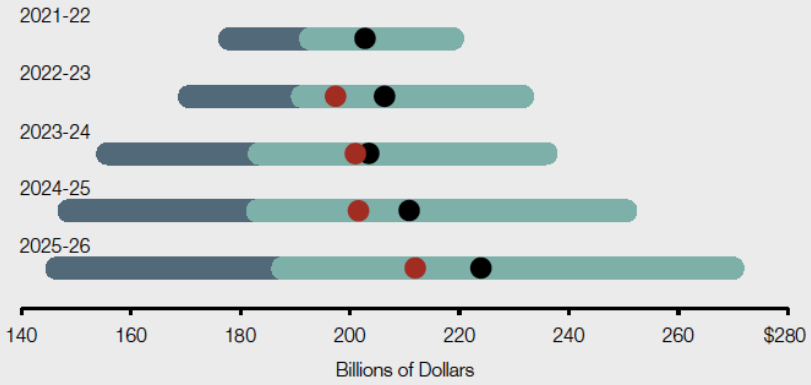
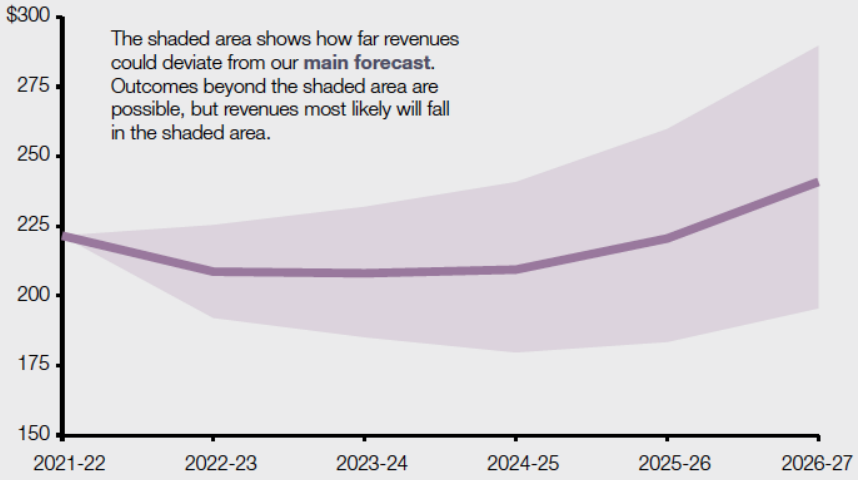



Figure 1

**LAO Revenue Outlook**

General Fund Revenue, Excluding BSA Transfers (In Billions)




BSA = Budget Stabilization Account.

LAO

Source: California LAO

# 7 – Explain It! Concisely Present Findings

**Considerations:**

- Simple
- Concise
- Policymakers don't need all the detail (a few may want to walk through it)
- Make clear this is NOT a forecast of these economic scenarios, but a theoretical exercise

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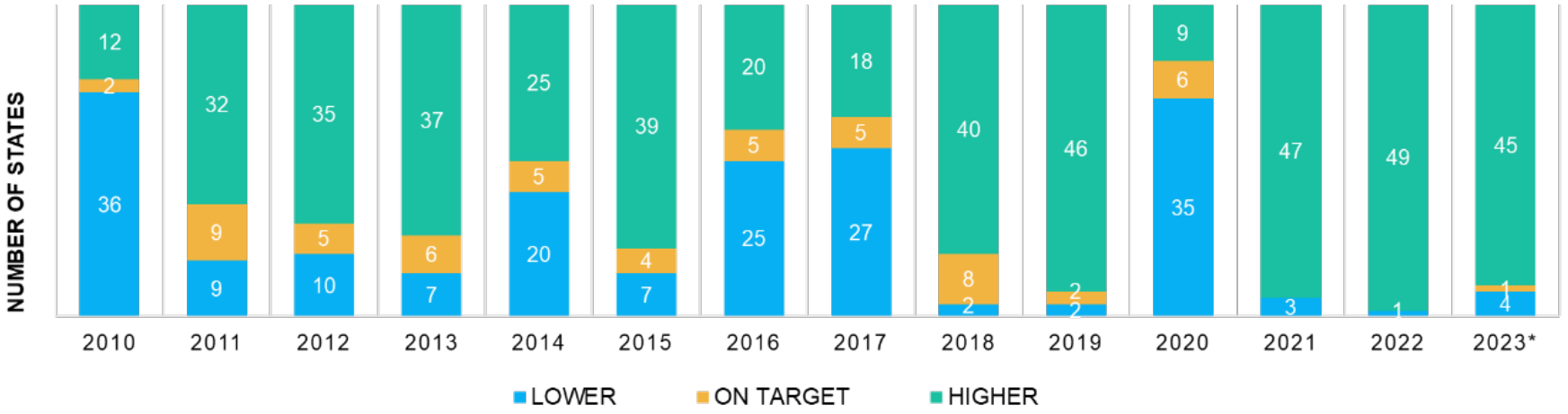
**Phil's Takeaway:**

- Plan to dedicate time here – this is one of the most critical steps and could be neglected
- May be the hardest part

# Historical State Forecast Performance




*Fiscal 2023 is ongoing and figures are subject to change.

Source: National Association of State Budget Officers

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