State Budget Stress Testing

How Utah Budget-makers are Shifting the Focus from a Balanced Budget to Fiscal Sustainability

Juliette Tennert, Kem C. Gardner Policy Institute
Angela J. Oh, Kem C. Gardner Policy Institute
Jonathan Ball, Utah Office of the Legislative Fiscal Analyst
Thomas Young, Utah Office of the Legislative Fiscal Analyst

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**Kem C. Gardner
POLICY INSTITUTE**
THE UNIVERSITY OF UTAH

DAVID ECCLES SCHOOL OF BUSINESS

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ANALYSIS IN BRIEF

State budget stress tests help policymakers to plan for and create appropriate, measured responses to economic volatility. Utah is the first state to implement comprehensive budget stress testing, evaluating the sufficiency of reserves and other budget contingencies to cover recession-spurred revenue shortfalls and countercyclical cost hikes.

In the wake of the 2008 financial crisis and concurrent Great Recession, Congress imposed a number of financial industry regulations in the Dodd-Frank Act of 2010, including requiring bank stress tests. These stress tests predict the impact of varying degrees of economic downturns on banks' balance sheets to assess their ability to absorb losses, continue lending, and meet credit obligations. Utah is the first state to adapt financial stress testing to state budgets, analyzing budget gaps, or value at risk, under economic stress scenarios and adequacy of budget contingencies. The analysis suggests that Utah is prepared for a moderate recession or extended period of stagflation; coping with a more severe recession like the Great Recession would be more difficult.

"Stress testing is a tool that governments use to prepare themselves for an inevitable economic downturn."

Marcia Van Wagner, Moody's Vice President and Senior Credit Officer

State Budget Stress Test in 4 Steps

1. Define the period of analysis and economic assumptions for stress scenarios.

2. Identify revenue and expenditure components at risk and estimate total value at risk under stress scenarios.

3. Inventory and categorize reserves and other budget contingencies by ease of accessibility.

4. Compare total value at risk to total contingencies to evaluate overall resilience of state budget.

2016 State of Utah Budget Stress Test Results
Value at risk under 3 economic scenarios and available reserves by ease of accessibility

Percent of FY 17 State Fund appropriations

Reserves Accessibility

Easy — Moderately Easy — Difficult — Somewhat Difficult — Very Difficult

Utah's Fiscal Toolkit
Reserves and Other Budget Contingencies

Only when value at risk and economic volatility are high are Utah policymakers more likely to tap into revenue enhancements and rainy day funds.

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Introduction

During economic downturns, governments address market volatility by providing a social safety-net and by retraining workers. In that sense, the demand for government services is counter-cyclical to the broader economy. Ironically, most governments finance such activities using pro-cyclical tax collections. In other words, governmental services are most demanded at a time when governments can least afford it.

The United States government addresses this apparent contradiction by issuing debt. While most state constitutions prohibit borrowing for operating expenses, state governments, in the past, have benefitted from Uncle Sam's line of credit via economic stimulus and bail-out programs. Many states recognize that our federal government is becoming increasingly over-leveraged and that it may not be as willing in the future to borrow on behalf of states. Moreover, the political dynamics in some states may be oriented toward lower reliance on federal funding more generally.

Economic volatility – and attendant revenue shortfalls/spending spikes – also drive interesting political dynamics. Dramatic government revenue increases typically precede an economic correction, and they in-turn can drive ongoing commitments to constituents, which may be tax cuts or program expansions. Projected revenue growth is pledged before it is collected – which leads to dashed expectations and broken promises when that revenue does not materialize.

Attempting to keep those promises can sometimes lead to short-term thinking: raiding one's pension fund, inappropriately accelerating revenue, or delaying cost experience without reducing total expenditures. Such budget gimmicks usually have unintended consequences that must be corrected later. They almost always create perceptions of crisis and instability. Yet businesses and citizens crave surety and stability.

An alternative exists to bail-outs, broken promises, and gimmicks during times of economic distress. By probing potential risk, measuring its probability and magnitude, and creating multiple contingencies, state and local governments can prepare for downturns without taking too much revenue out of the economy for a rainy day. Stress testing budgets allows governments to create appropriate, measured responses to economic volatility.

To that end, the state of Utah has taken a page from the Federal Reserve's playbook in order to assure consistency and solvency at all points of the business cycle. Under the Dodd-Frank Act, the Federal Reserve requires banks of a certain size to stress test their assets. The idea is to predict what will happen to bank balance sheets in hypothetical economic downturns and determine how much a bank must have in reserves to weather the storm. Utah is doing the same thing for its state budget – using the same scenarios produced for banks by the Federal Reserve. The state compares value at risk due to revenue declines combined with budget pressure from increased demand for government services to a portfolio of state reserves to determine how best to prepare for economic hard times without Uncle Sam's help.

A Brief History of State Budget Stress Testing

Utah was the first state to perform a comprehensive budget stress test, assessing its ability to respond to both recession-driven revenue shortfalls and cost increases in the spring of 2015, and again in the fall of 2016.[1] Around the time of the initial Utah analysis, Moody's Analytics performed a fiscal stress-testing exercise that evaluated the ability of the four most populous states in the U.S. to handle a recession: Texas, Florida, New York, and California (Moody's Investors Service, Inc. 2016). Also, in 2016 S&P Global Ratings performed a stress test on the top 10 borrowing states' budgets.

Since the initial analyses by Utah and the rating agencies, a number of states have taken steps to better understand fiscal stress, though no state-specific analysis to date has addressed all three components in the Utah work: revenue shortfalls, countercyclical cost increases, and reserves in addition to traditional rainy day funds. In 2018, four states—Maine, Montana, New Mexico, and California—published reports contemplating preparedness for a recession.[2][3]

Maine economic and revenue forecasters estimated potential impacts of moderate and severe recessions on state sales and income taxes in relation to current levels in the Maine Maine Budget Stabilization Fund (Maine Consensus Economic Forecasting Commission and Revenue Forecasting Committee 2018).

Montana's legislative fiscal staff evaluated the likelihood and magnitude of a revenue downturn and assessed the availability of fiscal tools including and in addition to rainy day funds (Montana Legislative Fiscal Division 2018).

New Mexico revenue estimators produced revenue stress scenarios with varying oil price and production shocks (New Mexico Consensus Revenue Estimating Group 2018).

California's Legislative Analyst's Office analyzed current revenue and the potential size and impacts of a recession, and provided suggestions on how the legislature could respond (Taylor 2018).

More comprehensive work includes Moody's Stress-Testing States 2018 report, which considered the amount of fiscal stress to state budgets under different recession scenarios in relation to the amount of money states have in reserve accounts (White, Metcalfe and Crane 2018). Most recently, S&P used stress test methodologies to evaluate states' level of fiscal preparedness for another downturn and categorized states by risk: low, moderate, and elevated (Petek, et al. 2018).

Budget Stress Testing in Utah

Overview

The state of Utah has been using volatility analysis to inform rainy day fund policy for over a decade. In 2008, Utah's Legislature passed, and governor signed, legislation requiring the Governor's Office of Management and Budget (GOMB) and the Office of the Legislative Fiscal Analyst (LFA) to jointly produce a triennial report on revenue volatility and the adequacy of rainy day fund balances in relation to volatility (Utah 57th Legislature 2008). Acting on the reports' recommendations, the Legislature increased the reserve balance targets that trigger automatic deposits from revenue surpluses in 2008, 2011, and 2014 as revenue volatility grew.

In 2015, Utah budget analysts expanded upon the revenue volatility and optimal rainy day fund size analysis, evaluating the sufficiency of a broader set of reserves and other budget contingencies to cover recession-spurred revenue shortfalls and cost hikes, i.e., a state budget stress test. Analysts repeated the analysis in 2016, and in 2018, the state enacted legislation formally requiring LFA to complete a stress test every three years (Utah 62nd Legislature 2018).[4]

Like routine budget forecasting, Utah's budget stress exercises are a consensus endeavor between the executive and legislative branches and follow a similar sequence, encompassing four major steps:[5]

1. Defining the period of analysis and economic assumptions for stress scenarios.
2. Identifying and estimating the value at risk for both revenue and expenditures under stress scenarios.
3. Inventorying and categorizing reserves and other contingencies by ease of accessibility.
4. Comparing total value at risk to total contingencies to evaluate the sufficiency of these contingencies and overall resilience of the state budget.

The following sections describe each of these steps and document results for Utah's 2015 and 2016 stress tests. Both tests employed similar methods with several notable differences:

- Analysts derived economic scenarios for the state in 2015 and purchased a national forecaster's state scenarios in 2016.
- The 2015 test evaluated two economic scenarios: an adverse recession and a severely adverse recession; the 2016 test added a third scenario that contemplated a period of stagflation.
- The 2015 analysis addressed impacts over two and half fiscal years; the 2016 analysis expanded the scope to cover five full fiscal years.
- The 2016 work included pension cost impacts in addition to the public and higher education and Medicaid enrollment impacts analyzed in 2015.

Both stress tests evaluated the Education Fund and unrestricted General Fund revenues and expenditures. Utah's Education Fund comprises revenues from corporate and personal income taxes, which are constitutionally earmarked for public and higher education; the state sales tax and other general revenue streams make up the General Fund. Together, these funds are equivalent to most state's general funds.

Economic Scenarios: The Backbone of Utah's Budget Stress Tests

2015 Economic Assumptions: Regionalizing Federal Reserve Scenarios

In Utah's first budget stress testing exercise, analysts based Utah economic assumptions on the Federal Reserve's 2015 supervisory scenarios for hypothetical economic contractions. The Federal Reserve annually publishes three supervisory scenarios for the U.S. and global economy: baseline, adverse, and severely adverse. The 2015 scenarios, released in October 2014, include quarterly values for 28 variables between the fourth quarters of 2014 and 2017.

The adverse scenario contemplates a mild U.S. recession beginning in the fourth quarter of 2014 that lasts through the first half of 2015, with real GDP falling about 0.5 percent from its peak. This drop in economic activity is coupled with a sharp increase in core inflation as the headline CPI inflation rate rises to 4 percent by the second half of 2015. The severely adverse scenario covers substantial weakening in the global economy and a profound, prolonged U.S. recession between the fourth quarter of 2014 and end of 2015, with GDP shrinking 4.5 percent from its pre-recession peak. Inflation in this scenario rises quickly to 4.3 percent in the first quarter of the recession on account of high oil prices and then falls relatively rapidly to 1.1 percent by the recession's end (Board of Governors of the Federal Reserve System 2014).

Figure 1 shows the trajectories of U.S. GDP in the 2015 Federal Reserve scenarios. See Appendix Tables 3 and 4 for a full accounting of all variables.

Utah analysts used REMI PI+ to derive Utah-specific economic indicators consistent with the national Federal Reserve scenarios. REMI PI+ is a dynamic, multi-regional simulation model that integrates input-output relationships, general equilibrium effects, econometric relationships, and economic geography effects (Regional Economic Models, Inc. 2015).[6] The model estimates the total regional effects of a user-defined exogenous shock. In this case, analysts entered the exogenous shock as a decrease in U.S. GDP and an increase in the U.S. unemployment rate, with REMI simultaneously estimating Utah-specific economic and demographic effects.

Gardner analysts recreated the REMI analysis, converting the 2015 Federal Reserve GDP and unemployment rate assumptions

Figure 1. U.S. Real GDP Growth, 2015 Dodd-Frank Act Stress Test Supervisory Scenarios

Chained 2009 $: Actual Q1 2001–Q3 2014;
Scenario Q4 2014–Q4 2017
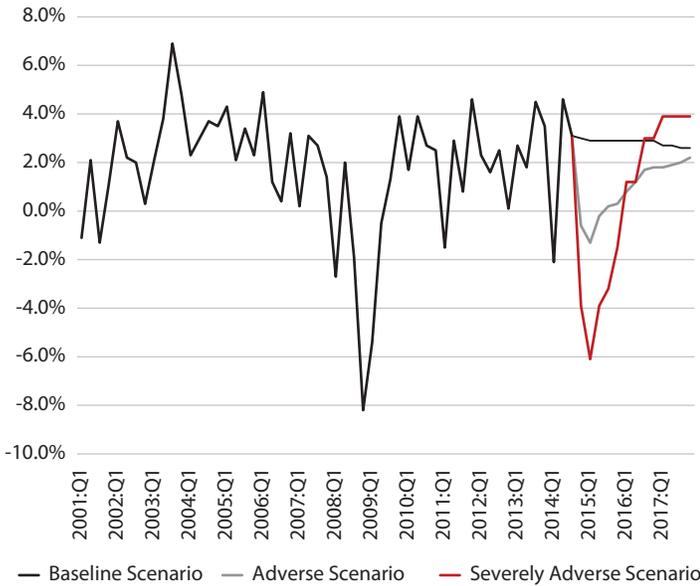
Source: Board of Governors of the Federal Reserve System

Figure 2. Utah and U.S. Real GDP Growth, 2015 Utah Budget Stress Test Scenarios

Chained 2009 $
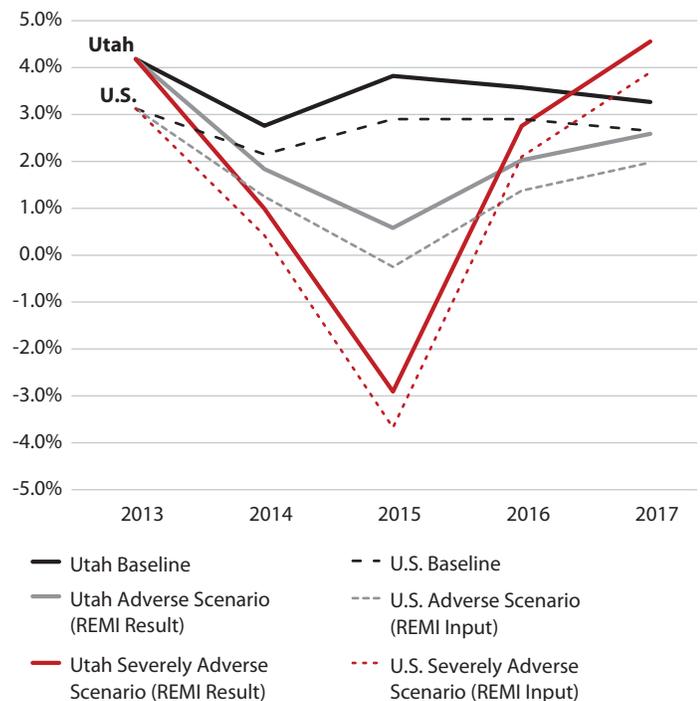
Source: Kem C. Gardner Policy Institute analysis of Board of Governors of the Federal Reserve System data using REMI PI+ Version 1.7 State of Utah Build 4111 Model

Figure 3. Utah and U.S. Unemployment Rates, 2015 Utah Budget Stress Test Scenarios
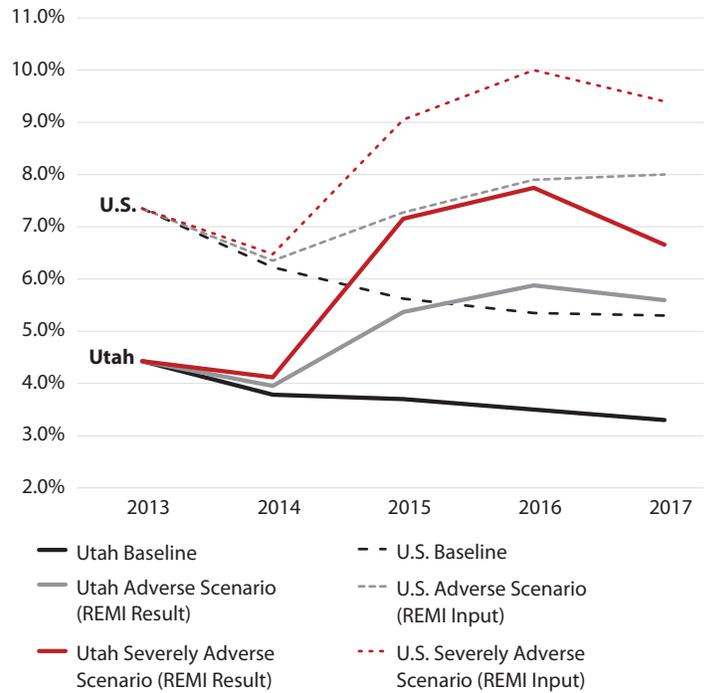
Note: Vertical axis does not include zero.
Source: Kem C. Gardner Policy Institute analysis of Board of Governors of the Federal Reserve System and Revenue Assumptions Working Group data using REMI PI+ Version 1.7 State of Utah Build 4111 Model

Figure 4. Utah and U.S. Unemployment Rates

Q4 2007 Peak, Q2 2009 Trough, Last Recession
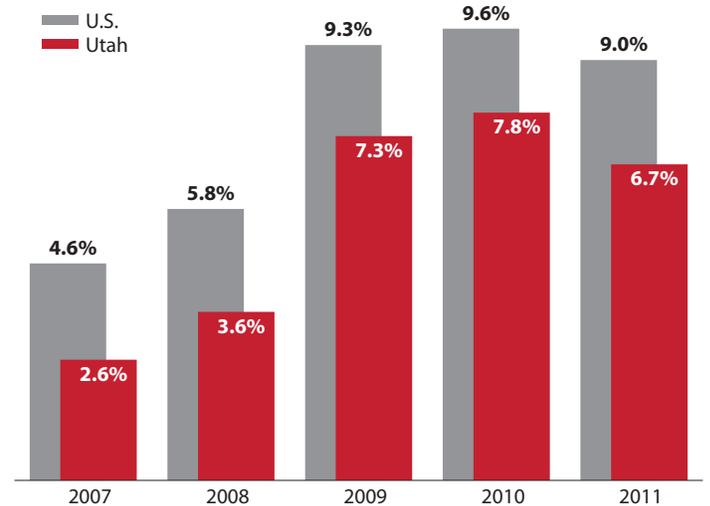
Source: U.S. Bureau of Labor Statistics

Table 1. 2015 Utah Budget Stress Test Economic Assumptions

Indicators	Baseline			Adverse Scenario			Severely Adverse Scenario		
	2015	2016	2017	2015	2016	2017	2015	2016	2017
REMI Model Results									
Utah Employment (thousands)	1,364.7	1,399.5	1,441.5	1,318.4	1,317.3	1,341.2	1,286.5	1,270.2	1,315.1
Utah Total Wages (millions)	$67,760	$71,450	$75,357	$66,364	$68,549	$70,836	$64,373	$65,807	$67,648
Utah Personal Income (millions)	$117,094	$123,119	$129,275	$113,007	$115,646	$119,890	$110,209	$111,410	$117,433
Utah Personal Consumption Expenditures (millions)	$11,653	$11,998	$12,292	$11,474	$11,630	$11,729	$11,129	$11,223	$11,260
Utah Population (thousands)	2,987.70	3,032.60	3,084.15	2,984.11	3,024.72	3,071.51	2,982.02	3,020.77	3,067.19
Utah Population Natural Growth (thousands)	36.2	36.7	37.1	36.0	36.3	36.4	35.9	36.0	35.8
Utah Employment to Population Ratio	0.62	0.62	0.61	0.60	0.60	0.60	0.58	0.58	0.58
2015 Dodd-Frank Act Stress Test Supervisory Scenarios									
Dow Jones Total Stock Market Index	21,327	22,454	23,651	17,360	15,337	14,868	10,016	10,174	14,723
IHS Markit U.S. Economic Outlook									
Oil Prices	$44.00	$43.00	$40.00	$32.56	$29.24	$38.00	$32.14	$28.30	$36.86

Source: Utah Office of the Legislative Fiscal Analyst

from quarterly to annual data and then entering them into the model's Macroeconomic Update module. Figures 2 and 3 show both REMI inputs and results for the macroeconomic update variables.[7] For both scenarios, Utah's impacts are consistent in timing with the national impacts, with Utah performing somewhat better than the nation. These results are consistent with historical trends in the relationship between the U.S. and Utah economies, as illustrated in Figure 4.

REMI PI+ produces estimates for numerous economic and demographic indicators through the year 2060. After modeling the adverse and severely adverse scenarios, Utah analysts calibrated the REMI outputs with consensus Revenue Assumptions Working Group (RAWG) indicators by applying the percent difference between the REMI baseline and REMI scenario result to the RAWG baseline for each variable.[8]

Table 1 presents the selected results that underpin Utah's 2015 stress test. In addition to REMI results, analysts used the Federal Reserve's scenarios for the stock market index and IHS Markit estimates of oil prices.[9]

2016 Economic Assumptions: Purchasing Regional Scenarios

Utah analysts purchased Moody's Analytics' regional forecast service for the 2016 stress test economic assumptions. In addition to the baseline Utah forecast and eight accompanying alternative scenarios, Moody's also produces regional scenarios that are consistent with the Federal Reserve's current adverse and severely adverse supervisory scenarios. Like the previous year's analysis, the 2016 analysis utilized these adverse and severely adverse scenarios. Analysts also developed a stress test scenario based on Moody's Stagflation Scenario.

Figure 5 illustrates the major U.S. economic indicators associated with the Moody's Utah scenarios. Both 2016 Federal Reserve scenarios envision longer and deeper recessions than their 2015 counterparts. The 2016 adverse scenario portrays

a moderate U.S. recession beginning in the first quarter of 2016 and ending by the first quarter of 2017, with real GDP contracting 1.75 percent from its pre-recession peak. Contrary to the 2015 adverse scenario, the recession in the 2016 scenario is paired with slight deflation. The 2016 severely adverse scenario models a severe global recession with a sharp 6.25 percent drop in real GDP over five quarters beginning with the first quarter of 2016. Also contrary to the related 2015 scenario, which included relatively strong inflation, this scenario features subdued inflation (Board of Governors of the Federal Reserve System 2016). The stagflation scenario combines a depression in GDP similar in severity to the adverse scenario but with more abrupt changes in inflation and unemployment, followed by a stronger recovery (Moody's Analytics 2016).

Table 2 presents the Utah-specific economic assumptions from the Moody's scenarios that analysts used to estimate budget values at risk in 2016. The 2016 analysis covers a total of five years, two years longer than in the 2015 analysis, to include the lagged effects of a recession on public education enrollment and pensions.[10]

Discussion of Different Methodologies for Economic Assumptions

Results

Both Utah's 2015 and 2016 methods for deriving economic assumptions produced sets of indicators that were internally consistent and sufficient as inputs for analyzing budget impacts. Varying degrees of national recessions underpinned the 2015 and 2016 assumptions, an appropriate approach given the fact that the distribution of economic activity in Utah closely resembles that of the United States. We cannot directly compare the Utah indicators in each analysis as the underlying national forecasts vary. However, both the REMI results and Moody's forecasts reasonably reflect the relationship between U.S. and Utah economies. Purchasing Utah-specific forecasts

Figure 5. U.S. Real GDP Growth, Inflation, and Unemployment, Moody's Analytics Scenarios
Actual Q1 2015 – Q2 2016; Scenario Q3 2016 – Q4 2022
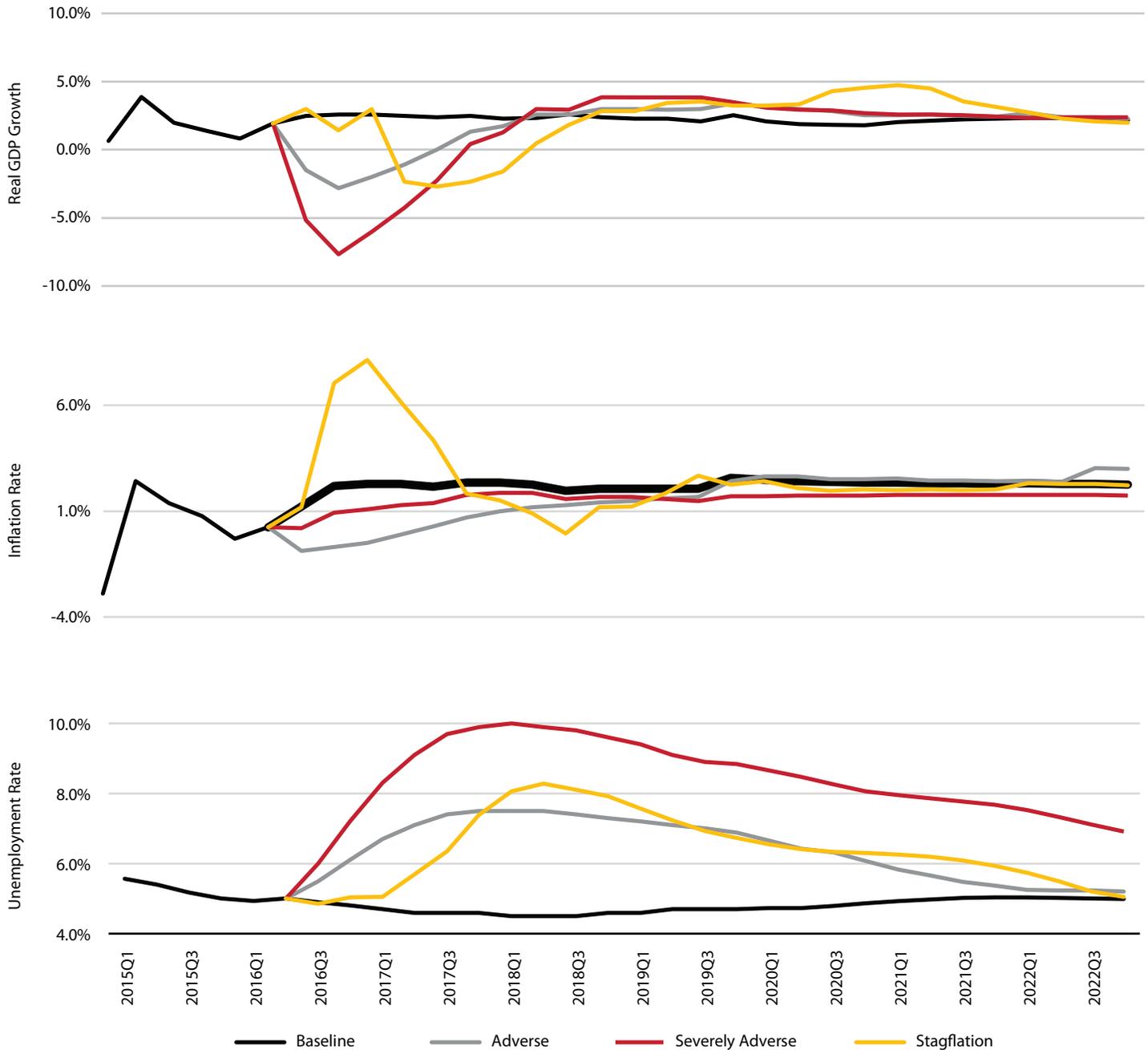
Source: Moody's Analytics

from Moody's in 2016 did allow analysts more flexibility in defining scopes of stress, while maintaining the option to use assumptions consistent with Federal Reserve scenarios.

Cost

An advantage of using the REMI model to regionalize the Federal Reserve scenarios in 2015 was that the state did not have to invest any additional resources to complete the analysis. The state did make a significant upfront investment for model construction over a decade ago and currently pays an annual maintenance fee.[11]

Period of Analysis

Neither method constrained specification of the period of analysis; like the Moody's forecasts, REMI outputs cover many years into the future. A benefit of the purchased scenarios over the REMI analysis is the availability of quarterly measures (REMI results are annual), which is helpful for fiscal year analyses.

Currency and Calibration

REMI updates its model on an annual basis, and therefore its results must be calibrated to the current economic situation as well as more recent baseline expectations. This calibration was

Table 2. 2016 Utah Budget Stress Test Economic Assumptions

Indicators	Baseline Scenario					Adverse Scenario				
	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Moody's Analytics Utah Forecast										
Utah Employment (thousands)	1,450.6	1,468.0	1,479.6	1,488.8	1,496.7	1,375.0	1,392.2	1,423.4	1,456.9	1,483.2
Utah Unemployment Rate	2.6	2.4	2.4	2.5	2.7	6.0	5.6	5.0	4.0	3.1
Utah Total Wages (millions)	$73,823	$77,955	$82,319	$86,267	$90,036	$66,882	$67,804	$69,467	$72,856	$76,082
Utah Personal Income (millions)	$133,246	$140,926	$148,666	$155,493	$162,555	$123,210	$127,744	$133,811	$141,382	$147,388
Utah Retail Sales (millions)	$59,701	$63,258	$66,647	$69,872	$73,084	$54,198	$57,599	$61,507	$65,484	$69,066
Utah Population (thousands)	3,112	3,159	3,207	3,254	3,300	3,112	3,159	3,207	3,254	3,300
Utah Births (thousands)	13.2	13.3	13.4	13.5	13.6	13.2	13.3	13.4	13.5	13.6
Utah Population Aged 5 to 19 (thousands)	777.8	779.7	774.6	771.4	769.6	777.8	779.7	774.6	771.4	769.6
Utah Population Aged 25 to 44 (thousands)	621.5	630.0	639.9	651.2	663.9	621.5	630.0	639.9	651.2	663.9
Utah Population Aged 45 to 64 (thousands)	906.8	919.9	932.0	943.5	954.4	906.8	919.9	932.0	943.5	954.4
Utah Population Aged 65 and Over (thousands)	342.9	357.8	373.2	388.7	404.3	342.9	357.8	373.2	388.7	404.3
Dow Jones Total Stock Market Index	24,009	25,184	26,238	27,999	28,653	17,034	19,785	22,155	24,371	24,958
S&P 500 Price Earnings Ratio	21.63	22.72	23.58	24.17	24.41	19.23	22.14	23.47	23.75	23.77
Oil Prices	$136.19	$148.19	$153.76	$174.51	$180.67	$130.68	$145.21	$157.19	$176.29	$182.38

Indicators	Severely Adverse Scenario					Stagflation Scenario				
	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Moody's Analytics Utah Forecast										
Utah Employment (thousands)	1,328.1	1,338.3	1,362.7	1,387.6	1,412.4	1,378.7	1,369.4	1,396.6	1,439.6	1,451.7
Utah Unemployment Rate	8.9	8.3	7.3	6.3	5.8	6.1	6.4	4.7	4.2	4.1
Utah Total Wages (millions)	$64,344	$66,412	$70,652	$75,314	$79,243	$69,462	$71,745	$77,124	$84,549	$86,422
Utah Personal Income (millions)	$118,433	$123,624	$130,730	$138,957	$146,807	$126,600	$132,209	$140,959	$152,890	$155,975
Utah Retail Sales (millions)	$52,919	$56,737	$61,415	$65,850	$70,144	$58,193	$60,228	$64,656	$69,385	$70,560
Utah Population (thousands)	3,112	3,159	3,207	3,254	3,300	3,108	3,153	3,199	3,245	3,256
Utah Births (thousands)	13.2	13.3	13.4	13.5	13.6	13.2	13.3	13.4	13.5	13.6
Utah Population Aged 5 to 19 (thousands)	777.8	779.7	774.6	771.4	769.6	776.7	778.3	772.7	769.2	768.5
Utah Population Aged 25 to 44 (thousands)	621.5	630.0	639.9	651.2	663.9	620.7	628.8	638.4	649.3	652.2
Utah Population Aged 45 to 64 (thousands)	906.8	919.9	932.0	943.5	954.4	905.6	918.1	929.7	940.8	943.6
Utah Population Aged 65 and Over (thousands)	342.9	357.8	373.2	388.7	404.3	342.4	357.1	372.3	387.6	391.4
Dow Jones Total Stock Market Index	12,874	19,096	24,509	26,950	27,345	17,938	17,245	19,516	23,667	27,171
S&P 500 Price Earnings Ratio	17.74	26.51	31.96	32.64	32.48	18.97	20.83	23.14	24.76	25.02
Oil Prices	$128.25	$146.01	$149.65	$174.61	$178.18	$262.37	$186.83	$175.11	$192.74	$220.43

Source: Moody's Analytics

not difficult for Utah analysts as the RAWG had already defined these expectations. Because Moody's updates its forecasts on a monthly basis, the baseline incorporates the most recent state of the regional and national economies.

Alternatives

Alternatives to the methods employed in 2015 and 2016 include purchasing some other firm's state forecasts, regionalizing some other national forecasts, and using the state's RAWG. At least one other national forecasting firm produces state economic forecasts and alternative planning scenarios, IHS Markit, formally IHS Global Insight; Utah currently subscribes to IHS's U.S. Macroeconomic forecasting service.[12]

One of the advantages of purchasing the Moody's regional forecasts was that analysts had the option to develop stress tests for more than just the economic scenarios defined by the Federal Reserve. Analysts could have similar options by using REMI to regionalize national forecast planning scenarios developed by firms like IHS and Moody's. Finally, given that the set of variables necessary for the revenue and expenditure analyses is relatively limited, Utah could also ask its RAWG to develop scenario assumptions based on some given U.S. scenario.

Minding the [Hypothetical Budget] Gap: Estimating Value at Risk

Once Utah analysts defined scopes of stress and Utah economic assumptions for the stress scenarios, they were able to model budget value at risk. The value at risk is the potential budget gap that could occur on account of declines in state revenue and increases in costs for counter-cyclical government services. Analysts evaluated the state's Education Fund and unrestricted General Fund budgets, referred to jointly as the State Fund Budget.[13]

The revenue value at risk is a consensus between LFA, GOMB, and Utah's Tax Commission; the expenditure value at risk is a consensus between LFA and GOMB. Each entity independently modeled the components and then met to agree on estimates, typically the mean of independent results.

In both the 2015 and 2016 tests, analysts employed time-series methods with 15 years of historical data, using lags of dependent variables and economic drivers. The difference in results between the tests is not due to changes in approach to economic forecasts or estimation methods but rather due to the differences in severity of stresses and number of years assessed.

The 2015 test covered impacts between FY 2015 and 2017; the 2016 test covered impacts between FY 2017 and FY 2021.

Revenue at Risk

To assess revenue at risk, analysts used the economic variables shown in Table 3 to model the impacts of the various stress scenarios on revenue. They estimated the impacts separately for each major revenue source – sales tax, personal income tax, and corporate income tax. Together, these sources account for over 90 percent of all revenue (see Figure 6). The remainder of revenues, including sources like severance and tobacco taxes, were treated as one source.

Figures 7 and 8 present the state fund revenue scenarios. In both years' analyses, the baseline is equal to the revenue estimates adopted in the previous general session, with revenue outside of the session's budget window held constant. The 2015 test's baseline is adopted FY 2015 and FY 2016 revenue, with FY 2017 revenue equal to the FY 2016 estimate; the 2016 test's baseline is adopted FY 2017 and FY 2018 revenue, with FY 2019 – FY 2021 revenue equal to the FY 2018 estimate.

The 2015 test includes a trough for both scenarios but does not include enough years to show a full recovery. With additional years of analysis, the 2016 test captures troughs and recovery past baseline for all scenarios. Tables 4 and 5 show the timing and magnitude of the troughs for each scenario.

Table 3. Economic Drivers of Revenue at Risk Estimates

Economic Drivers	Sales Tax	Personal Income Tax	Corporate Income Tax	All Other Revenue
2015 Analysis				
Utah Employment	■			■
Utah Personal Income	■	■		■
Utah Personal Consumption Expenditures	■			
Utah Population		■		■
Dow Jones Total Stock Market Index		■	■	
Oil Prices				■
2016 Analysis				
Utah Employment	■			■
Utah Personal Income	■	■		■
Utah Retail Sales	■			
Utah Population		■		■
Dow Jones Total Stock Market Index			■	
S&P 500 Price Earnings Ratio			■	
Oil Prices				■

Source: Utah Office of the Legislative Fiscal Analyst

Figure 6. Share of General Fund/Education Fund Revenues
FY 2016

- Unrestricted Sales and Use Tax — 30%
- All Other Revenue — 8%
- Corporate Income Tax — 6%
- Individual Income Tax — 56%
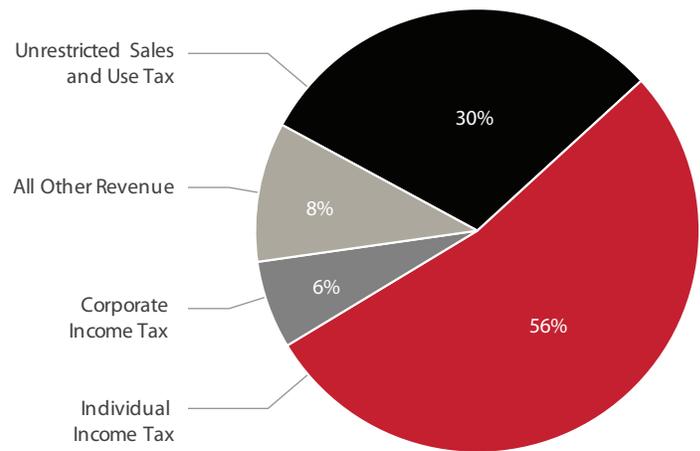
Source: Utah State Tax Commission

Figure 7. State Fund Revenue Scenarios, 2015
$ Millions: Actual FY 2007 – FY 2014; Scenario FY 2015 – FY 2017
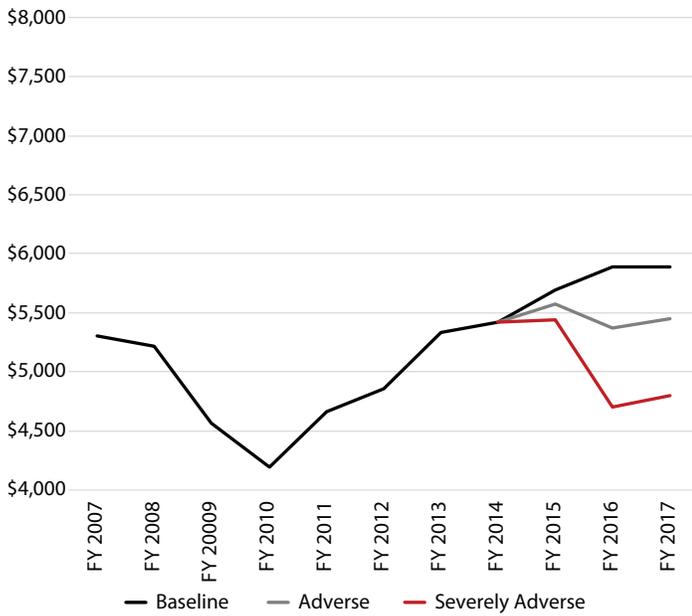
Source: Utah Office of the Legislative Fiscal Analyst

Figure 8. State Fund Revenue Scenarios, 2016
$ Millions: Actual FY 2011 – FY 2016; Scenario FY 2017 – FY 2021
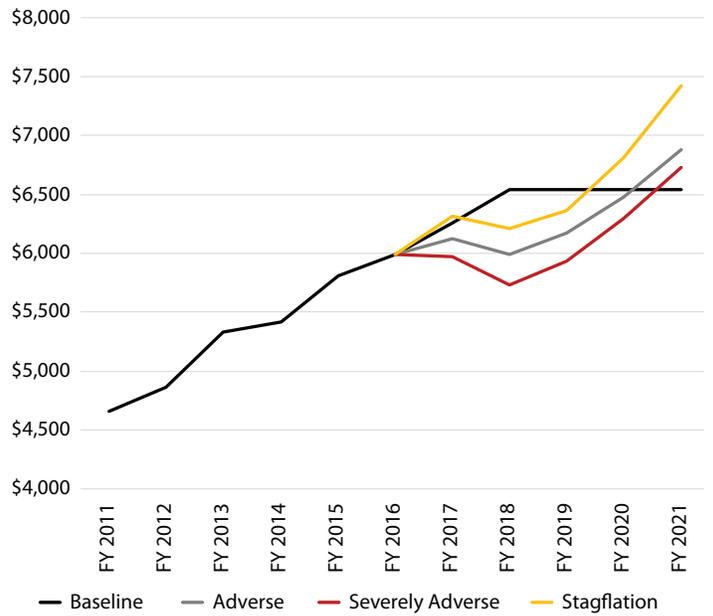
Source: Utah Office of the Legislative Fiscal Analyst

Table 4. 2015 Revenue Declines Through Peak/Trough

Scenario	Trough	% Change from FY 2015 Peak
Adverse	FY 2016	-3.6%
Severely Adverse	FY 2016	-13.6%

Source: Kem C. Gardner Policy Institute analysis of Utah Office of the Legislative Fiscal Analyst data

Table 5. 2016 Revenue Declines Through Peak/Trough

Scenario	Trough	% Change from FY 2017 Peak
Adverse	FY 2018	-2.2%
Severely Adverse	FY 2018	-4.0%
Stagflation	FY 2018	-1.6%

Source: Kem C. Gardner Policy Institute analysis of Utah Office of the Legislative Fiscal Analyst data

Table 6. State Fund Revenue at Risk, 2015
Difference between baseline and scenarios as a percent of FY 16 State Fund appropriations

Scenario	FY 2015	FY 2016	FY 2017	Total
Adverse Scenario				
Sales Tax	-0.9%	-2.2%	-1.8%	-5.0%
Personal Income Tax	-0.6%	-4.7%	-4.0%	-9.2%
Corporate Income Tax	-0.4%	-1.3%	-1.4%	-3.2%
All Other Revenue	-0.1%	-0.1%	0.3%	0.2%
Total Adverse Scenario	**-2.0%**	**-8.2%**	**-6.9%**	**-17.1%**
Severely Adverse Scenario				
Sales Tax	-1.8%	-4.2%	-4.1%	-10.2%
Personal Income Tax	-1.4%	-8.7%	-8.4%	-18.5%
Corporate Income Tax	-0.6%	-2.5%	-1.8%	-4.9%
All Other Revenue	-0.3%	-0.5%	0.0%	-0.7%
Total Severely Adverse Scenario	**-4.1%**	**-15.8%**	**-14.3%**	**-34.3%**

Source: Kem C. Gardner Policy Institute analysis of Utah Office of the Legislative Fiscal Analyst data

Tables 6 and 7 summarize the revenue shortfalls, or value at risk, as a percent of appropriations under each scenario.[14] The cumulative revenue value at risk in the 2015 test was just over 17 percent of annual appropriations in the adverse scenario, and over a third, 34.4 percent, of appropriations in the severely adverse scenario. In 2016, revenues were higher than the baseline in all of the scenarios by the final year, resulting in smaller, but still significant cumulative values at risk: 11.9 percent of appropriations under the adverse scenario and 27.5 percent under the severely adverse scenario. Under the stagflation scenario, the state would collect more revenue in total over the assessment period; while revenue is falling through the third year, the cumulative value at risk in this scenario was equivalent to 6.9 percent of appropriations.

**Table 7. State Fund Revenue at Risk, 2016**
Difference between baseline and scenarios as a percent of FY 17 State Fund appropriations

Scenario	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	Total
Adverse Scenario						
Sales Tax	0.0%	-2.5%	-1.9%	0.7%	1.1%	-2.7%
Personal Income Tax	-1.6%	-4.8%	-3.0%	-1.6%	3.5%	-7.6%
Corporate Income Tax	-0.2%	-0.5%	-0.2%	-0.7%	0.6%	-0.8%
All Other Revenue	-0.2%	-0.7%	-0.6%	0.6%	0.1%	-0.9%
Total Adverse Scenario	**-2.0%**	**-8.5%**	**-5.7%**	**-1.0%**	**5.3%**	**-11.9%**
Severely Adverse Scenario						
Sales Tax	-1.3%	-3.7%	-3.0%	-2.0%	0.5%	-9.5%
Personal Income Tax	-2.5%	-7.2%	-5.1%	-1.3%	2.0%	-14.0%
Corporate Income Tax	-0.4%	-0.7%	-0.4%	0.3%	0.4%	-0.7%
All Other Revenue	-0.4%	-1.0%	-0.9%	-0.9%	0.0%	-3.2%
Total Severely Adverse Scenario	**-4.5%**	**-12.6%**	**-9.5%**	**-3.9%**	**2.9%**	**-27.5%**
Stagflation Scenario						
Sales Tax	0.3%	-1.5%	-1.4%	1.0%	3.5%	1.9%
Personal Income Tax	0.5%	-2.9%	-0.9%	2.7%	8.4%	7.8%
Corporate Income Tax	0.0%	-0.3%	0.2%	0.4%	1.1%	1.4%
All Other Revenue	0.1%	-0.4%	-0.6%	0.2%	0.8%	0.0%
Total Severely Adverse Scenario	**0.9%**	**-5.1%**	**-2.7%**	**4.2%**	**13.7%**	**11.1%**

Source: Kem C. Gardner Policy Institute analysis of Utah Office of the Legislative Fiscal Analyst data

Figure 9. Medicaid Enrollment
Persons
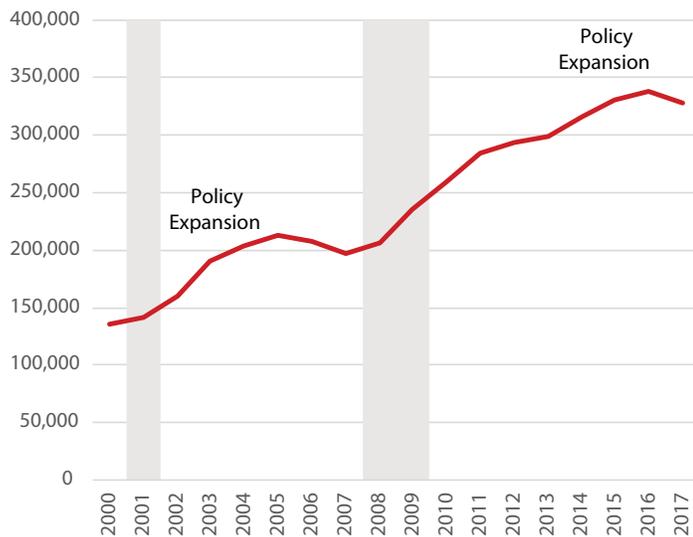
Note: Gray bars indicate a recession. Includes children and adults. Medicaid enrollment data represents the averave annual count of persons receiving benefits on the third working day of each month.
Source: Utah Office of the Legislative Fiscal Analyst

Figure 10. Higher Education Enrollment
Fall Third-week Headcount
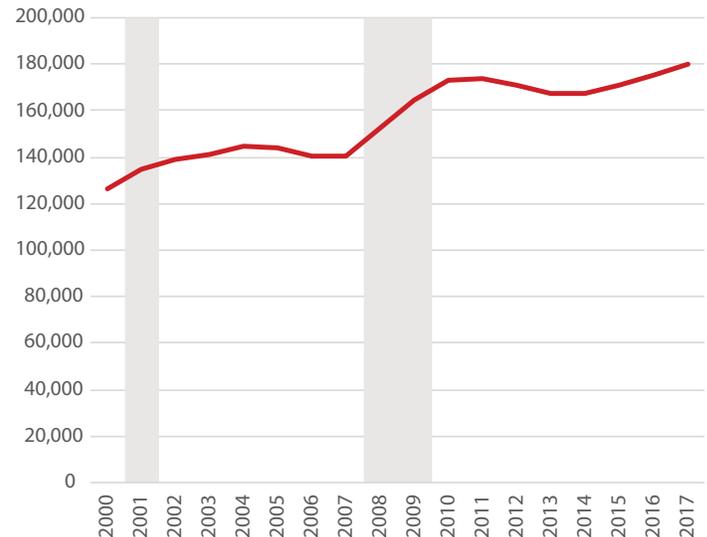
Note: Gray bars indicate a recession. Includes the number of students at institutions in the Utah System of Higher Education (fall semester, third week). The year represents the calendar year of fall semester, e.g. Fall 2000 is from the 2000-2001 academic year.
Source: Utah System of Higher Education

Expenditures at Risk

After estimating revenue value at risk, analysts moved on to the other side of the balance sheet to model expenditure value at risk. As a first step, they identified those major state programs which are counter-cyclical – Medicaid, higher education, and public pensions. Figures 9 through 11 show this counter-cyclical nature. They also chose to include public education in the analysis, as growth in enrollment is continually a significant cost driver. Together, these programs account for 70 percent of all ongoing annual expenditures (see Figure 12).[15] Modeling these programs and not others results in a budget stress test that addresses the state's ability to fund counter-cyclical and public education growth and maintain current service levels for all other programs.

Figure 11. Pension Contribution Rates
Noncontributory Retirement System
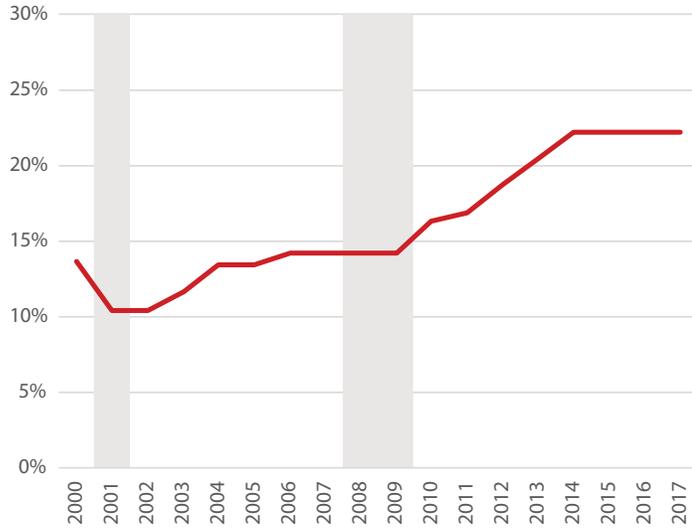
Note: Gray bars indicate a recession. Pension system earnings and losses used to calculate the contribution rate are smoothed over a period of five years; therefore the full impact does not materialize until several years after a recession.
Source: Utah Retirement Systems

Figure 12. Share of General Fund/Education Fund Expenditures
FY 2016
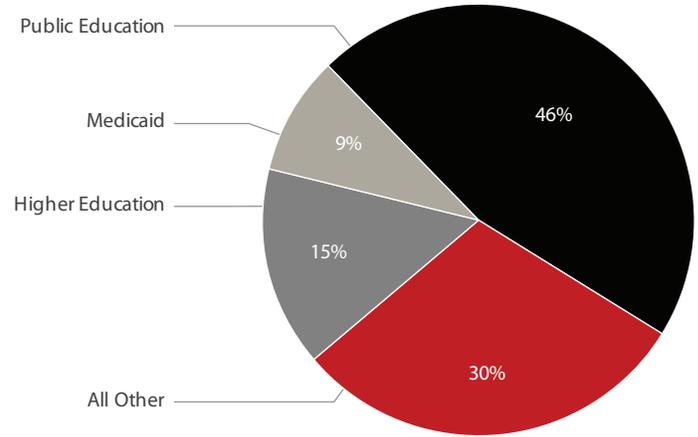
Note: Shares of public education and higher education only include the components reviewed in the analysis; i.e. for public education it includes administration, minimum school program, and the school building program and for higher education it includes administration, colleges and universities, and applied technical colleges.
Source: Utah Office of the Legislative Fiscal Analyst

Figure 13. State Fund Expenditure Scenarios, 2015
$ Millions: Actual FY 2007 – FY 2014; Scenario FY 2015 – FY 2017
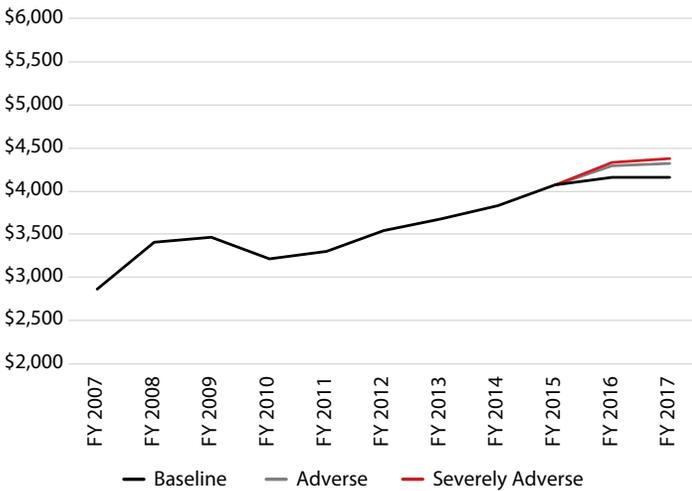
Source: Utah Office of the Legislative Fiscal Analyst

Figure 14. State Fund Expenditure Scenarios, 2016
$ Millions: Actual FY 2011 – FY 2016; Scenario FY 2017 – FY 2021
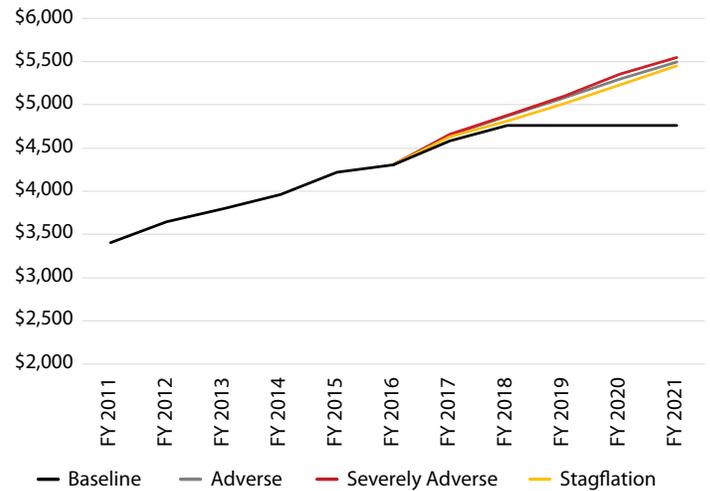
Source: Utah Office of the Legislative Fiscal Analyst

Figures 13 and 14 present the state fund expenditures scenarios. Like the revenue analysis, the 2015 test's expenditure baseline reflects FY 2016 appropriations, with FY 2017 costs equal to FY 2016 appropriations; the 2016 test's baseline reflects FY 2017 and FY 2018 appropriations, with FY 2019 – FY 2021 costs equal to FY 2018 appropriations.[16 17]

In the cases of Medicaid, higher education, and public education, analysts used the variables listed in Table 8 to estimate enrollment impacts. They then multiplied these impacts by constant per capita costs, derived from the current appropriated budget.[18] The Utah Retirement System smooths

net earnings over five years to set pension contribution rates (GRS Consulting 2017). Therefore, analysts assumed impacts to the rates would be minimal in the 2015 analysis's limited timeframe and did not model them.

Tables 9 and 10 summarize the cost increases, or value at risk, associated with each scenario as a percent of appropriations.[19] The cumulative expenditure value at risk in the 2015 test was 4.6 percent of annual appropriations in the adverse scenario, and 6.2 percent of appropriations in the severely adverse scenario. In 2016, revenues recovered in all scenarios by the end of the period of analysis, but expenditures do not return to

Table 8. Economic Drivers of Expenditures at Risk Estimates

Economic Drivers	Medicaid Enrollment	Higher Ed. Enrollment	Pension Costs	Public Ed. Enrollment
2015 Analysis				
Utah Personal Income		■		
Utah Population Natural Growth				■
Utah Employment to Population Ratio	■			
2016 Analysis				
Utah Employment		■		
Utah Unemployment Rate	■	■		
Utah Personal Income		■		
Utah Births				■
Utah Population Aged 5 to 19	■			
Utah Population Aged 25 to 44	■			
Utah Population Aged 45 to 64	■			
Utah Population Aged 65 and Over	■			
Dow Jones Total Stock Market Index			■	
S&P 500 Price Earnings Ratio			■	

Source: Utah Office of the Legislative Fiscal Analyst

Table 9. Expenditures at Risk, 2015

Difference between baseline and scenarios as a percent of FY 16 State Fund appropriations

Scenario	2016	2017	Total
Adverse			
Medicaid	0.8%	0.9%	1.7%
Public Education	0.7%	0.7%	1.4%
Higher Education	0.6%	0.9%	1.5%
Total Adverse Scenario	**2.1%**	**2.6%**	**4.6%**
Severely Adverse			
Medicaid	1.0%	1.3%	2.3%
Public Education	0.7%	0.7%	1.4%
Higher Education	1.0%	1.4%	2.5%
Total Severely Adverse Scenario	**2.8%**	**3.5%**	**6.2%**

Source: Kem C. Gardner Policy Institute analysis of Utah Office of the Legislative Fiscal Analyst data

baseline levels. In the cases of public and higher education, this result is predominantly influenced by general population growth than extended recession impacts. In the cases of Medicaid and pensions, the result is influenced by lagging recession impacts. The cumulative expenditures at risk for all 2016 scenarios exceeded 20 percent of annual appropriations – 27.4 percent under the adverse scenario, 29.8 percent under the severely adverse scenario, and 23.6 percent under the stagflation scenario.

Table 10. Expenditures at Risk, 2016

Difference between baseline and scenarios as a percent of FY 17 State Fund appropriations

Scenario	2017	2018	2019	2020	2021	Total
Adverse Scenario						
Medicaid	0.5%	0.7%	1.2%	1.8%	2.2%	6.3%
Public Education	0.0%	0.0%	1.7%	3.2%	4.7%	9.6%
Higher Education	0.5%	0.9%	1.7%	2.9%	3.6%	9.6%
Retirement	0.0%	0.0%	0.3%	0.6%	0.9%	1.8%
Total Adverse Scenario	**1.0%**	**1.6%**	**4.9%**	**8.5%**	**11.4%**	**27.4%**
Severely Adverse Scenario						
Medicaid	0.6%	0.8%	1.4%	2.2%	2.6%	7.6%
Public Education	0.0%	0.0%	1.7%	3.2%	4.7%	9.6%
Higher Education	0.5%	1.0%	1.9%	3.4%	4.2%	11.0%
Retirement	0.0%	0.1%	0.3%	0.5%	0.8%	1.6%
Total Severely Adverse Scenario	**1.1%**	**1.9%**	**5.3%**	**9.3%**	**12.3%**	**29.8%**
Stagflation Scenario						
Medicaid	0.4%	0.5%	0.9%	1.4%	1.8%	5.1%
Public Education	0.0%	0.0%	1.7%	3.2%	4.7%	9.6%
Higher Education	0.3%	0.3%	1.1%	2.2%	3.5%	7.5%
Retirement	0.0%	0.0%	0.2%	0.4%	0.7%	1.3%
Total Stagflation Scenario	**0.7%**	**0.8%**	**4.0%**	**7.3%**	**10.8%**	**23.6%**

Source: Kem C. Gardner Policy Institute analysis of Utah Office of the Legislative Fiscal Analyst data

Total Value at Risk

In the final step of modeling value at risk, analysts added revenue and expenditure risk results together to derive the total budget gap that could result from each of the stress scenarios. Figure 15 show these gaps. In the 2015 test, the cumulative total value at risk was equivalent to 21.8 percent of annual appropriations under the adverse scenario and 40.5 percent of appropriations under the severely adverse scenario. With more years in the 2016 evaluation, the revenue value at risk was lower across all scenarios because the analysis included the recovery. By extending the time frame, we see the positive gains when looking at the value at risk (this is in part to the baseline for revenue being kept constant). Higher expenditure values at risk offset the lower revenue risk with total value at risk equivalent to 39.3 percent of appropriations under the adverse scenario and 57.3 percent of appropriations under the severely adverse scenario. Under the stagflation scenario, revenues that exceed baseline expectations significantly offset cost increases, leading to a substantially lower value at risk equivalent to 12.5 percent of annual appropriations.

It Will Take More than Rainy Day Funds: Identifying Reserves and Other Contingencies

The last major component of Utah's budget stress test is an inventory of tools available to address increased service demand and simultaneous revenue loss. These tools include financial buffers – like formal rainy day funds – but also encompass policy changes like budget cuts and tax hikes. Collectively, the tools can be viewed as a government's financial contingency plan. The budget stress test evaluates the size of these contingencies to total value at risk to measure preparedness for an economic downturn.

Utah's Fiscal Sustainability Toolkit

Utah analysts began their contingency plan assessment by reviewing how policymakers closed budget gaps that resulted from the 2001 and 2008 recessions. For each fiscal year in which a historical budget gap was identified, LFA had documented in its Appropriations Reports how those shortfalls were addressed. Building on that documentation, the team researched other intentional buffers established in rule or law and contemplated informal contingencies that might be used in a similar manner. The resulting inventory of contingencies formed a fiscal sustainability toolkit, of sorts.

Analysts identified seven types of contingencies in this toolkit:

1. **Temporal balance:** matching ongoing expectations with more reliable revenue sources and using one-time windfalls for spending of limited scope.

2. **Cashflow management:** previous-year revenue collections carried into a succeeding fiscal year and budgeted for expenditure there.

3. **Spending reductions:** projects that can be delayed or lower-impact programs that can be eliminated or reduced.

Figure 15. Total Value at Risk, 2015 and 2016
3-year cumulative total as a percent of FY 16 State Fund appropriations, 2015; and 5-year cumulative total as a percent of FY 2017 State Fund appropriations, 2016
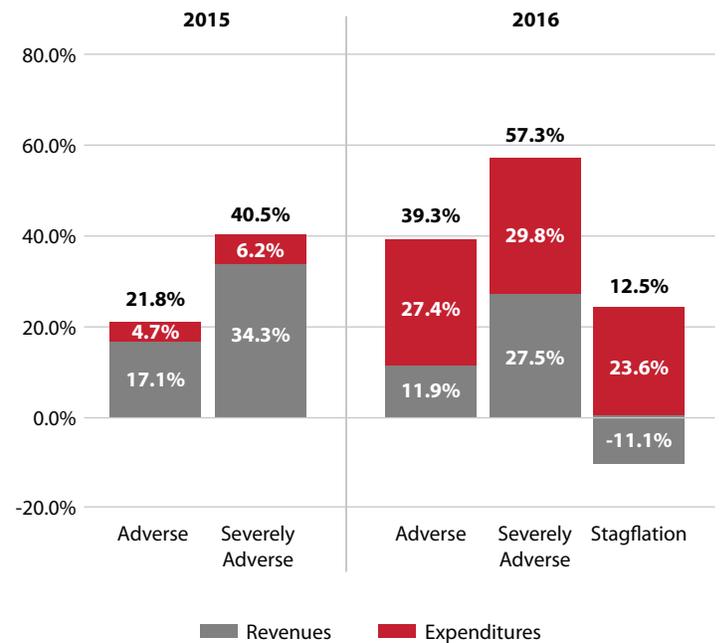
Source: Kem C. Gardner Policy Institute analysis of Utah Office of the Legislative Fiscal Analyst data

4. **Working rainy day funds:** ongoing cash invested in infrastructure that can be replaced with debt financing for which a state has reserved capacity.[19]

5. **Operating reserves:** unspent program balances, restricted account balances, spending triggers, and buffers that can be easily accessed.

6. **Revenue enhancements:** raising taxes or fees in areas with relatively inelastic demand functions (vehicle registration, property taxes, "sin" taxes).

7. **Formal budget reserves:** rainy day funds that can only be accessed when a state is in deficit.

In addition to identifying different types of contingencies in their review, analysts noticed budget decision makers exhibited different appetites for using the contingencies, based on the severity and volatility of the situation. As shown in Figure 16, when volatility is low, value at risk is also low, and Utah politicians are less likely to spend their savings, cut programs, or raise citizens' taxes. However, as severity and volatility (horizontal axis) and value at risk (vertical axis) both increase, so does Utah's governing body's willingness to exercise contingencies. The order in which tools are taken out of the toolkit and used largely depends upon a government's political ideology. More fiscally conservative governments are apt to cut budgets before raising taxes, where fiscally progressive jurisdictions might do the opposite.

Figure 16. Fiscal Sustainability Toolkit
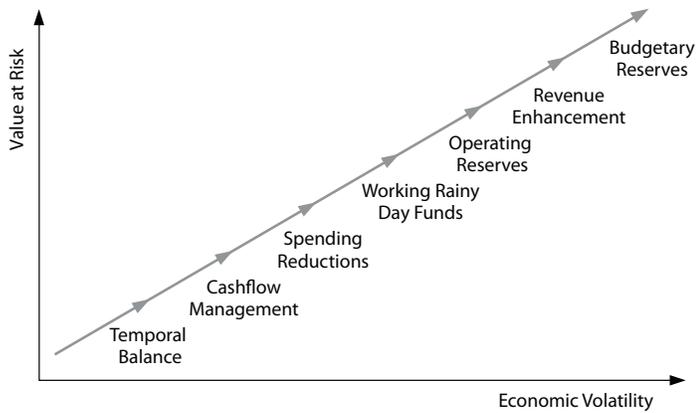
Source: Utah Office of the Legislative Fiscal Analyst

Valuing the Financial Contingency Plan

After defining the scope of Utah's fiscal toolkit, analysts created a comprehensive inventory of reserve and contingencies. They easily quantified formal reserves, like rainy day funds, using public documents like the state's Comprehensive Annual Financial Report. They evaluated the value of informal reserves, like program and fund balances, using the Division of Finance's data warehouse. For less conventional reserves, like the state's "working rainy day fund," analysts reviewed appropriated budgets and related materials.

Some contingencies, like program balances, can be easily used without impacting operations. Others, like restricted account balances, might require a statute change. Still others, like formal rainy day funds, have specific conditions upon their use. Informed by these legal characteristics and the fiscal toolkit framework for policymakers' willingness to utilize different types of tools, analysts categorized the reserve and contingency inventory by ease of access, identifying each component's accessibility as (1) easy, (2) moderately easy, (3) somewhat difficult, (4) difficult, and (5) very difficult.

See Appendix Tables 9 and 10 for a full accounting of reserves and other contingencies identified in the 2015 and 2016 stress tests. Figure 17 summarizes the inventories. The 2015 analysis identified contingencies equal to over 80 percent of annual appropriations, with the moderately easy and easy to access share totaling about 15 percent of appropriations. Analysts included the state's $2.1 billion Permanent School Fund, equivalent to about a third of appropriations, in the 2015 contingency plan, categorizing it as very difficult to access. Upon further consideration of the status of this fund, which was created in Utah's enabling act, analysts decided to exclude it from the 2016 plan. Including this adjustment, the 2016 analysis identified reserves and contingencies totaling an equivalent of just over 50 percent of annual appropriations, with a little over a fifth of the pool moderately easy or easy to access.

Figure 17. Reserves and Contingencies
Percent of State Fund appropriations
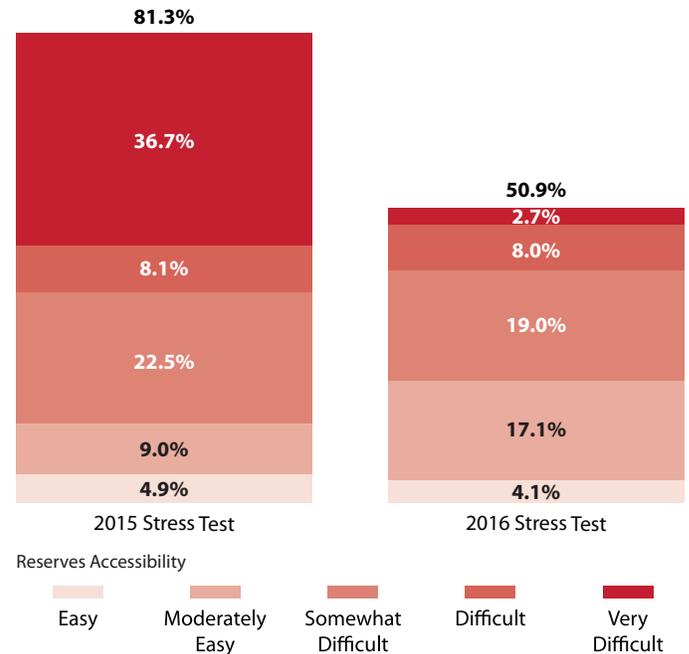
Source: Kem C. Gardner Policy Institute analysis of Utah Office of the Legislative Fiscal Analyst data

Figure 18. 2015 State of Utah Budget Stress Test Results
Value at risk by year and reserves by ease of accessibility as a percent of FY 16 State Fund appropriations
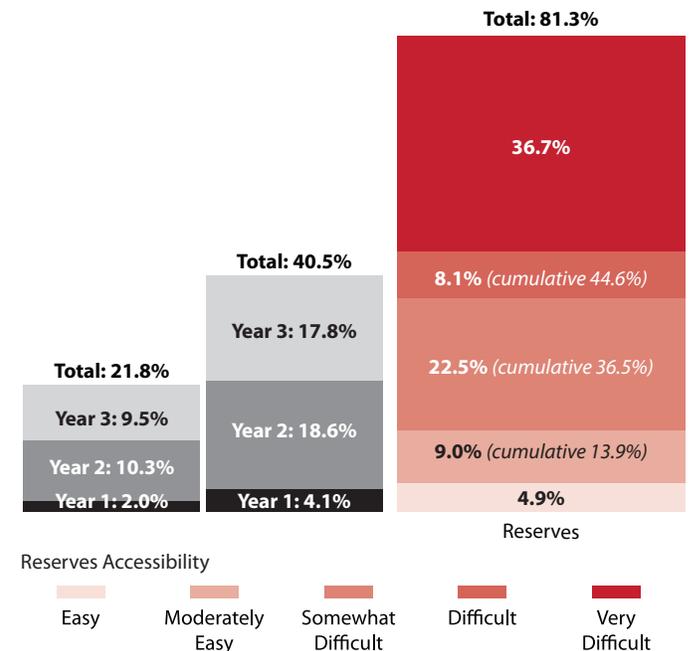
Source: Kem C. Gardner Policy Institute analysis of Utah Office of the Legislative Fiscal Analyst data

In addition to compiling fiscal reserves and related contingencies, analysts also reviewed state policymakers' propensity to enact program cuts or tax increases in a downturn. Using Appropriations Reports, the team measured enacted cuts and taxes in proportion to both the budget at the time and the size of the shortfall. Using those proportions, they could estimate an amount of budget cuts or tax increases they might assume for a future downturn. Given the limited amount of data from those two downturns, analysts chose to exclude these cuts from contingency values, but they did briefly summarize them as additional tools available to address a shortfall when presenting results. See Appendix Table 11 that show budget cuts and revenue increases as buffers.

Stress Test Results

Once revenue at risk, expenditure at risk, and contingencies have all been analyzed, the stress test can be completed. Figure 18 shows that, for the three-year window of analysis, the state would likely have sufficient reserves and contingencies to manage a moderate and severe recession. In the case of a severe recession, policymakers might be more likely to implement budget cuts and revenue enhancements; by the third year of the period, the cumulative value at risk exceeds the most accessible reserves.

Figure 19. 2016 State of Utah Budget Stress Test Results
Value at risk by year and reserves by ease of accessibility as a percent of FY 17 State Fund appropriations
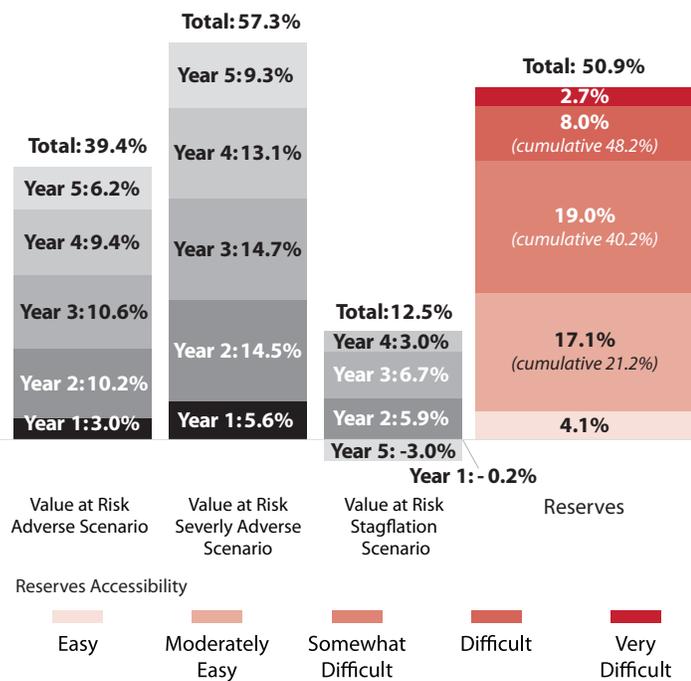
Source: Kem C. Gardner Policy Institute analysis of Utah Office of the Legislative Fiscal Analyst data

Figure 20. 2016 State of Utah Budget Stress Test Detailed Results
Reserves by ease of accessibility as a Percent of FY 17 State Fund appropriations
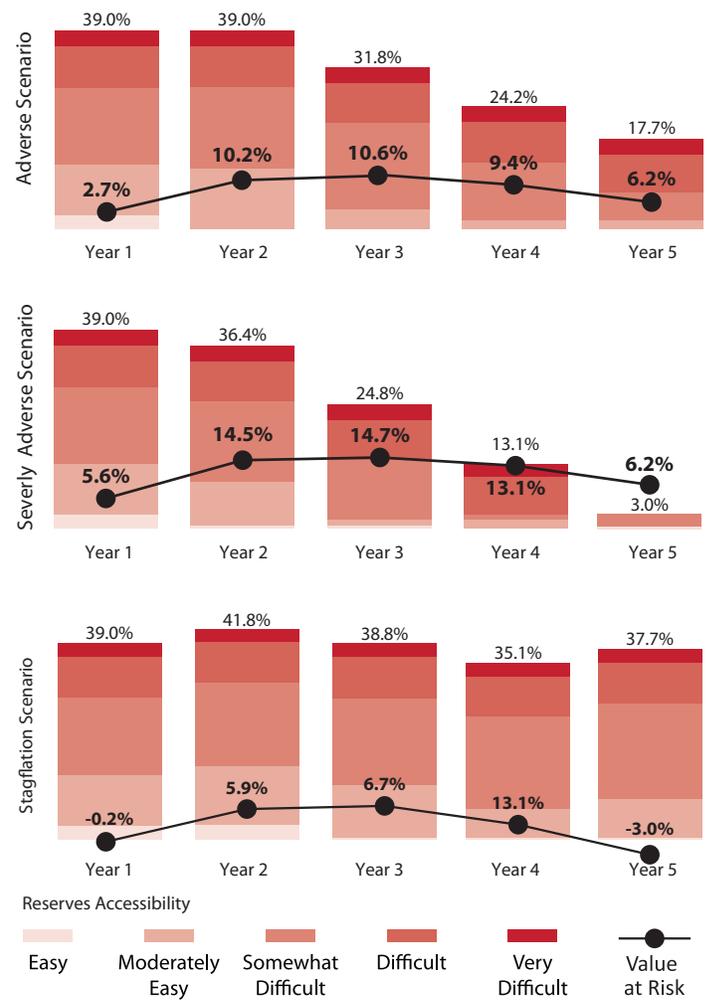
Source: Kem C. Gardner Policy Institute analysis of Utah Office of the Legislative Fiscal Analyst data

As Figures 19 and 20 illustrate, extending the timeframe to five years and excluding the Permanent School Fund from contingencies leads to a different conclusion on the preparedness of the state for a severe recession. Driven in part by regular growth in public education outpacing a recovery in revenue, contingencies would be depleted within four years of the beginning of a deep, six-quarter recession.

Considerations for Future Analyses

Utah's 2015 and 2016 stress tests provide a useful framework for future analyses in Utah and other states. Drawing from the Utah experience, considerations for these analyses include:

Developing a Fiscal Toolkit

States with limited resources or capacity to execute a full comprehensive stress test should at the very least consider using Utah's fiscal toolkit framework to inventory and categorize a broader set of contingencies than just rainy day funds. Doing this can help to mitigate crisis-driven decision-making in response to the next economic downturn. This exercise should also consider the ease of accessibility of the available contingencies.

Identifying Economic Scenarios

Utah analysts found that policymakers were familiar with bank stress testing and therefore the Federal Reserve scenarios carried a certain amount of credibility. The scenarios proved to provide sufficient stress to test the resiliency of Utah's budget, given that Utah's economy closely mirrors that of the U.S. The Hachman Index in Figure 21 illustrates the similarity between states' economies and the U.S. economy – the more like the U.S. in distribution of economic activity, the closer the Hachman Index to 100. States with greater degrees of industrial concentration, i.e., lesser degrees of economic diversity, have lower indices. These states should consider testing revenues using forecasts that are more relevant to their industrial base. For example, rather than using the Federal Reserve's scenarios, a more appropriate stress scenario for Wyoming, would be one that contemplates a shock to oil and gas profits.

Period of Analysis

The difference in Utah's 2015 and 2016 test results underline the importance of picking an appropriate period of analysis. As with any forecast, increasing the length of the budget stress forecast period introduces uncertainty. However, limiting the length might result in an analysis that does not fully capture the lagged effects of a recession, including differences in the pace of revenue recovery and general growth in enrollment in large programs like public education.

Analyzing a period that is longer than the regular budget cycle and better matches the business cycle helps policymakers gain a more comprehensive perspective on the sufficiency of contingencies but also to think longer term to anticipate how they would make informed decisions around budget cuts and tax increases. As noted earlier in the report, the 2015 budget stress test included a trough for both scenarios but it did not include enough years to show a full recovery. By adding additional years of analysis, the 2016 budget stress test captures troughs and recovery past baseline for all scenarios.

Figure 21. Economic Diversity Among States: Hachman Index, 2017
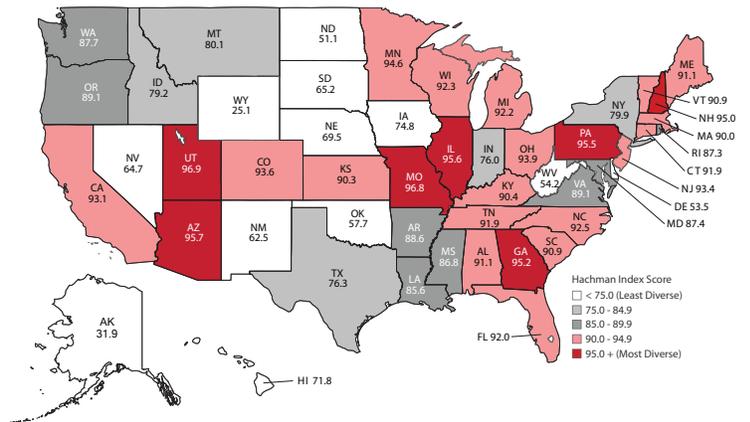
Source: Kem C. Gardner Policy Institute analysis of U.S. Bureau of Economic Analysis GDP data

Budget Scope

Utah stress tested its unrestricted General and Education Fund budget, which is equivalent to most state's general fund budgets. While Medicaid and higher education are the most counter-cyclical parts of this budget, Utah chose to also include public education as the state's demographics result in continual funding pressure for this program. Various factors in other states might call for analyzing other components of expenditures at risk.

States should also consider including any revenues that support general obligation debt payments when evaluating revenue at risk. For example, earmarks of Utah's general sales tax support debt service but are not part of the General Fund budget; analysts should add this revenue source to future value at risk analyses. On the expenditure side, analysts should add any additional debt obligations that the state would incur as a result of using cash-funded infrastructure as a contingency to expenditure values at risk.

Role of 50-state Analyses

Moody's and S&P's 50-state analyses are instructive in getting a sense of risk and preparedness and making general comparisons among states, but they lack the detail necessary to inform specific policies. For example, the Moody's analysis does not evaluate Utah's many informal reserves, nor does it include even all formal reserves like the state's Medicaid Rainy Day Fund in its contingency analysis. Additionally, a 50-state analysis may not capture where an individual state is in its business cycle.

Further, the 50-state analyses are unable to address policymakers' appetites for using the contingencies, based on the severity and volatility of the situation (e.g. Utah's fiscal toolkit). The Moody's and S&P analyses do help to communicate how important longer-term thinking about fiscal preparedness is.

Conclusion: How Budget Stress-Testing is Promoting Long-term Fiscal Health in Utah

Utah's previous revenue volatility analyses have helped to inform rainy day fund size targets that trigger automatic deposits from revenue surpluses. However, Utah's rainy day targets are just that – targets. Automatic deposits are made only if fund balances are below those targets, and the state has a revenue surplus (the Legislature can appropriate funds into the rainy day accounts at any point, the targets notwithstanding). While policymakers formally raised these targets a number of times over the past decade, accurate revenue estimating and generally slow economic growth have generated relatively small surpluses, especially in Utah's sales tax driven General Fund.

Budget stress testing shined a new light on Utah's formal rainy day funds by comparing total reserves with potential budget gaps. While formal rainy day fund balances were healthy by comparison to the past, policymakers could see that the size of the state's cumulative reserves – including informal buffers – were not as great as they had been before the Great Recession. To bolster total reserves, and make better progress toward rainy day fund targets, the Legislature appropriated $85 million from newly available one-time revenue into the rainy day funds in FY 2019.

Stress testing also highlighted the importance of budget demands on fiscal stress. Past exercises in long-term fiscal management, like the aforementioned volatility analysis, focused on revenue. Demand for government services was not considered. Budget stress testing considers both sides of the problem and showed how certain costs, like Medicaid and higher education, grow in a downturn. Having seen this in the stress tests, and with encouragement from the Volcker Alliance's Truth and Integrity in State Budgeting study, Utah's Legislature passed, and the governor signed legislation formally requiring multi-year budget analyses and stress testing, along with revenue volatility analyses (Volcker Alliance 2017) (Utah 62nd Legislature 2018).

Budget stress testing has also been helpful in the state's regular revenue estimating process. Among the greatest challenges in forecasting state tax collections is calling a turn in the economy. Utah uses trend analysis to determine how high or low a point estimate is compared to historical trends. When revenue is significantly above trend, legislative rule encourages, but does not require, lawmakers to use the above-trend revenue for one-time expenses. Stress testing allows revenue estimators and lawmakers to determine how much risk to take when forecasting robust revenue growth and when determining how to spend it. In Utah's case, when traditionally ongoing revenue sources spike, legislators and staff look to stress tests to determine whether to treat some or all of that revenue as one-time to minimize future value at risk.

Beyond informing risk taking, budget stress testing allows technicians to remain true to their analysis. When revenue and cost forecasting models produce deviations from the norm, staff may feel political pressure to alter results. Knowing that a government is prepared for risk provides assurance to forecasters – allowing them to have faith in their empirical results.

Finally, credit rating agencies acknowledge budget stress-testing as a gold standard. According to S&P Analyst Gabe Petek, "modeling out what a recession would look like, and how it would affect their finances, and using that as a basis for funding their reserves, is a strong practice" (Lucia 2016).

It is an ideal time for states to prepare for the next downturn while excess revenues exist. States that take the opportunity to shore up reserves, and identify options for addressing budget gaps now, will not only be more resilient in the next recession, but will have greater long-term fiscal health and sustainability.

Appendix

Appendix Figure 1. Remi Pi+ Model Linkages

Source: Regional Economic Models, Inc.

Appendix Table 1. Utah Revenue Assumptions Working Group February 2015 Economic Forecast

Economic Indicators for Utah and the United States

Economic Indicators	Units	2012 Actual	2013 Actual	2014 Estimate	2015 Forecast	2016 Forecast	Percent Change 2013	2014	2015	2016
Production and Spending										
U.S. Real Gross Domestic Product	Billion Chained $2009	15,369.2	15,710.3	16,089.0	16,587.5	17,031.2	2.2	2.4	3.1	2.7
U.S. Real Personal Consumption	Billion Chained $2009	10,449.7	10,699.7	10,967.0	11,343.0	11,687.6	2.4	2.5	3.4	3.0
U.S. Real Private Fixed Investment	Billion Chained $2009	2,368.0	2,479.2	2,610.5	2,769.2	2,954.1	4.7	5.3	6.1	6.7
U.S. Real Federal Defense Spending	Billion Chained $2009	768.7	717.7	701.7	700.5	698.6	-6.6	-2.2	-0.2	-0.3
U.S. Real Exports	Billion Chained $2009	1,960.1	2,019.8	2,084.3	2,166.2	2,238.4	3.0	3.2	3.9	3.3
Utah Exports (NAICS, Census)	Million Dollars	19,255.8	16,111.4	12,257.7	13,017.5	14,018.5	-16.3	-23.9	6.2	7.7
Utah Coal Production	Million Tons	17.2	17.0	17.9	15.8	15.5	-1.2	5.8	-11.9	-1.9
Utah Crude Oil Production	Million Barrels	30.2	35.0	40.8	40.7	39.8	15.9	16.6	-0.2	-2.2
Utah Natural Gas Production Sales	Billion Cubic Feet	436.2	409.5	392.7	374.4	370.0	-6.1	-4.1	-4.7	-1.2
Utah Copper Mined Production	Million Pounds	373.9	486.9	470.4	391.1	560.0	30.2	-3.4	-16.9	43.2
Utah Molybdenum Production	Million Pounds	20.6	12.7	25.4	18.0	27.0	-38.6	100.4	-29.1	50.0
Sales and Construction										
U.S. New Auto and Truck Sales	Millions	14.4	15.5	16.4	16.9	17.2	7.6	5.7	2.9	2.1
U.S. Housing Starts	Millions	0.8	0.9	1.0	1.2	1.3	18.6	6.9	17.0	16.0
U.S. Private Residential Investment	Billion Dollars	442.3	519.9	559.2	639.4	723.7	17.5	7.6	14.3	13.2
U.S. Nonresidential Structures	Billion Dollars	446.9	457.2	506.6	508.3	539.1	2.3	10.8	0.3	6.1
U.S. Home Price Index (FHFA)	1980Q1 = 100	312.0	324.9	346.2	370.8	382.6	4.1	6.6	7.1	3.2
U.S. Nontaxable & Taxable Retail Sales	Billion Dollars	4,863.3	5,065.7	5,273.4	5,436.2	5,716.5	4.2	4.1	3.1	5.2
Utah New Auto and Truck Sales	Thousands	96.8	107.5	113.4	118.3	123.2	11.0	5.5	4.3	4.1
Utah Dwelling Unit Permits	Thousands	11.2	14.9	16.6	18.0	19.5	32.7	11.4	8.4	8.3
Utah Residential Permit Value	Million Dollars	2,192.4	3,220.5	3,270.5	3,700.0	4,100.0	46.9	1.6	13.1	10.8
Utah Nonresidential Permit Value	Million Dollars	1,016.6	1,087.2	1,300.0	1,400.0	1,500.0	7.0	19.6	7.7	7.1
Utah Additions, Alterations and Repairs	Million Dollars	726.0	776.5	487.0	700.0	700.0	7.0	-37.3	43.7	0.0
Utah Home Price Index (FHFA)	1980Q1 = 100	308.9	330.6	360.1	379.1	386.7	7.0	8.9	5.3	2.0
Utah Taxable Retail Sales	Million Dollars	23,512	24,944	26,100	27,488	28,830	6.1	4.6	5.3	4.9
Utah All Taxable Sales	Million Dollars	47,531	49,404	51,586	54,652	57,459	3.9	4.4	5.9	5.1
Demographics and Sentiment										
U.S. July 1st Population	Millions	314.5	316.7	319.0	321.7	324.3	0.7	0.7	0.8	0.8
U.S. Consumer Sentiment (U of M)	Diffusion Index	76.5	79.2	84.1	91.2	90.5	3.5	6.2	8.4	-0.8
Utah July 1st Population	Thousands	2,855.2	2,902.8	2,942.9	2,987.7	3,032.6	1.7	1.4	1.5	1.5
Utah Net Migration	Thousands	3.5	12.0	5.5	9.0	9.1				
Profits and Resource Prices										
U.S. Corporate Before Tax Profits	Billion Dollars	2,136.1	2,235.3	2,438.1	2,572.7	2,570.0	4.6	9.1	5.5	-0.1
U.S. Corporate Profit [above less Fed. Res.]	Billion Dollars	2,064.4	2,155.8	2,345.8	2,478.9	2,491.1	4.4	8.8	5.7	0.5
West Texas Intermediate Crude Oil	$ Per Barrel	94.2	98.0	93.0	58.2	71.1	4.0	-5.1	-37.4	22.0
U.S. Coal Producer Price Index	1982 = 100	211.4	208.2	199.4	201.4	202.3	-1.6	-4.2	1.0	0.5
Utah Coal Prices	$ Per Short Ton	35.8	34.2	33.1	32.0	31.0	-4.5	-3.2	-3.3	-3.1
Utah Oil Prices	$ Per Barrel	82.7	84.8	78.9	44.0	58.0	2.5	-7.0	-44.2	31.8
Utah Natural Gas Prices	$ Per MCF	2.82	3.69	4.34	3.00	3.30	30.8	17.6	-30.9	10.0
Utah Copper Prices	$ Per Pound	3.60	3.40	3.11	2.70	2.85	-5.6	-8.5	-13.2	5.6
Utah Molybdenum Prices	$ Per Pound	13.0	10.3	11.4	10.3	11.5	-20.7	10.7	-10.2	12.2
Inflation and Interest Rates										
U.S. CPI Urban Consumers (BLS)	1982-84 = 100	229.6	233.0	236.7	237.0	242.6	1.5	1.6	0.1	2.3
U.S. GDP Chained Price Index (BEA)	2005 = 100	105.2	106.7	108.4	110.3	112.4	1.5	1.6	1.8	1.9
U.S. Federal Funds Rate (FRB)	Effective Rate	0.14	0.11	0.09	0.44	1.56				
U.S. 3-Month Treasury Bills (FRB)	Discount Rate	0.09	0.06	0.03	0.39	1.58				
U.S. 10-Year Treasury Notes (FRB)	Yield (%)	1.80	2.35	2.54	2.68	3.59				
30 Year Mortgage Rate (FHLMC)	Percent	3.66	3.98	4.17	4.35	5.43				
Employment and Wages										
U.S. Establishment Employment (BLS)	Millions	134.1	136.4	138.9	141.7	144.2	1.7	1.8	2.0	1.8
U.S. Average Annual Pay (BLS)	Dollars	51,694	52,248	53,530	55,044	56,909	1.1	2.5	2.8	3.4
U.S. Total Wages & Salaries (BLS)	Billion Dollars	6,932	7,125	7,434	7,800	8,206	2.8	4.3	4.9	5.2
Utah Nonagricultural Employment (DWS)	Thousands	1,248.9	1,290.4	1,327.5	1,364.7	1,399.5	3.3	2.9	2.8	2.6
Utah Average Annual Pay (DWS)	Dollars	40,646	41,063	41,717	43,028	44,061	1.0	1.6	3.1	2.4
Utah Total Nonagriculture Wages (DWS)	Million Dollars	50,762	52,989	55,379	58,720	61,663	4.4	4.5	6.0	5.0
Income and Unemployment										
U.S. Personal Income (BEA)	Billion Dollars	13,888	14,167	14,715	15,356	16,126	2.0	3.9	4.4	5.0
U.S. Unemployment Rate (BLS)	Percent	8.1	7.4	6.2	5.5	5.3				
Utah Personal Income (BEA)	Million Dollars	102,464	106,289	111,291	117,094	123,119	3.7	4.7	5.2	5.1
Utah Unemployment Rate (DWS)	Percent	5.4	4.4	3.7	3.4	3.2				

Source: Utah Revenue Assumptions Working Group

Appendix Table 2. Utah Revenue Assumptions Working Group September 2016 Economic Forecast
Economic Indicators for Utah and the United States

Economic Indicators	Units	2014 Actual	2015 Actual	2016 Estimate	2017 Forecast	2018 Forecast	Perecent Change 2015	2016	2017	2018
Production and Spending										
U.S. Real Gross Domestic Product	Billion Chained $2009	15,982.3	16,397.2	16,645.7	17,052.7	17,466.9	2.6	1.5	2.4	2.4
U.S. Real Personal Consumption	Billion Chained $2009	10,868.9	11,214.7	11,523.4	11,819.5	12,111.5	3.2	2.8	2.6	2.5
U.S. Real Private Fixed Investment	Billion Chained $2009	2,660.6	2,767.8	2,792.1	2,922.2	3,065.1	4.0	0.9	4.7	4.9
U.S. Real Federal Defense Spending	Billion Chained $2009	686.3	672.0	668.8	669.5	665.3	-2.1	-0.5	0.1	-0.6
U.S. Real Exports	Billion Chained $2009	2,118.3	2,120.6	2,112.2	2,171.2	2,262.9	0.1	-0.4	2.8	4.2
Utah Exports (NAICS, Census)	Million Dollars	12,224.3	13,307.2	14,503.8	14,059.0	13,952.1	8.9	9.0	-3.1	-0.8
Utah Coal Production	Million Tons	17.9	14.5	14.1	15.5	15.0	-19.1	-2.8	9.9	-3.2
Utah Crude Oil Production	Million Barrels	40.9	37.1	28.7	28.0	29.0	-9.3	-22.6	-2.4	3.6
Utah Natural Gas Production Sales	Billion Cubic Feet	385.5	359.0	310.0	300.0	295.0	-6.9	-13.6	-3.2	-1.7
Utah Copper Mined Production	Million Pounds	467.8	220.6	330.9	380.5	430.0	-52.8	50.0	15.0	13.0
Utah Molybdenum Production	Million Pounds	25.4	16.8	6.6	20.0	25.0	-34.0	-60.6	203.0	25.0
Sales and Construction										
U.S. New Auto and Truck Sales	Millions	16.4	17.4	17.4	17.7	17.7	5.8	-0.2	1.9	-0.2
U.S. Housing Starts	Millions	1.0	1.1	1.2	1.3	1.5	10.7	6.1	14.0	10.7
U.S. Private Residential Investment	Billion Dollars	570.0	651.9	705.4	777.1	853.9	14.4	8.2	10.2	9.9
U.S. Nonresidential Structures	Billion Dollars	530.7	507.3	491.4	533.7	568.4	-4.4	-3.1	8.6	6.5
U.S. Home Price Index (FHFA)	1980Q1 = 100	209.5	221.3	233.0	242.5	250.2	5.6	5.3	4.1	3.2
U.S. Nontaxable & Taxable Retail Sales	Billion Dollars	5,207.6	5,327.2	5,477.1	5,698.7	5,938.1	2.3	2.8	4.0	4.2
Utah New Auto and Truck Sales	Thousands	114.7	121.9	128.4	134.2	139.6	6.3	5.4	4.5	4.0
Utah Dwelling Unit Permits	Thousands	18.7	17.5	18.5	18.0	17.5	-6.4	5.7	-2.7	-2.8
Utah Residential Permit Value	Million Dollars	3,347.7	3,824.0	3,950.0	4,100.0	4,100.0	14.2	3.3	3.8	0.0
Utah Nonresidential Permit Value	Million Dollars	1,447.2	2,041.6	2,100.0	1,700.0	1,500.0	41.1	2.9	-19.0	-11.8
Utah Additions, Alterations and Repairs	Million Dollars	1,028.2	1,053.7	1,000.0	900.0	800.0	2.5	-5.1	-10.0	-11.1
Utah Home Price Index (FHFA)	1980Q1 = 100	350.3	370.3	396.4	420.0	437.0	5.7	7.0	6.0	4.0
Utah Taxable Retail Sales	Million Dollars	26,193	27,801	29,201	30,685	32,182	6.1	5.0	5.1	4.9
Utah All Taxable Sales	Million Dollars	51,709	53,933	56,317	59,138	62,184	4.3	4.4	5.0	5.2
Demographics and Sentiment										
U.S. July 1st Population	Millions	319.5	322.0	324.5	327.1	329.8	0.8	0.8	0.8	0.8
U.S. Consumer Sentiment (U of M)	Diffusion Index	84.1	92.9	91.7	92.5	93.4	10.5	-1.3	0.9	1.0
Utah July 1st Population	Thousands	2,944.5	2,995.9	3,046.9	3,098.8	3,151.5	1.7	1.7	1.7	1.7
Utah Net Migration	Thousands	6.0	17.6	17.9	18.2	18.5				
Profits and Resource Prices										
U.S. Corporate Before Tax Profits	Billion Dollars	2,152.1	2,088.1	2,055.0	2,157.9	2,260.0	-3.0	-1.6	5.0	4.7
U.S. Corporate Profit [above less Fed. Res.]	Billion Dollars	2,048.7	1,987.4	1,949.7	2,095.1	2,226.3	-3.0	-1.9	7.5	6.3
West Texas Intermediate Crude Oil	$ Per Barrel	93.3	48.7	42.6	50.2	54.4	-47.8	-12.5	17.7	8.4
U.S. Coal Producer Price Index	1982 = 100	199.9	194.0	186.0	184.5	183.2	-3.0	-4.1	-0.8	-0.7
Utah Coal Prices	$ Per Short Ton	35.6	35.0	36.0	38.0	38.0	-1.7	2.9	5.6	0.0
Utah Oil Prices	$ Per Barrel	79.0	40.7	36.0	43.0	45.0	-48.5	-11.5	19.4	4.7
Utah Natural Gas Prices	$ Per MCF	4.34	2.60	2.25	2.80	2.70	-40.1	-13.5	24.4	-3.6
Utah Copper Prices	$ Per Pound	3.20	2.50	2.15	2.20	2.30	-21.9	-14.0	2.3	4.5
Utah Molybdenum Prices	$ Per Pound	11.7	6.8	6.8	6.5	6.5	-42.0	-0.7	-3.7	0.0
Inflation and Interest Rates										
U.S. CPI Urban Consumers (BLS)	1982-84 = 100	236.7	237.0	240.0	245.5	250.8	0.1	1.3	2.3	2.1
U.S. GDP Chained Price Index (BEA)	2005 = 100	108.8	110.0	111.6	114.0	116.2	1.1	1.4	2.1	1.9
U.S. Federal Funds Rate (FRB)	Effective Rate	0.09	0.13	0.41	0.96	1.72				
U.S. 3-Month Treasury Bills (FRB)	Discount Rate	0.03	0.05	0.32	0.86	1.61				
U.S. 10-Year Treasury Notes (FRB)	Yield (%)	2.54	2.14	1.74	2.28	2.88				
30 Year Mortgage Rate (FHLMC)	Percent	4.17	3.85	3.59	4.11	4.85				
Employment and Wages										
U.S. Establishment Employment (BLS)	Millions	138.9	141.8	144.3	146.1	147.4	2.1	1.7	1.2	0.9
U.S. Average Annual Pay (BEA)	Dollars	53,810	55,381	56,479	58,581	60,943	2.9	2.0	3.7	4.0
U.S. Total Wages & Salaries (BEA)	Billion Dollars	7,476	7,855	8,150	8,558	8,983	5.1	3.8	5.0	5.0
Utah Nonagricultural Employment (DWS)	Thousands	1,328.1	1,377.7	1,427.2	1,472.1	1,509.7	3.7	3.6	3.1	2.6
Utah Average Annual Pay (DWS)	Dollars	42,187	43,522	45,039	46,197	47,254	3.2	3.5	2.6	2.3
Utah Total Nonagriculture Wages (DWS)	Million Dollars	56,026	59,962	64,279	68,007	71,340	7.0	7.2	5.8	4.9
Income and Unemployment										
U.S. Personal Income (BEA)	Billion Dollars	14,810	15,459	15,988	16,712	17,528	4.4	3.4	4.5	4.9
U.S. Unemployment Rate (BLS)	Percent	6.2	5.3	4.9	4.8	4.8				
Utah Personal Income (BEA)	Million Dollars	110,844	117,764	124,510	130,912	137,628	6.2	5.7	5.1	5.1
Utah Unemployment Rate (DWS)	Percent	3.8	3.5	3.7	3.6	4.0				

Source: Utah Revenue Assumptions Working Group

Appendix Table 3. Dodd-Frank Act Stress Test 2015: Supervisory Adverse Scenario

Indicator	2014:Q4	2015:Q1	2015:Q2	2015:Q3	2015:Q4	2016:Q1	2016:Q2	2016:Q3	2016:Q4	2017:Q1	2017:Q2	2017:Q3	2017:Q4
Domestic													
Real GDP growth	-0.6	-1.3	-0.2	0.2	0.3	0.8	1.2	1.7	1.8	1.8	1.9	2	2.2
Nominal GDP growth	1.1	0.9	2.8	3.8	4.1	4.3	4.9	5.4	5.4	5.4	5.5	5.5	5.5
Real disposable income growth	0	-0.4	-0.3	-0.1	0	1	1.1	1.4	1.5	1.8	1.6	1.6	1.7
Nominal disposable income growth	2	2.2	2.7	3.5	3.6	4.7	4.8	5.1	5.2	5.5	5.2	5.1	5.1
Unemployment rate	6.4	6.9	7.2	7.4	7.6	7.8	7.9	7.9	8	8	8	8	8
CPI inflation rate	2.5	3	3.5	4	4	4	4	4	4	4	3.9	3.8	3.6
3-month Treasury rate	0.7	1.2	1.6	2.1	2.6	3.1	3.6	4	4.4	4.7	5	5.2	5.3
5-year Treasury yield	2.6	2.9	3.3	3.7	4	4.3	4.5	4.8	5	5.2	5.3	5.5	5.5
10-year Treasury yield	3.3	3.7	4	4.3	4.6	4.8	5	5.2	5.4	5.5	5.7	5.8	5.8
BBB corporate yield	5.7	6.5	6.9	7	7.1	7.4	7.5	7.5	7.6	7.6	7.7	7.7	7.7
Mortgage rate	5.1	5.7	6.1	6.3	6.6	6.8	7	7.1	7.3	7.4	7.5	7.6	7.6
Prime rate	3.9	4.3	4.7	5.2	5.7	6.2	6.7	7.1	7.5	7.8	8	8.2	8.4
Dow Jones Total Stock Market Index	19,418.4	18,508.7	17,689.2	16,983.8	16,257.8	15,737.3	15,430.8	15,188.2	14,992.3	14,866.4	14,791.4	14,807.1	15,005.9
House Price Index	170.8	168.0	164.8	161.2	157.7	154.5	151.7	150.0	148.9	148.6	148.9	149.5	150.3
Commercial Real Estate Price Index	238.9	235.3	228.1	220.8	214.8	207.7	202.9	199.6	197.7	196.6	196.5	196.6	197.1
Market Volatility Index	28.9	32.9	33.2	27.3	24.9	24.6	22.8	21.4	20.5	19.8	19.4	19.1	19.2
International													
Euro area real GDP growth	-4.1	-3.3	-1.7	-0.5	0.4	1.1	1.6	1.9	2.1	2.1	2.1	2.0	2.0
Euro area inflation	-0.4	-0.4	-0.4	-0.1	0.1	0.4	0.6	0.8	0.9	1	1.1	1.1	1.2
Euro area bilateral dollar exchange rate (USD/euro)	1.265	1.257	1.243	1.226	1.21	1.209	1.212	1.217	1.222	1.229	1.236	1.242	1.248
Developing Asia real GDP growth	2	3.9	5.3	6.1	6.4	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.6
Developing Asia inflation	1.6	1.3	1.1	1.1	1.4	1.6	1.9	2.1	2.2	2.3	2.4	2.5	2.6
Developing Asia bilateral dollar exchange rate (F/USD, index)	89.3	89.3	89	88.7	88.2	86.8	85.5	84.2	82.9	82.4	81.9	81.6	81.3
Japan real GDP growth	-4.6	-6	-5	-3.7	-2.5	-1.4	-0.5	0.2	0.7	1.2	1.4	1.6	1.7
Japan inflation	-1.6	-1.4	-1.6	-1.2	-0.7	-0.2	0.3	0.5	0.6	0.5	0.6	0.7	0.9
Japan bilateral dollar exchange rate (yen/USD)	97.6	97.7	98.4	99.5	100.5	100.7	100.6	100.3	100.2	99.9	99.6	99.5	99.3
U.K. real GDP growth	-1.6	-1.7	-0.9	-0.1	0.6	1.2	1.7	2.2	2.5	2.7	2.8	2.8	2.8
U.K. inflation	0.1	0.1	0.1	0.3	0.6	0.9	1.2	1.4	1.6	1.6	1.7	1.8	1.8
U.K. bilateral dollar exchange rate (USD/pound)	1.68	1.676	1.668	1.656	1.645	1.641	1.638	1.636	1.633	1.634	1.634	1.634	1.635

Source: Board of Governors of the Federal Reserve System

Appendix Table 4. Dodd-Frank Act Stress Test 2015: Supervisory Severely Adverse Scenario

Indicator	2014:Q4	2015:Q1	2015:Q2	2015:Q3	2015:Q4	2016:Q1	2016:Q2	2016:Q3	2016:Q4	2017:Q1	2017:Q2	2017:Q3	2017:Q4
Domestic													
Real GDP growth	-3.9	-6.1	-3.9	-3.2	-1.5	1.2	1.2	3	3	3.9	3.9	3.9	3.9
Nominal GDP growth	-2.8	-4.7	-2.4	-1.7	0	2.4	2.5	4.4	4.3	5.2	5.2	5.1	5.1
Real disposable income growth	-3	-4.4	-3.4	-2.4	-1.5	0.2	0.4	1.2	1.8	2.7	2.8	2.9	3
Nominal disposable income growth	-0.1	-2.3	-2.2	-1.4	-0.7	1.5	1.8	2.8	3.3	4.2	4.1	4.2	4.3
Unemployment rate	6.9	8	8.8	9.5	9.9	10	10.1	10	9.9	9.7	9.5	9.3	9.1
CPI inflation rate	4.3	3	1.7	1.3	1.1	1.6	1.9	2	1.9	1.9	1.7	1.6	1.6
3-month Treasury rate	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
5-year Treasury yield	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.8	0.9	1.1	1.2	1.3	1.5
10-year Treasury yield	0.9	1	1.2	1.3	1.5	1.5	1.6	1.8	1.9	2	2.1	2.2	2.3
BBB corporate yield	4.7	5.6	6	6.3	6.2	6	5.8	5.6	5.5	5.3	5.2	5.1	5.1
Mortgage rate	4.2	4.6	4.8	5	5	4.9	4.8	4.8	4.7	4.7	4.7	4.7	4.7
Prime rate	3.3	3.3	3.3	3.3	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Dow Jones Total Stock Market Index	17,133.5	12,498.5	10,190.1	8,770.7	8,606.3	9,087.3	9,607.2	10,480.7	11,521.4	12,894.7	14,079.2	15,430.3	16,487.6
House Price Index	169.5	164.0	157.6	150.7	144.3	138.4	133.4	130.4	128.4	127.9	128.4	129.5	131.0
Commercial Real Estate Price Index	238.9	230.2	213.6	195.1	177.6	164.4	157.4	154.4	154.6	156.1	159.6	164.0	169.1
Market Volatility Index	79.0	71.3	76.9	68.1	48.1	38.4	30.7	25.5	21.6	18.7	17.6	16.4	16.5
International													
Euro area real GDP growth	-8.8	-6.5	-3.6	-1.5	-0.1	1.0	1.7	2.1	2.2	2.2	2.2	2.0	1.9
Euro area inflation	3.8	0.7	-0.7	-1.1	-1.1	-0.3	0.2	0.5	0.5	0.6	0.5	0.5	0.6
Euro area bilateral dollar exchange rate (USD/euro)	1.112	1.11	1.103	1.094	1.084	1.088	1.095	1.105	1.114	1.125	1.135	1.143	1.152
Developing Asia real GDP growth	-3.2	0.8	4.1	5.8	6.6	6.8	6.6	6.5	6.4	6.3	6.3	6.4	6.4
Developing Asia inflation	11.9	3.7	0.1	-1.1	-1.2	0.4	1.3	1.8	1.8	1.9	1.7	1.7	1.9
Developing Asia bilateral dollar exchange rate (F/USD, index)	98	97.7	97.5	97.2	96.7	94.7	92.6	90.7	89.2	88.4	87.9	87.5	87.2
Japan real GDP growth	-9.4	-10.6	-8.5	-6.4	-4.4	-2.5	-1.0	0.2	1.1	1.7	2.1	2.3	2.4
Japan inflation	0.3	-2	-3.3	-3.3	-2.7	-1.5	-0.7	-0.2	-0.1	0	0	0.1	0.4
Japan bilateral dollar exchange rate (yen/USD)	101.4	101.2	101.7	102.6	103.4	103.4	103.1	102.9	102.9	103	103.1	103.1	102.9
U.K. real GDP growth	-4	-4.2	-3.2	-2	-0.8	0.3	1.3	2.1	2.6	3	3.1	3.2	3.1
U.K. inflation	1.5	-0.4	-1.3	-1.3	-0.9	0	0.6	1	1.2	1.4	1.4	1.4	1.5
U.K. bilateral dollar exchange rate (USD/pound)	1.572	1.575	1.571	1.564	1.558	1.559	1.56	1.559	1.555	1.552	1.552	1.552	1.552

Source: Board of Governors of the Federal Reserve System

Appendix Table 5. Moody's Analytics Regional Economic Forecast Scenarios

Baseline
Stronger Near-term Rebound Scenario
Slower Near-term Recovery Scenario
Moderate Recession Scenario
Protracted Slump Scenario
Below-trend Long-term Growth Scenario
Stagflation
Next-cycle Recession Scenario
Low Oil Price Scenario
Federal Reserve 2016 Supervisory Scenarios: Baseline Scenario
Federal Reserve 2016 Supervisory Scenarios: Adverse Scenario
Federal Reserve 2016 Supervisory Scenarios: Severly Adverse Scenario

Source: Moody's Analytics

Appendix Table 6. Variables in Moody's Analytics Regional Economic Forecast

ABA Delinquency: Automobile - Direct Loans
ABA Delinquency: Automobile - Direct Loans, losed-end
ABA Delinquency: Automobile - Indirect
ABA Delinquency: Automobile - Indirect Loans, Closed-end
ABA Delinquency: Bank Card Credit
ABA Delinquency: Bank Card Credit, Open-end
ABA Delinquency: Home Equity Lines of Credit
ABA Delinquency: Home Equity Lines of Credit, Open-end
ABA Delinquency: Mobile Home Loans
ABA Delinquency: Mobile Home Loans, Closed-end
ABA Delinquency: Personal Loans
ABA Delinquency: Personal Loans, Closed-end
ABA Delinquency: Summary of Accounts
ABA Delinquency: Summary of Accounts, Closed-end
Average Hourly Earnings: Manufacturing
Births
Bankruptcies: Business - Chapter 13
Bankruptcies: Business - Chapter 7
Bankruptcies: Business - Chapter 11 and 12
Bankruptcies: Total Business
Bankruptcies: Personal - Chapter 11
Bankruptcies: Personal - Chapter 13
Bankruptcies: Personal - Chapter 7
Bankruptcies: Total Personal
Birth rate
Consumer Credit: Total
Consumer Credit: Non-revolving
Consumer Credit: Revolving
Construction Put in Place: Private Non-residential
Deaths
Debt to Income Ratio
Deposits at all FDIC-Insured Banks
Death rate
Employment: Utilities
Employment: Construction
Employment: Machinery Mfg.
Employment: Transportation Equipment Mfg.
Employment: Wholesale Trade
Employment: Information
Employment: Other Services (except Public Administration)
Employment: Education & Health Services
Employment: Financial Activities
Employment: Goods-Producing
Employment: Total Government
Employment: Federal Government
Employment: Local Government
Employment: State Government
Employment: State & Local Government
Employment: Leisure & Hospitality
Employment: Total Manufacturing
Employment: Chemicals, Energy, Plastics & Rubber Mfg.
Employment: Electronic & Electrical Mfg.
Employment: Food, Beverage & Tobacco Mfg.
Employment: Furniture & Misc. Mfg.
Employment: Metals & Mining-based Mfg.
Employment: Textile, Fiber & Printing Mfg.
Employment: Military
Employment: Office-using
Employment: Professional & Business Services
Employment: Natural Resources & Mining
Employment: Retail Trade
Employment: Transportation & Warehousing
Employment: Service-Providing
Employment: Private Service Providing
Employment: Total Nonagricultural
Employment: Trade, Transportation & Utilities
Employment: Total Private
Employment: Transportation & Utilities
Gross State Product: Total
Fishing, & Hunting
Gross State Product: Mining

Gross State Product: Utilities
Gross State Product: Construction
Gross State Product: Machinery Mfg.
Gross State Product: Transportation Equipment Mfg.
Gross State Product: Wholesale Trade
Gross State Product: Information
Gross State Product: Other Services (except Public Administration)
Gross State Product: Education & Health Services
Gross State Product: Financial Activities
Gross State Product: Total Government
Gross State Product: Federal Government
Gross State Product: Local Government
Gross State Product: State Government
Gross State Product: Leisure & Hospitality
Gross State Product: Total Manufacturing
Gross State Product: Chemicals, Energy, Plastics, & Rubber Mfg.
Gross State Product: Electronic & Electrical Mfg.
Gross State Product: Food, Beverage, & Tobacco Mfg.
Gross State Product: Furniture & Misc. Mfg.
Gross State Product: Metals & Mining-based Mfg.
Gross State Product: Textile, Fiber, & Printing Mfg.
Gross State Product: Professional & Business Services
Gross State Product: Total
Gross State Product: Retail Trade
Gross State Product: Transportation & Warehousing
Gross State Product: Trade, Transportation, & Utilities
Gross State Product: Transportation & Utilities
Housing Completions: Single-family
Housing Completions: Multi-family
Housing Completions: Total
Households: Total
FHFA Purchase-Only Price Index, 1991Q1 = 100
FHFA All Transactions Home Price Index
Residential Permits: Single-family
Residential Permits: Multifamily
Residential Permits: Total
Housing Starts: Single-family
Housing Starts: Multifamily
Housing Starts: Total
Rental Vacancy Rate
Existing Single-family Home Sales
Median Existing Single-Family Home Price
Affordability Index
Industrial Production: Total
Labor: Number of Employed
Labor: Civilian Labor Force
Labor: Unemployment Rate
Labor Force Participation Rate
Labor: Number of Unemployed
MBA: All Loans - % of Loans Past Due Total
MBA: All Loans - % of Loans Past Due 30 Days
MBA: Conventional Loans: Prime only - % of Loans Past Due 30 Days
MBA: Conventional Loans: Subprime only - % of Loans Past Due 30 Days
MBA: FHA Loans - % of Loans Past Due 30 Days
MBA: VA Loans - % of Loans Past Due 30 Days
MBA: All Loans - % of Loans Past Due 60 Days
MBA: Conventional Loans: Prime only - % of Loans Past Due 60 Days
MBA: Conventional Loans: Subprime only - % of Loans Past Due 60 Days
MBA: FHA Loans - % of Loans Past Due 60 Days
MBA: VA Loans - % of Loans Past Due 60 Days
MBA: All Loans - % of Loans Past Due 90 Days
MBA: Conventional Loans: Prime only - % of Loans Past Due 90 Days
MBA: Conventional Loans: Subprime only - % of Loans Past Due 90 Days
MBA: FHA Loans - % of Loans Past Due 90 Days
MBA: VA Loans - % of Loans Past Due 90 Days
MBA: Conventional Loans: Prime only - % of Loans Past Due Total

MBA: Conventional Loans: Subprime only - % of Loans Past Due Total
MBA: FHA Loans - % of Loans Past Due Total
MBA: VA Loans - % of Loans Past Due Total
MBA: All Loans - % in Foreclosure - Started
MBA: Conventional Loans: Prime only - % in Foreclosure - Started
MBA: Conventional Loans: Subprime only - % in Foreclosure - Started
MBA: FHA Loans - % in Foreclosure Started During Quarter
MBA: VA Loans - % in Foreclosure - Started
Mobile Home Shipments
Mortgage Originations: Purchase
Mortgage Originations: Refinance
Mortgage Originations: Total
Domestic Migration: Net
International Migration: Net
Total Migration: Net
Population (Resident): Total - Total Age 0 to 4
Population (Resident): Total - Total Age 5 to 9
Population (Resident): Age 5 to 19
Population (Resident): Total - Total Age 10 to 14
Population (Resident): Total - Total Age 15 to 19
Population (Resident): Total - Total Age 20 to 24
Population (Resident): Total - Total Age 25 to 29
Population (Resident): Age 25 to 44
Population (Resident): Total - Total Age 30 to 34
Population (Resident): Total - Total Age 35 to 39
Population (Resident): Total - Total Age 40 to 44
Population (Resident): Total - Total Age 45 to 49
Population (Resident): Age 45 to 64
Population (Resident): Total - Total Age 50 to 54
Population (Resident): Total - Total Age 55 to 59
Population (Resident): Total - Total Age 60 to 64
Population (Resident): Total - Total Age 65 and older
Population: Total
New Vehicle Registrations: Total
New Vehicle Registrations: Cars
New Vehicle Registrations: Light Trucks
Terms Conventional Mortgages: All Loans - Composite Effective Rate
Retail Sales: Total
Effective Tax Rate
Labor: Initial Unemployment Claims
Effective Wage Rate
FHFA Purchase-Only Price Index, 1991Q1 = 100, NSA
FHFA All Transactions Home Price Index
Employment (Household Survey): Unemployment Rate (%, NSA)
Income: Median Family
Income: Average Household
Income: Median Household
Real Personal Income
Income: Residence Adjustment
Per Capita Disposable Personal Income
Income: Per Capita Disposable
Income: Contributions for Social Insurance
Per Capita Income
Income: Per Capita
Income: Dividends, Interest, & Rents
Disposable Personal Income
Income: Disposable Personal
Income: Farm Proprietors
Income: Non-farm Proprietors
Income: Total Proprietors
Income: Supplements to Wages & Salaries
Income: Wages & Salaries
Income: Non-wage
Income: Total Personal
Income: Transfer Receipts

Source: Moody's Analytics

Appendix Table 7. Initial Revenue at Risk Results by Entity

Difference between baseline and scenarios as a percent of State Fund appropriations

2015

Scenario	2015				2016				2017			
	LFA	GOMB	Tax	Consensus	LFA	GOMB	Tax	Consensus	LFA	GOMB	Tax	Consensus
Adverse												
Sales Tax	1.3%	1.1%	0.5%	0.9%	2.9%	2.4%	1.4%	2.2%	2.9%	2.1%	0.8%	1.8%
Income Tax	0.6%	0.7%	0.4%	0.6%	6.6%	3.9%	3.5%	4.7%	3.5%	4.6%	3.5%	4.0%
Corporate Income Tax	0.5%	0.4%	0.3%	0.4%	1.5%	1.2%	1.1%	1.3%	1.6%	1.3%	1.3%	1.4%
GF/EF* Other	0.1%	0.0%	0.0%	0.1%	0.3%	-0.3%	0.2%	0.1%	0.2%	-0.9%	-0.2%	-0.3%
Total Adverse Scenario	**2.5%**	**2.2%**	**1.1%**	**2.0%**	**11.2%**	**7.2%**	**6.2%**	**8.2%**	**8.1%**	**7.1%**	**5.3%**	**6.9%**
Severely Adverse												
Sales Tax	2.1%	2.2%	1.2%	1.8%	4.7%	4.5%	3.4%	4.2%	4.5%	4.4%	3.2%	4.1%
Income Tax	1.9%	1.5%	0.8%	1.4%	9.3%	7.5%	9.3%	8.7%	8.0%	7.6%	9.6%	8.4%
Corporate Income Tax	0.6%	0.4%	0.7%	0.6%	2.1%	2.7%	2.6%	2.5%	1.9%	1.3%	2.2%	1.8%
GF/EF* Other	0.3%	0.4%	0.1%	0.3%	1.0%	-0.1%	0.6%	0.5%	0.1%	-0.4%	0.3%	0.0%
Total Severely Adverse Scenario	**4.9%**	**4.5%**	**2.9%**	**4.1%**	**17.1%**	**14.6%**	**15.9%**	**15.8%**	**14.5%**	**12.9%**	**15.4%**	**14.3%**

2016

Scenario	2017				2018				2019				2020				2021			
	LFA	GOMB	Tax	Consensus	LFA	GOMB	Tax	Consensus	LFA	GOMB	Tax	Consensus	LFA	GOMB	Tax	Consensus	LFA	GOMB	Tax	Consensus
Adverse																				
Sales Tax	0.0%	0.0%	0.0%	0.0%	2.4%	1.5%	2.1%	2.5%	1.6%	-0.1%	0.9%	1.9%	0.3%	-1.9%	-0.7%	-0.7%	-1.5%	-3.7%	-2.5%	-1.1%
Income Tax	2.0%	1.9%	1.1%	1.6%	4.7%	5.3%	5.9%	4.8%	2.5%	4.5%	5.0%	3.0%	-0.7%	3.0%	2.3%	1.6%	-4.8%	0.3%	-1.7%	-3.5%
Corporate Income Tax	0.2%	0.2%	0.3%	0.2%	0.4%	0.9%	0.8%	0.5%	0.1%	0.8%	0.6%	0.2%	-0.3%	0.4%	0.3%	0.7%	-0.8%	0.0%	-0.1%	-0.6%
GF/EF* Other	0.3%	0.0%	0.1%	0.2%	0.7%	0.4%	0.4%	0.7%	0.5%	0.3%	0.3%	0.6%	0.3%	0.0%	0.0%	-0.6%	-0.1%	-0.5%	-0.3%	-0.1%
Total Adverse Scenario	**2.4%**	**2.1%**	**1.5%**	**2.0%**	**8.2%**	**8.2%**	**9.2%**	**8.5%**	**4.8%**	**5.5%**	**6.8%**	**5.7%**	**-0.4%**	**1.5%**	**1.9%**	**1.0%**	**-7.2%**	**-3.9%**	**-4.7%**	**-5.3%**
Severely Adverse																				
Sales Tax	1.5%	1.0%	1.2%	1.3%	3.5%	2.0%	2.8%	3.7%	2.5%	0.2%	1.5%	3.0%	1.0%	-1.9%	-0.3%	2.0%	-1.0%	-3.9%	-2.3%	-0.5%
Income Tax	3.0%	2.6%	2.0%	2.5%	6.8%	7.3%	9.4%	7.2%	4.2%	5.3%	9.3%	5.1%	0.7%	1.9%	6.8%	1.3%	-3.8%	-1.7%	3.0%	-2.0%
Corporate Income Tax	0.5%	0.3%	0.5%	0.4%	0.6%	1.6%	1.4%	0.7%	0.3%	1.8%	1.5%	0.4%	-0.2%	1.7%	1.3%	-0.3%	-0.7%	1.5%	1.0%	-0.4%
GF/EF* Other	0.4%	0.1%	0.2%	0.4%	1.0%	0.8%	0.6%	1.0%	0.8%	0.4%	0.6%	0.9%	0.5%	-0.2%	0.3%	0.9%	0.0%	-0.9%	0.0%	0.0%
Total Severely Adverse Scenario	**5.4%**	**4.1%**	**3.9%**	**4.5%**	**11.9%**	**11.7%**	**14.2%**	**12.6%**	**7.8%**	**7.8%**	**12.8%**	**9.5%**	**2.0%**	**1.5%**	**8.2%**	**3.9%**	**-5.5%**	**-5.1%**	**1.8%**	**-2.9%**
Stagflation																				
Sales Tax	0.1%	-0.7%	-0.1%	-0.3%	1.6%	-0.4%	0.8%	1.5%	0.5%	-1.4%	0.4%	1.4%	-1.5%	-3.5%	-1.5%	-1.0%	-4.3%	-5.7%	-3.7%	-3.5%
Income Tax	0.2%	0.5%	0.2%	-0.5%	3.1%	3.5%	4.2%	2.9%	0.3%	1.3%	5.3%	0.9%	-4.1%	-3.2%	1.8%	-2.7%	-10.3%	-9.0%	-3.7%	-8.4%
Corporate Income Tax	0.0%	-2.8%	0.0%	0.0%	0.3%	0.7%	0.6%	0.3%	-0.1%	1.1%	0.7%	-0.2%	-0.6%	1.0%	0.5%	-0.4%	-1.3%	0.5%	0.0%	-1.1%
GF/EF* Other	0.0%	-0.3%	0.0%	-0.1%	0.5%	0.1%	0.3%	0.4%	0.2%	-0.3%	0.2%	0.6%	-0.2%	-1.2%	-0.1%	-0.2%	-0.9%	-2.3%	-0.6%	-0.8%
Total Stagflation Scenario	**0.3%**	**-3.2%**	**0.1%**	**-0.9%**	**5.5%**	**4.0%**	**5.9%**	**5.1%**	**1.0%**	**0.7%**	**6.5%**	**2.7%**	**-6.4%**	**-6.9%**	**0.6%**	**-4.2%**	**-16.8%**	**-16.5%**	**-7.9%**	**-13.7%**

Note: 2015–percent of FY 16 State Fund appropriations; 2016–percent of FY 17 State Fund appropriations.
* GF/EF = General Fund/Education Fund
Source: Utah Office of the Legislative Fiscal Analyst

Appendix Table 8. Initial Expenditure at Risk Results by Entity
Difference between baseline and scenarios as a percent of State Fund appropriations

2015

Scenario	2016			2017		
	GOMB	LFA	Consensus	GOMB	LFA	Consensus
Adverse						
Medicaid	0.8%	0.8%	0.8%	0.9%	0.9%	0.9%
Public Education	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Higher Education	0.4%	0.8%	0.6%	0.5%	1.3%	0.9%
Total Adverse Scenario	**1.8%**	**2.3%**	**2.1%**	**2.9%**	**3.7%**	**2.6%**
Severely Adverse						
Medicaid	1.0%	1.0%	1.0%	1.3%	1.3%	1.3%
Public Education	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Higher Education	0.7%	1.3%	1.0%	0.9%	2.0%	1.4%
Total Severely Adverse Scenario	**2.5%**	**3.0%**	**2.8%**	**4.0%**	**5.0%**	**3.5%**

2016

Scenario	2017			2018			2019			2020			2021		
	GOMB	LFA	Consensus	GOMB	LFA	Consensus	GOMB	LFA	Consensus	GOMB	LFA	Consensus	GOMB	LFA	Consensus
Adverse															
Medicaid	0.1%	0.9%	0.5%	0.2%	1.3%	0.7%	0.8%	1.6%	1.2%	1.6%	1.9%	1.8%	2.2%	2.2%	2.2%
Public Education	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.8%	1.6%	1.7%	3.2%	3.2%	3.2%	4.5%	4.9%	4.7%
Higher Education	0.0%	1.0%	0.5%	0.0%	1.8%	0.9%	1.4%	2.1%	1.7%	3.3%	2.5%	2.9%	4.4%	2.9%	3.6%
Retirement	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.1%	0.5%	0.3%	0.2%	1.0%	0.6%	0.4%	1.4%	0.9%
Total Adverse Scenario	**0.1%**	**1.9%**	**1.0%**	**0.2%**	**3.1%**	**1.6%**	**4.1%**	**5.8%**	**4.9%**	**8.3%**	**8.6%**	**8.5%**	**11.4%**	**11.4%**	**11.4%**
Severely Adverse															
Medicaid	0.2%	1.0%	0.6%	0.4%	1.3%	0.8%	1.3%	1.6%	1.4%	2.5%	1.9%	2.2%	3.0%	2.2%	2.6%
Public Education	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.8%	1.6%	1.7%	3.2%	3.2%	3.2%	4.5%	4.9%	4.7%
Higher Education	0.0%	1.0%	0.5%	0.0%	1.9%	1.0%	1.5%	2.3%	1.9%	4.0%	2.7%	3.4%	5.3%	3.1%	4.2%
Retirement	0.0%	0.0%	0.0%	0.2%	0.0%	0.1%	0.4%	0.1%	0.3%	0.8%	0.2%	0.5%	1.1%	0.4%	0.8%
Total Severely Adverse Scenario	**0.1%**	**2.1%**	**1.1%**	**0.6%**	**3.3%**	**1.9%**	**4.9%**	**5.6%**	**5.3%**	**10.5%**	**8.0%**	**9.3%**	**14.0%**	**10.5%**	**12.3%**
Stagflation															
Medicaid	0.1%	0.7%	0.4%	0.1%	0.9%	0.5%	0.7%	1.2%	0.9%	1.4%	1.5%	1.4%	1.9%	1.8%	1.8%
Public Education	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.8%	1.6%	1.7%	3.2%	3.2%	3.2%	4.5%	4.9%	4.7%
Higher Education	0.0%	0.7%	0.3%	0.0%	0.6%	0.3%	1.3%	0.9%	1.1%	3.1%	1.3%	2.2%	5.5%	1.6%	3.5%
Retirement	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.3%	0.2%	0.3%	0.6%	0.4%	0.4%	0.9%	0.7%
Total Stagflation Scenario	**0.1%**	**1.4%**	**0.7%**	**0.1%**	**1.5%**	**0.8%**	**3.9%**	**4.0%**	**4.0%**	**8.0%**	**6.6%**	**7.3%**	**12.3%**	**9.2%**	**10.8%**

Note: 2015–percent of FY 16 State Fund appropriations; 2016–percent of FY 17 State Fund appropriations.
Source: Utah Office of the Legislative Fiscal Analyst

Appendix Table 9. Reserves and Other Contingencies, 2015

Reserves and Other Contingencies	One-time	Ongoing	Total
Easy to Access			
Cash Funded Buildings	$264.6	$0.0	$264.6
Unappropriated Balance	$19.4	$0.0	$19.4
Medicaid Budget Stabilization Restricted Account	$17.1	$0.0	$17.1
Medicaid Restricted Account	$8.6	$0.0	$8.6
Easy to Access Total	**$309.7**	**$0.0**	**$309.7**
Moderately Easy to Access			
Nonlapsing Balances	$309.9	$0.0	$309.9
Cash Funded Roads	$147.1	$0.0	$147.1
Capital Improvements FY 2016 Appropriated	$0.0	$111.5	$111.5
Moderately Easy to Access Total	**$457.0**	**$111.5**	**$568.5**
Somewhat Difficult to Access			
Transportation Investment Fund of 2005	$544.5	$16.8	$561.3
Carry Forward Balances Appropriated in a Future Year	$398.2	$0.0	$398.2
Restricted Fund Balances	$187.0	$0.0	$187.0
Utah State Revolving Fund for Wastewater Projects	$81.5	$0.0	$81.5
State Revolving Fund for Drinking Water Projects	$51.5	$0.0	$51.5
Water Resources Conservation & Development Fund	$32.1	$0.0	$32.1
Industrial Assistance Account	$27.4	$0.0	$27.4
Water Resources C&D Pledged Loans	$24.8	$0.0	$24.8
Utah Wastewater Loan Program Subaccount	$13.8	$0.0	$13.8
Water Resources Construction Fund	$10.3	$0.0	$10.3
Water Resources Cities Water Loan Fund	$8.6	$0.0	$8.6
Water Quality SRF Hardship Assessment	$5.9	$0.0	$5.9
Utah Drinking Water Loan Program Subaccount	$4.5	$0.0	$4.5
Drinking Water SRF Hardship Fee Account	$3.1	$0.0	$3.1
Hardship Grant Program for Drinking Water Projects	$1.4	$0.0	$1.4
Water Resources Cities Pledged Loans	$1.4	$0.0	$1.4
Hardship Grant Program for Wastewater Projects Subaccount	$0.6	$0.0	$0.6
Tourism Marketing Performance Account	$0.5	$0.0	$0.5
Water Quality Origination Fee-Federal	$0.5	$0.0	$0.5
Drinking Water Origination Fee-Federal	$0.4	$0.0	$0.4
Drinking Water Origination Fee Subaccount	$0.1	$0.0	$0.1
Water Quality Origination Fee Subaccount	$0.0	$0.0	$0.0
Water Resources 2010 Recap Rev Bond	-$2.4	$0.0	-$2.4
Somewhat Difficult to Access Total	**$1,395.7**	**$16.8**	**$1,412.6**
Difficult to Access			
Education Fund Budget Reserve Account	$349.5	$0.0	$349.5
General Fund Budget Reserve Account	$141.2	$0.0	$141.2
State Disaster Recovery Restricted Account	$20.5	$0.0	$20.5
Difficult to Access Total	**$511.1**	**$0.0**	**$511.1**
Very Difficult to Access			
Permanent State School Fund	$2,137.6	$0.0	$2,137.6
State Endowment Fund	$169.1	$0.0	$169.1
Very Difficult to Access	**$2,306.7**	**$0.0**	**$2,306.7**
All Degrees of Access			
Total Reserves and Other Contingencies	**$4,980.2**	**$128.4**	**$5,108.6**

Source: Utah Office of the Legislative Fiscal Analyst

Appendix Table 10. Reserves and Other Contingencies, 2016

Reserves and Other Contingencies	One-time	Ongoing	Total*
Easy to Access			
Cash Funded Buildings	$108.6	$20.0	$208.6
Medicaid Budget Stabilization Restricted Account	$25.9	$0.0	$25.9
Medicaid Restricted Account	$16.4	$0.0	$16.4
Unappropriated Balance	$10.4	$0.0	$10.4
Easy to Access Total	**$161.3**	**$20.0**	**$261.3**
Moderately Easy to Access			
Nonlapsing Balances	$286.1	$0.0	$286.1
Cash Funded Roads	$252.0	$0.0	$252.0
Half of Capital Improvements Funding	$1.2	$58.9	$295.8
Other Earmarks	$0.0	$53.0	$265.0
Moderately Easy to Access Total	**$539.3**	**$111.9**	**$1,098.9**
Somewhat Difficult to Access			
Transportation Investment Fund of 2005	$444.9	$0.0	$444.9
Restricted Fund Balances	$180.7	$0.0	$180.7
Utah State Revolving Fund for Wastewater Projects	$96.3	$0.0	$96.3
State Revolving Fund for Drinking Water Projects	$59.0	$0.0	$59.0
Half of Capital Improvements Funding and $1.2M for one-time project	$0.0	$58.9	$294.6
Water Resources Conservation & Development Fund	$35.6	$0.0	$35.6
Water Resources C&D Pledged Loans	$27.7	$0.0	$27.7
Industrial Assistance Account	$23.5	$0.0	$23.5
Utah Wastewater Loan Program Subaccount	$19.4	$0.0	$19.4
Water Resources Construction Fund	$13.2	$0.0	$13.2
Water Resources Cities Water Loan Fund	$8.1	$0.0	$8.1
Water Quality SRF Hardship Assessment	$6.2	$0.0	$6.2
Utah Drinking Water Loan Program Subaccount	$5.4	$0.0	$5.4
Drinking Water SRF Hardship Fee Account	$2.8	$0.0	$2.8
Water Resources Cities Pledged Loans	$2.1	$0.0	$2.1
Water Quality Origination Fee-Federal	$1.1	$0.0	$1.1
Hardship Grant Program for Wastewater Projects Subaccount	$1.1	$0.0	$1.1
Hardship Grant Program for Drinking Water Projects	$0.8	$0.0	$0.8
Tourism Marketing Performance Account	$0.5	$0.0	$0.5
Drinking Water Origination Fee-Federal	$0.2	$0.0	$0.2
Water Quality Origination Fee Subaccount	$0.1	$0.0	$0.1
Drinking Water Origination Fee Subaccount	$0.0	$0.0	$0.0
Water Resources 2010 Recap Rev Bond	-$2.4	$0.0	-$2.4
Somewhat Difficult to Access Total	**$926.2**	**$58.9**	**$1,220.8**
Difficult to Access			
Education Fund Budget Reserve Account	$349.5	$0.0	$349.5
General Fund Budget Reserve Account	$143.6	$0.0	$143.6
State Disaster Recovery Restricted Account	$20.5	$0.0	$20.5
Difficult to Access Total	**$513.6**	**$0.0**	**$513.6**
Very Difficult to Access			
State Endowment Fund	$171.4	$0.0	$171.4
Very Difficult to Access	**$171.4**	**$0.0**	**$171.4**
All Degrees of Access			
Total Reserves and Other Contingencies	**$2,311.8**	**$190.8**	**$3,265.9**

* Total = one-time + five years of ongoing
Source: Utah Office of the Legislative Fiscal Analyst

Appendix Table 11. Budget Cuts And Revenue Increases As Buffers
$ Millions

Session	FY	Budget Cuts	Revenue Increases	Revenue Multiplied	Shortfall	Cut % Shortfall	Rev % Shortfall	GF/EF* Budget	Cut % Budget	Rev % Budget
2008S2	2009	$161	–	–	$354	45.5%	0.0%	$5,574	2.9%	0.0%
2008S2	2010	$251	–	–	$272	92.3%	0.0%	$5,413	4.6%	0.0%
2009	2009	$116	$2	$6	$521	22.3%	1.2%	$5,413	2.1%	0.1%
2009	2010	$317	$59	$177	$685	46.3%	25.8%	$5,162	6.1%	3.4%
2010	2010	$70	–	–	$208	33.7%	0.0%	$4,845	1.4%	0.0%
2010	2011	$75	$43	$43	$482	15.6%	8.9%	$4,770	1.6%	0.9%
		$990	**$104**	**$226**	**$2,522**	**39.3%**	**9.0%**	**$31,177**	**3.2%**	**0.7%**

* GF/EF = General Fund/Education Fund
Source: Utah Office of the Legislative Fiscal Analyst

Endnotes

1   Gardner Policy Institute was unable to find any documentation of an earlier budget stress test by another state. Experts from the National Conference of State Legislatures and National Association of State Budget Officers confirmed that they knew of no earlier stress tests (Perez 2018) (Hicks 2018).

2   Captures all action as of December 2018.

3   Additionally, Minnesota and North Carolina legislatures have both passed legislation requiring optimal reserve size analyses (Bailey 2017) (Pew Charitable Trusts 2015).

4   The Volcker Alliance Truth and Integrity in State Budgeting project confirmed that Utah's budget practices are among the best in the nation, but the state's lack of multi-year revenue and expenditure forecasts was an area of weakness (Volcker Alliance 2017). Encouraged by the Volcker finding, Utah's legislature passed House Bill 452, building out a three-year cycle of fiscal sustainability analysis that starts with the originally required revenue volatility report in the first year, long-term budget preparation in the second year, and a budget stress test in the third year.

4   The forecasts that underpin Utah's governor's budget recommendations and legislative appropriations start with the convening of a group of public and private sector economists and analysts, known as the Revenue Assumptions Working Group (RAWG), to develop a set of economic assumptions for the budget period. After independently forecasting state revenues using RAWG assumptions, GOMB, LFA, and the Utah State Tax Commission agree upon a consensus revenue forecast. GOMB and LFA also use the RAWG assumptions, among other indicators, to develop consensus forecasts for public education and Medicaid enrollment.

5   See Appendix Figure 1 for a diagram of REMI model linkages.

6   REMI produces percent change in unemployment rates relative to baseline, as opposed to actual unemployment rates. Therefore, Gardner analysts applied these change results to RAWG unemployment rate baseline assumptions to produce unemployment rate scenarios.

7   See Appendix Tables 1 and 2 for the RAWG economic assumptions available at the time of 2015 and 2016 stress tests. RAWG updates assumptions for a set of 54 economic indicators on a quarterly basis.

8   The IHS Markit estimates are part of a U.S. macroeconomic forecasting service that the state subscribes to and uses in its regular revenue forecasting process.

9   The 2016 economic assumptions also include special population variables which were available but not used in 2015. These variables were used to refine the analysis of Medicaid expenditures at risk. See Expenditures at Risk section of this report for further discussion of this and lagged effects on public education enrollment and pensions.

10   LFA's cost for REMI and Moody's data combined was about $60,000 one-time and $10,000 per year ongoing. LFA uses both resources for other purposes in addition to stress testing (revenue estimates, dynamic fiscal notes, tax evaluation, etc.). While the Federal Reserve scenarios were free, LFA had to share them down with REMI.

11   IHS Markit updates its state forecasts on a semi-annual basis, compared to Moody's monthly basis.

12   See, for example, p. 12 in the 2015-2016 Budget of the State of Utah and Related Appropriations Report (Utah Office of the Legislative Fiscal Analyst 2015). The analysis did not include any federal funds.

13   See Appendix Table 7 for initial LFA, GOMB, and Tax estimates.

14   Pension expenditures are not line-item appropriations in the state of Utah's operating budget. Based on data provided by LFA, Gardner analysts estimated state funded expenditures for pensions are approximately 2 percent of the total General and Education fund budget.

15   Analysts did not estimate FY 2015 expenditure impacts, assuming minimal changes to demand in the final months of the fiscal year that could be addressed with current appropriations.

16   Baseline in the analysis does not assume growth (constant). In Utah, the base budget is defined as last year's ongoing appropriation. Other states where growth is included in the base may want to take a different approach.

17   In previous recessions, new Medicaid enrollees tended, on average, to be healthier than the Medicaid population during economic expansions, pushing per capita costs down. Therefore, the Medicaid value at risk results in the 2015 and 2016 may be upwardly-biased. Higher education value at risk might also be biased upwards to the extent that marginal costs per student are lower than average costs per student.

18   See Appendix Table 8 for initial GOMB and LFA estimates.

19   For example, in the 2007 and 2008 General Session, the state of Utah was cash funding buildings ($63 million and $129.2 million, respectively). Paying cash for capital projects helped the Utah State Legislature avoid incurring additional general obligation debt for buildings. During the 2009 General Session, the Legislature authorized $115 million in general obligation debt. Having this ability to move to bonding to free up cash was beneficial to Utah to maintain its investment in infrastructure (Utah Office of the Legislative Fiscal Analyst, 2007, 2008, 2009).

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