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Stress-Testing States

Introduction

One of the few great inescapable facts in the field of economics is the reality of the business cycle. No matter how high-flying an economy might appear, another recession is coming sooner or later. It can be difficult, if not impossible, to regularly predict when one might occur, or how severe it may be, but recessions and their place in the business cycle are an accepted fact of economic life. Therefore, preparing for recessions is an equally inescapable concept.

It has been more than eight years since the end of the last recession, the third longest period of expansion in U.S. history, and many are rightfully beginning to look ahead to the next economic downturn. However, one of the most effective ways to look forward is to look back and make sure that we have adequately learned the lessons of the Great Recession. Nowhere is this type of postmortem more appropriate than for state and local governments.

Stress-Testing States

BY DAN WHITE, BERNARD YAROS AND BRITTANY MEROLLO

O ne of the few great inescapable facts in the field of economics is the reality of the business cycle. No matter how high-flying an economy might appear, another recession is coming sooner or later. It can be difficult, if not impossible, to regularly predict when one might occur, or how severe it may be, but recessions and their place in the business cycle are an accepted fact of economic life. Therefore, preparing for recessions is an equally inescapable concept.

It has been more than eight years since the end of the last recession, the third longest period of expansion in U.S. history, and many are rightfully beginning to look ahead to the next economic downturn. However, one of the most effective ways to look forward is to look back and make sure that we have adequately learned the lessons of the Great Recession. Nowhere is this type of postmortem more appropriate than for state and local governments.

In the five fiscal years immediately following the start of the Great Recession, state and local governments shed almost 750,000 workers. Though this undoubtedly cut waste and increased efficiency in many governments across the country, it also was a painful and disruptive change to many parts of the economy. The loss of so many mid-wage jobs over so short a time is a big reason that the Great Recession was followed by the not-so-great recovery. Research shows that extraordinary fiscal actions can harm regional and national economic recoveries, differentiating performance relative to that of neighbors.[1]

To be fair, state and local governments typically lag the economy coming out of a recession, so it is no wonder that their payrolls should have shrunk significantly following the largest economic downturn in more

Stress-Test Findings

» 16 states have the funds they need for the next recession
» 19 states have most of the funds they need for the next recession
» 15 states have significantly less funds than they need for the next recession

than a generation. However, something was different about the way the Great Recession impacted states in particular, but also their local government counterparts.

During the immediate five years of the recovery, state and local government employment lagged the rest of the economy by a larger margin than ever before (see Chart 1). Almost a decade later, state and local government payrolls have still not recovered to prerecession levels, plateauing around 300,000 jobs below the previous peak. On a per-capita basis, there are actually fewer state and local government employees today than at any time since the late 1980s.

As we near the top of the current business cycle, this raises the question: Aside from its severity, why was the Great Recession so different from previous ones for states and local governments? Examining this question in detail not only offers policymakers some key lessons learned, but also new ways to act on those lessons.

This paper will identify and discuss some of those lessons with a specific emphasis on states, though most of the findings could apply just as easily to cities, counties, and other local governments. In addition to looking back at lessons learned, this paper will also look forward by putting state budgets through a stress test to gauge exactly how prepared they are for the next recession. Encouragingly, a majority of states ultimately passed this test, but too many are still woe-

Chart 1: This Time Really Was Different

Cumulative job growth after 5 yrs of recovery, by recession, %
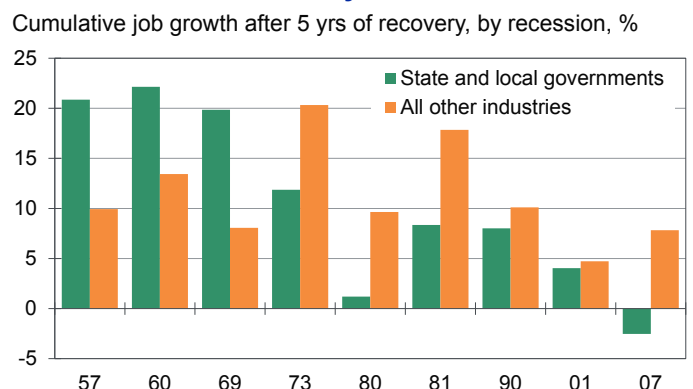
Sources: Census Bureau, Moody's Analytics

1 Dan White, "A Tale of Two Recessions: The Influence of State Fiscal Actions on Regional Recoveries," Moody's Analytics Regional Financial Review (October 2011).

fully underprepared for the next change in the business cycle. Focusing on states is key to this discussion because their budgets have not only experienced the most significant changes in relation to turns in the business cycle, but also because local government fiscal conditions depend in large part on the amount of aid and support they receive from states.

This time really is different

The first characteristic that stands out about the Great Recession, as it relates to state budgets, is that it had a much greater impact than previous recessions, even when controlling for its historic severity. Almost every state was forced to take some form of extraordinary fiscal action by raising revenues or cutting spending. Many did both. And although state tax revenues fully recovered by 2015, accounting for inflation, newspapers even a decade later are still filled with headlines about state budget woes. Almost a dozen states had no budget at the end of fiscal 2017, despite a national unemployment rate of less than 5% and real GDP growth of better than 2%. It is clear that this time really is different, but how?

Lesson 1: Recessions affect revenues AND spending.

To better understand why the Great Recession was so much more stressful on states than previous recessions, it is important to break down exactly what happens to a state budget during an economic downturn. The most easily recognizable sign of a recession for most observers is a decline in tax revenue collections. This is understandable, given that tax revenues are a function of the economy upon which they are levied. Therefore, as economic activity slows or declines, tax revenues will subsequently slow or decline in turn. Though this is the sign keyed into by most recession watchers, it is not the first state budget indicator to give off recessionary alarm bells, and the Great Recession was a textbook example.

For evidence, look back to the summer of 2008. Fiscal conditions were extremely healthy in most cases, and states were still hiring new workers. In fact, state government employment did not peak nationally until August of that year, despite the fact that the Great Recession was already in its ninth month at that point. For even greater context, at least one natural resource state was so confident in its surplus that it actually gave rebates to taxpayers as oil prices hit more than $140 per barrel that summer. Though the recession had been in full swing for the better part of a year, the first realization from many that something was genuinely wrong did not occur until the financial crisis hit a fever pitch that September with the collapse of Lehman Brothers.

Meanwhile, there was at least one person in most every state who knew, or should have known, that we had entered a recession far earlier: the state Medicaid director. State Medicaid enrollment jumped significantly beginning in the first half of 2008 as the number of unemployed Americans began to rise in earnest (see Chart 2). This gave those looking for the right signs an indication that things were not all right in the world of state fiscal policy almost a full nine months before state taxes began their first year-over-year declines.

This matters a great deal for states looking ahead to the next recession. Unlike at the federal level, where policymakers can borrow for operations, state and local government budgets are a zero-sum game. Every additional dollar spent on mandatory programs such as Medicaid is a dollar that cannot be spent on discretionary outlays such as education, public safety or infrastructure. Increased Medicaid spending was more of a problem for states during the Great Recession than during previous downturns because that spending has consistently grown at a much faster rate than the revenues that states use to fund the program (see Chart 3). By regularly outpacing revenues, the zero-sum nature of state budgets have made Medicaid a much larger portion of total state spending over time.

The full impact of higher state Medicaid burdens was somewhat offset during the Great Recession by enhanced federal funding. However, the fact remains that states are much more vulnerable to recessionary budget changes on the spending side of the ledger than they have been in the past. What is more, especially in today's fiscal environment, they may not always be able to count on the federal government helping them lessen future recessionary burdens.

Chart 2: Revenues and Spending
% change yr ago
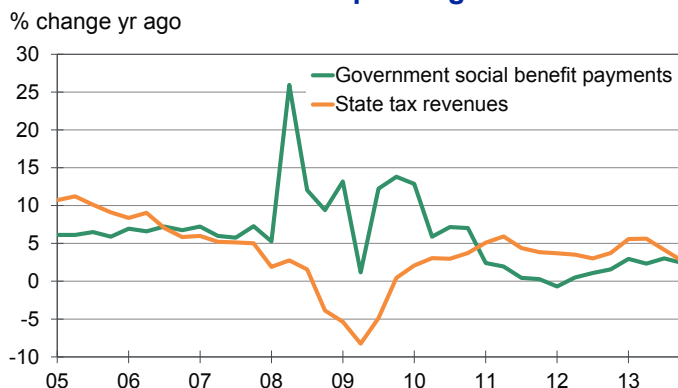
Sources: BEA, Moody's Analytics

Chart 3: Unsustainable Medicaid Path
States and local governments, 1965Q1=100
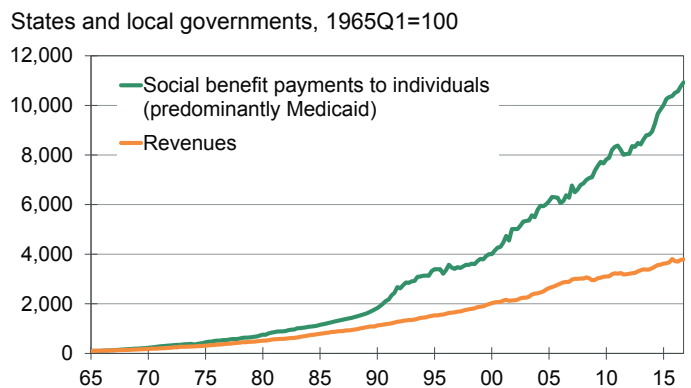
Sources: BEA, Moody's Analytics
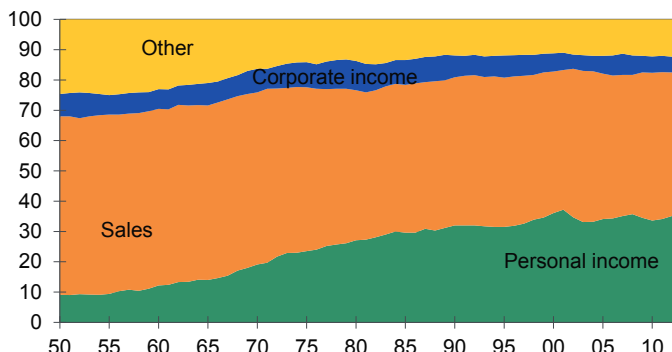
Chart 4: Increased Volatility in Tax Collections

Standard deviation of annual % change

Sources: Census Bureau, BEA, Moody's Analytics

Chart 5: Growing Reliance on Income Taxes

State personal income tax revenues, % of total tax revenue

Sources: Census Bureau, Moody's Analytics

Lesson 2: Recessions impact revenues differently than they used to.

Although Medicaid will play a larger role in state budgets throughout the business cycle, the lion's share of recessionary state fiscal impacts will still come by way of decreased tax revenues. However, the degree to which that revenue will decline because of a recession is not always as clear-cut as it might seem. The underlying relationship between tax revenues and the economy has changed considerably over time, and as a result, tax revenues have become much more sensitive to changes in the business cycle (see Chart 4).[2] State tax revenues were around three times more volatile than the underlying economy in the first decade of the 2000s, a significant break with previous decades. Such growing volatility is primarily the result of two long-term trends in state tax policy.

First, states are relying more heavily on increasingly progressive personal income tax structures. This is at least in part a reflection of long-term changes in the U.S. economy, particularly its transition from a reliance on goods producers to an orientation around services. An overwhelming majority of services are exempt from sales taxes, and personal income taxes have grown in importance to most states over the past half-century as a result (see Chart 5). Personal income tax revenues are much more volatile than sales taxes because they are linked ex-

plicitly to personal income and not personal consumption, which proves much more stable over time.

What is more, as part of more explicit tax reforms taking place largely over the past two decades, states have exacerbated that volatility by relying more heavily on a smaller number of high-income taxpayers for revenue. A growing number of states have added new tax brackets or raised rates in an effort to enact tax hikes on their highest-income earners. This in and of itself is not necessarily a bad thing from the perspective of tax policy. Though it can obviously be overdone and limit competitiveness with other states, to maximize fairness, most tax structures should be at least somewhat progressive.

However, an often unintended side effect of that progressivity is the introduction of more volatility. Think of it in the context of portfolio theory in the field of finance. By putting more of their eggs in one basket, states have become less diversified in their tax portfolios. More important, they have become more dependent on taxpayers with extremely volatile incomes. Taxpayers in the top 1% of the income distribution can easily swing from a $15 million gain one year

to a $15 million loss the next. That manifests itself in higher highs and lower lows for state tax collections.

As a result, the decline in state tax revenues was much steeper during the Great Recession than during any other U.S. recession for which we have reliable records. In fact, just to demonstrate the gradual impact that changes in state tax policy have had, before the 2001 recession, combined U.S. state tax revenues had never experienced an outright year-over-year decline (see Chart 6). This relationship can vary significantly from one state to another, however, based on a state's industrial base and tax structure. In general, those states with the most cyclical economies, for example energy or other commodity states, and those states that rely most on very progressive personal income tax systems will experience the most revenue volatility over time.

Chart 6: Historic Declines in the 21st Century

State tax revenue, % change
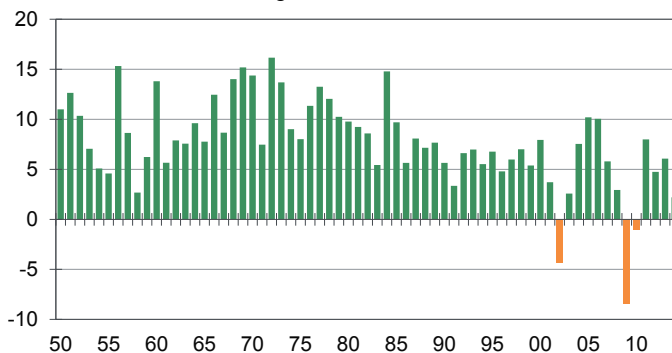
Sources: Census Bureau, Moody's Analytics

The second reason that state revenues have grown more volatile over the past few decades relates to distortions introduced through the growing use of economically targeted tax incentives. Like progressivity in a tax code, the use of these incentives is not in and of itself inherently bad fiscal policy, especially when done transparently and with plenty of protection for taxpayers. However, it carries with it the unintended consequence of distorting the relationship between tax revenues and the underlying economy.

If an incentive is working properly it should be helping to generate more economic activity, but this also often means that some of the fastest growing pieces of an economy are growing tax-free. Additionally, these incentives are often not tracked very closely. This decouples tax collections from underlying measures of economic growth and can make life extremely difficult for economists and revenue estimators trying to project future revenue collections. This is one of a handful of factors increasing the amount of error in state revenue forecasts. Projecting state tax revenues is harder today than it has ever been, a fact backed by research that shows average state forecasting errors steadily growing over time.[3]

Lesson 3: Preparedness is key.

Past performance is not always a good indicator of future success or, in this case, failure. Even under the best of circumstances the most seasoned professional forecaster is not going to be able to consistently and routinely predict the precise timing and severity of every oncoming recession. Nevertheless, policymakers must make major policy decisions with the best available information. Though the risk of forecast error can never be eliminated, it can be mitigated through proper preparation and flexibility.

One characteristic of the financial crisis that stands out most was the degree to which state and local governments were generally underprepared for any economic downturn, let alone one the size of the Great Recession. This lack of preparation left some policymakers budgeting without a net at the absolute worst time.

At the start of fiscal 2008 the median rainy-day fund balance of states was approximately 5% of general fund expenditures, which proved wholly inadequate to offset the full brunt of the Great Recession (see Chart 7). It should be noted that overall state fund balances were higher, at just more than 8% of general fund expenditures, giving those states with adequate financial flexibility a marginally higher line of defense against the recession. However, many states had no such flexibility, which limited their ability to react outside of budget cuts and tax hikes.
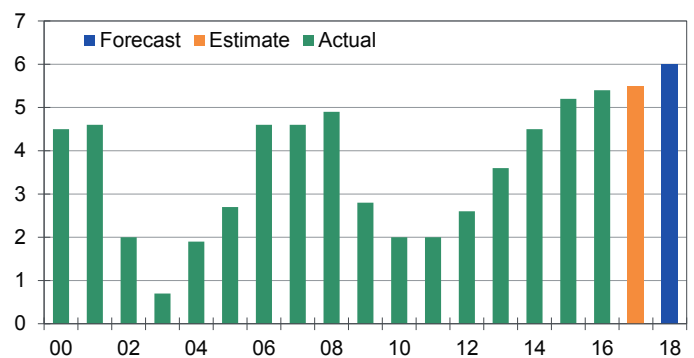
What is more, some of those states that did have sizable reserves had trouble using them because of vagaries about what the fund balances were intended for. In these instances, policy debates about the true intention of these reserves were often lengthy enough to delay the use of funds until economic and fiscal conditions had worsened considerably. Research shows that this is still an issue in a majority of states. The Pew Center on the States, for example, recently found that 29 states still do not include economic or revenue fluctuations as criteria for when funds should be withdrawn from reserves.[4]

Preparing for the inevitable

All of these lessons highlight the need for states to formulate specifically targeted reserve levels with intentionally crafted policy goals in mind. A well-crafted reserve policy, fiscal flexibility, and careful planning are still the best ways to protect a state's budget and economy in times of economic distress. This of course raises one additional question: How much should a state put away in its rainy-day reserve?

There is not always an easy answer. State policymakers must make sure that their reserves are large enough to protect their budgets in times of economic distress but not so large as to deprive important programs of much-needed funding. The economic impacts of inadequate funding for education and infrastructure in particular can be devastating. Planning for the next recession thus involves the difficult balancing act of putting away enough money to avoid having to make a major fiscal correction without stunting the pace of economic growth.

The tool that can make that balancing act more manageable is stress-testing.

In the wake of the Great Recession, the private sector has become acutely aware of the necessity of planning for economic downturns. In fact, the U.S. government in some cases has moved to require the private sector, specifically banks, to publicly stress-test for a rainy day. These same principles can be redirected to government with an aim toward protecting budgets and the economy.

Moody's Analytics pioneered the concept of stress-testing the public sector several years ago, after a study found that the average state would need a dedicated rainy-day reserve fund of approximately 8.5% of general fund revenues to survive one year of recessionary effects without cutting spending or raising revenues.[5] However, the outcome

Chart 7: States Were Not Ready for a Rainy Day
Median state rainy-day fund balance, % of expenditures

Sources: NASBO, Moody's Analytics

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3   Donald Boyd and Lucy Dadayan, "State Tax Revenue Forecasting Accuracy: Technical Report," The Nelson A. Rockefeller Institute of Government (September 2014).

4   Robert Zahradnik, "When to Use State Rainy Day Funds," The Pew Charitable Trusts (April 2017).

5   Dan White, "Stress-Testing State and Local Reserves," Moody's Analytics Regional Financial Review (August 2014).

of that paper was limited by the fact that it modeled the effects of a hypothetical recession on state governments as a whole to determine the outcome for an "average" state.

Subsequent research and the experience of Moody's Analytics working with individual states have highlighted the fact that the "average" state does not exist, and that a wide degree of variation can exist from one state to another, especially in terms of revenue impacts. To address those variations, this paper will stress-test all 50 states individually for a more accurate representation of their potential recessionary needs.

Generating fiscal stress

The mechanics of stress-testing are relatively simple and depend on the use of alternative economic scenarios. As part of its monthly forecasting process, Moody's Analytics generates nine different alternative economic scenarios to accompany the U.S. and regional baseline forecasts. These scenarios are designed to capture the most pressing forecast risks facing the economy today, varying widely from an oil price shock all the way to another major recession. These monthly scenarios are estimated at the national, state and metro area level, and custom scenarios can be generated at the county level, giving policymakers the ability to stress-test fiscal assumptions with increasing granularity.

For this exercise we selected two recession scenarios, one moderate and one severe, to give us as broad a range of downside options as possible. Before describing these scenarios, it should be made clear that Moody's Analytics does not project a near-term recession in its baseline forecast. Though another recession is inevitable, the odds of it beginning within the current fiscal year are low. Nevertheless, each of the recession scenarios used in this stress test are assumed to begin in fiscal 2018. The moderate recession scenario is roughly in line with what economists would characterize as a "normal" recession, if such a thing exists, while the severe scenario would be more in line with the losses experienced during the Great Recession (see Chart 8). To perform the stress tests, certain simplifying assumptions had to be made.

First, state balanced-budget requirements were assumed to hold true. State and local governments, in general, are not permitted to issue long-term debt for operations. There are some practical ways around this, particularly with regard to public pensions and other post-employment benefits, but for the purposes of this exercise, we assume that state spending habits are constrained by the amount of revenue collected.

Second, the levers used to stress state budgets were limited to changes in general fund revenues and Medicaid spending. As revenues decline during a recession, subnational governments have less to spend, while at the same time they experience more demand for government services. To avoid having to drastically cut spending or raise taxes, governments would need to hold in reserve at least enough funds to make up for declines in revenue and meet higher demands for services. These services obviously extend beyond Medicaid. Funding demands for other general fund programs would also increase, along with programs that typically fall outside the state general fund such as unemployment insurance. However, these pro-grams pale in comparison with the scope of Medicaid in terms of their state general fund impact. Therefore, the recessionary impacts estimated on the spending side of the ledger in this exercise should be considered a lower bound. More precise spending impacts could be estimated by individual states, both for social services programs and discretionary needs such as education, by injecting more detailed spending data into the process.

Third, the baselines to which these alternative estimates are compared differ slightly from our previous work. Medicaid spending will still be compared with its dynamic baseline forecast. However, revenue forecasts will not. Instead, the alternative scenarios for revenues will be judged compared with an underlying inflation rate of 2%. Though state policymakers may have originally included more revenue growth in their fiscal 2018 and fiscal 2019 budgets, it is more realistic to compare changes in revenue with the previous year's figures plus inflation as opposed to a potentially optimistic or inconsistent baseline revenue forecast. This gives us a true measure of how much funds would be necessary to strictly avoid disruptive fiscal corrections throughout a recession.

General fund revenues were forecast using Moody's Analytics proprietary state tax revenue models. These models rely on ordinary least squares regression techniques to tie underlying forecasts for major economic variables to future changes in state revenues. The regressions are based on historical general fund revenue data reported by the National Association of State Budget Officers in its semiannual *Fiscal Survey of the States* publications, and they attempt to control for past legislative tax changes, which can distort historical revenue data during economic downturns. These forecasts are prepared using an individual regression equation for each state, allowing the use of specific economic drivers custom tailored to each state's specific tax and industrial structure.

Spending needs were forecast using Moody's Analytics proprietary Medicaid models[6], which are slightly more complex

## Chart 8: Alternative Scenarios
Real GDP, prerecession peak=100
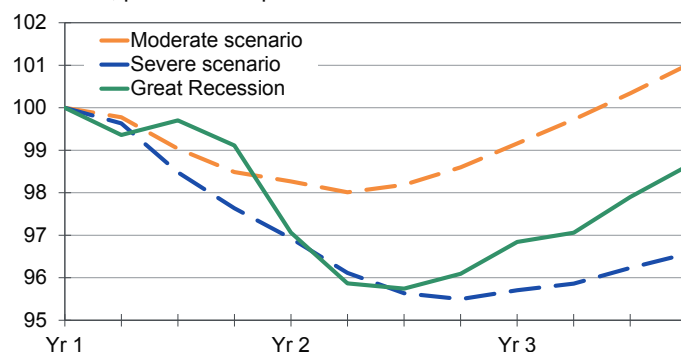
Sources: BEA, Moody's Analytics

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6   Dan White and Michael Brisson, "Moody's Analytics State Medicaid Forecast Model," Moody's Analytics Regional Financial Review (June 2015).
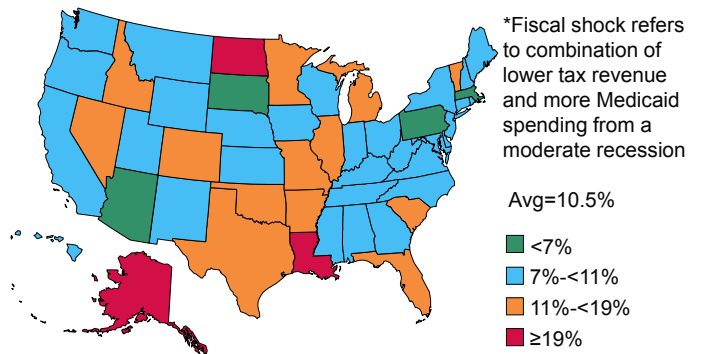
Chart 9: Larger Costs, but Less Volatility
Federally approved expansion status as of fiscal 2017

*Includes
Washington DC

■ Expansion*
■ Non-expansion
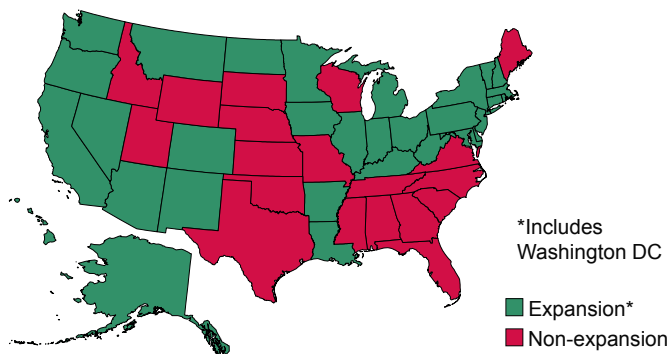
Sources: Kaiser Family Foundation, Moody's Analytics

Chart 10: Recession Affects States Differently
Fiscal shock as a share of estimated fiscal 2017 revenues*

*Fiscal shock refers
to combination of
lower tax revenue
and more Medicaid
spending from a
moderate recession

Avg=10.5%

■ <7%
■ 7%-<11%
■ 11%-<19%
■ ≥19%

Source: Moody's Analytics

than the revenue models. Because the share of overall Medicaid expenditures is constantly fluctuating between states and the federal government, compiling an econometric forecast of strictly Medicaid spending can be problematic. Therefore, the Medicaid forecast model actually begins with a forecast of Medicaid enrollment, which is more directly tied to underlying economic changes than total spending numbers.

This is accomplished through OLS regression techniques tying forecasts for measures of underlying economic growth, specifically the number of unemployed persons in the economy, to future levels of Medicaid enrollment. Those enrollment numbers are then augmented by estimates from the Centers for Medicaid and Medicare Services as to the number of additional people expected to enroll in Medicaid for noneconomic reasons associated with the Affordable Care Act. As part of the ACA, 31 states have voluntarily expanded their Medicaid programs to include new enrollees funded in large part by the federal government. The Medicaid model assumes a current law baseline, meaning that no new states are assumed to expand their Medicaid programs during the forecast period. Therefore, the Medicaid projections included in this study could be disrupted should other states choose to expand their programs (see Chart 9).

Lastly, enrollment forecasts are married to costs per enrollee to develop a full estimate of future state Medicaid spending needs. Costs per enrollee forecasts are taken

from the Centers for Medicare & Medicaid Services Annual Actuarial Report on the Future of Medicaid, and individual state costs are assumed to maintain their current relationship to the national average throughout the forecast.

Measuring preparedness

The overall results of this exercise find that in order to weather the next recession without having to resort to potentially disruptive fiscal measures, an average state would need to have more than 10% of its budget put away in reserve. To weather an even larger downturn, akin to the Great Recession, an average state would need more than 16% (see Tables 1 and 2).

These figures reflect a state revenue downturn and Medicaid increase over a period of two fiscal years, and to reiterate, the decline in revenues is relative to the long-term pace of inflation, not what may have been previously forecast as part of the baseline budget projections. Looking closely at the detailed, state-by-state results, several other key findings are revealed as well.

First, there is no such thing as an average state (see Chart 10). Each state's tax and industrial structure makes it unique in its reaction to a recession, underlining the necessity for all states to stress-test their own needs for recession preparedness as opposed to a one-size-fits-all approach for the whole country. There is a tremendous amount of variance among the recessionary needs of different states.

Alaska, for example, highly dependent on volatile commodity markets for tax revenue, has the largest potential fiscal shock during a moderate recession, at more than 40% of its budget. Meanwhile, Arkansas has a much less volatile tax or economic structure, limiting its liabilities to around 7% of its general fund budget. As a result, when asked, "How much should a state put away for a rainy day?" the answer, as to so many other good economic questions, is that "it depends." Each state's target is unique to its volatility and, ultimately, risk tolerance.

Second, about 85% of the simulated fiscal stress in this exercise boiled down to lost tax revenue as opposed to greater Medicaid needs. The 15% or so of the stress attributable to increased spending needs is assuredly an understatement, as it ignores several other previously mentioned social service programs. However, even accounting for this slight understatement, the share of the total recessionary fiscal stress from Medicaid was lower than expected.

The simulated Medicaid shock to states was less than expected, largely because of the number of states that have opted into the expansion provisions of the ACA. By taking on these additional enrollees, states have increased their long-term liabilities, and as a result Medicaid will continue to make up an even larger share of their general fund budgets. However, an interesting side effect of these increased liabilities is less volatility as it relates to the business cycle.

Because more citizens are already enrolled in Medicaid, fewer are left over to be caught

Table1: Stress-Test Results - Moderate Recession

	Tax revenue shortfall		Medicaid spending increase		Combined fiscal shock	
	%	$ mil	%	$ mil	%	$ mil
Sum of states	-8.9%	(73,927.6)	1.7%	13,810.9	-10.5%	(87,738.5)
Alabama	-9.3%	(775.0)	1.5%	128.6	-10.9%	(903.6)
Alaska	-40.2%	(1,215.9)	1.8%	53.5	-42.0%	(1,269.4)
Arizona	-10.1%	(1,040.2)	2.2%	228.6	-12.4%	(1,268.8)
Arkansas	-4.9%	(261.3)	1.7%	91.4	-6.7%	(352.7)
California	-9.3%	(12,214.2)	1.4%	1,892.7	-10.7%	(14,106.9)
Colorado	-11.8%	(1,325.2)	3.2%	359.0	-15.1%	(1,684.2)
Connecticut	-6.3%	(1,281.7)	1.1%	222.9	-7.4%	(1,504.7)
Delaware	-7.0%	(300.4)	0.8%	35.4	-7.8%	(335.8)
Florida	-9.2%	(2,869.5)	2.9%	906.5	-12.2%	(3,776.0)
Georgia	-9.5%	(2,284.0)	1.0%	230.7	-10.4%	(2,514.8)
Hawaii	-8.5%	(637.8)	0.8%	57.1	-9.2%	(695.0)
Idaho	-12.7%	(497.6)	1.1%	43.5	-13.8%	(541.1)
Illinois	-9.7%	(3,004.4)	1.4%	443.4	-11.1%	(3,447.8)
Indiana	-6.3%	(1,020.2)	1.2%	198.3	-7.5%	(1,218.5)
Iowa	-7.9%	(559.1)	2.1%	146.8	-10.0%	(705.8)
Kansas	-7.4%	(467.0)	1.7%	108.3	-9.2%	(575.2)
Kentucky	-7.0%	(764.7)	1.1%	122.4	-8.1%	(887.1)
Louisiana	-23.9%	(1,983.1)	3.3%	270.1	-27.2%	(2,253.2)
Maine	-8.2%	(289.8)	1.6%	55.1	-9.7%	(344.9)
Maryland	-7.3%	(1,230.2)	1.7%	288.5	-9.0%	(1,518.8)
Massachusetts	-6.1%	(2,646.4)	0.8%	333.4	-6.9%	(2,979.9)
Michigan	-10.4%	(1,183.0)	3.2%	353.2	-13.6%	(1,536.1)
Minnesota	-10.5%	(2,269.0)	1.2%	265.7	-11.7%	(2,534.6)
Mississippi	-9.2%	(542.2)	1.3%	74.9	-10.5%	(617.0)
Missouri	-11.9%	(1,049.9)	1.9%	171.1	-13.8%	(1,221.0)
Montana	-8.8%	(198.6)	1.2%	26.4	-10.0%	(225.0)
Nebraska	-7.3%	(324.5)	1.3%	58.3	-8.6%	(382.7)
Nevada	-9.5%	(410.5)	2.7%	116.4	-12.2%	(526.9)
New Hampshire	-6.8%	(108.3)	2.2%	35.7	-9.1%	(144.0)
New Jersey	-10.3%	(3,564.4)	0.7%	247.4	-11.0%	(3,811.8)
New Mexico	-8.9%	(556.6)	1.1%	66.7	-10.0%	(623.3)
New York	-9.5%	(6,817.6)	1.5%	1,076.7	-11.0%	(7,894.3)
North Carolina	-6.6%	(1,562.2)	1.3%	297.0	-7.9%	(1,859.3)
North Dakota	-17.2%	(266.6)	2.8%	43.9	-20.1%	(310.4)
Ohio	-6.0%	(2,070.1)	3.3%	1,125.6	-9.2%	(3,195.7)
Oklahoma	-13.8%	(836.2)	2.2%	134.9	-16.0%	(971.1)
Oregon	-7.9%	(727.3)	2.1%	188.9	-10.0%	(916.2)
Pennsylvania	-5.7%	(1,869.3)	1.3%	417.7	-6.9%	(2,287.0)
Rhode Island	-8.7%	(348.2)	0.9%	36.4	-9.6%	(384.6)
South Carolina	-11.9%	(910.7)	1.6%	125.3	-13.5%	(1,036.0)
South Dakota	-5.2%	(79.6)	1.7%	26.4	-6.9%	(106.0)
Tennessee	-8.1%	(1,161.1)	1.4%	202.1	-9.5%	(1,363.2)
Texas	-9.1%	(4,933.9)	2.6%	1,403.0	-11.7%	(6,336.9)
Utah	-9.1%	(606.2)	1.6%	109.7	-10.7%	(716.0)
Vermont	-11.0%	(165.5)	2.3%	35.3	-13.3%	(200.8)
Virginia	-9.0%	(1,664.5)	1.9%	354.6	-10.9%	(2,019.1)
Washington	-8.4%	(1,609.4)	0.8%	156.9	-9.2%	(1,766.3)
West Virginia	-5.3%	(207.9)	1.8%	70.9	-7.1%	(278.8)
Wisconsin	-7.3%	(1,166.5)	2.1%	337.8	-9.4%	(1,504.3)
Wyoming	-7.0%	(110.8)	1.6%	25.7	-8.6%	(136.6)

Notes:

1) Tax revenue shortfall is how much lower the level of tax revenues in 2019 would be under our moderate recession scenario compared with where tax revenues would have been in the same year if they had simply increased at the rate of inflation (2%) in 2018 and 2019. The column captures this concept in both nominal dollar terms and as a percentage of estimated fiscal 2017 revenues.

2) Medicaid spending increase refers to how much higher Medicaid spending would be in 2019 under the stress scenarios compared with where it would have been in the same year under our baseline forecast. This column shows this concept in nominal dollar terms and as a percentage of fiscal 2017 revenues in our baseline forecast.

3) Combined fiscal shock is how much money a state would need in reserves to maintain revenues at their 2017 inflation-adjusted level while keeping up with the increase in Medicaid spending without raising taxes or cutting spending. This column shows this concept in nominal dollar terms and as a percentage of estimated fiscal 2017 revenues.

Sources: NASBO, Moody's Analytics

Table 2: Stress-Test Results - Severe Recession

	Tax revenue shortfall		Medicaid spending increase		Combined fiscal shock	
	%	$ mil	%	$ mil	%	$ mil
Sum of states	-13.6%	(113,677.7)	2.9%	23,983.6	-16.5%	(137,661.3)
Alabama	-14.6%	(1,214.7)	2.4%	203.6	-17.1%	(1,418.3)
Alaska	-62.6%	(1,892.5)	4.3%	129.4	-66.9%	(2,021.8)
Arizona	-15.9%	(1,630.7)	4.1%	425.8	-20.0%	(2,056.5)
Arkansas	-6.2%	(326.4)	3.3%	176.1	-9.5%	(502.5)
California	-12.4%	(16,332.4)	2.3%	3,065.4	-14.7%	(19,397.8)
Colorado	-19.5%	(2,182.2)	6.4%	721.0	-25.9%	(2,903.2)
Connecticut	-11.6%	(2,384.1)	2.0%	415.7	-13.7%	(2,799.8)
Delaware	-8.3%	(356.6)	1.4%	61.9	-9.7%	(418.4)
Florida	-12.9%	(3,998.1)	5.2%	1,600.7	-18.0%	(5,598.7)
Georgia	-18.3%	(4,397.5)	1.7%	402.6	-19.9%	(4,800.1)
Hawaii	-11.3%	(845.4)	1.2%	90.1	-12.5%	(935.6)
Idaho	-21.8%	(853.2)	2.4%	92.5	-24.2%	(945.8)
Illinois	-15.9%	(4,959.9)	2.5%	793.4	-18.5%	(5,753.3)
Indiana	-9.2%	(1,480.6)	2.2%	352.4	-11.4%	(1,833.1)
Iowa	-11.0%	(775.8)	3.4%	238.9	-14.4%	(1,014.7)
Kansas	-12.2%	(769.0)	2.9%	185.1	-15.2%	(954.1)
Kentucky	-9.5%	(1,041.1)	1.8%	199.2	-11.3%	(1,240.3)
Louisiana	-28.9%	(2,400.6)	4.9%	403.1	-33.8%	(2,803.8)
Maine	-13.2%	(468.0)	3.2%	111.6	-16.4%	(579.7)
Maryland	-9.9%	(1,668.8)	3.5%	580.5	-13.4%	(2,249.4)
Massachusetts	-10.4%	(4,512.8)	1.2%	534.7	-11.7%	(5,047.6)
Michigan	-18.0%	(2,241.6)	5.5%	603.1	-23.5%	(2,844.7)
Minnesota	-16.6%	(3,600.3)	2.5%	546.7	-19.1%	(4,147.0)
Mississippi	-12.2%	(719.1)	2.4%	138.9	-14.6%	(858.0)
Missouri	-18.4%	(1,622.6)	3.7%	324.4	-22.1%	(1,947.0)
Montana	-14.6%	(327.4)	1.8%	40.0	-16.3%	(367.4)
Nebraska	-10.8%	(480.3)	2.3%	101.3	-13.1%	(581.6)
Nevada	-22.4%	(967.6)	4.3%	185.0	-26.7%	(1,152.7)
New Hampshire	-10.2%	(161.8)	4.3%	68.8	-14.5%	(230.6)
New Jersey	-17.7%	(6,117.7)	1.3%	464.8	-19.0%	(6,582.5)
New Mexico	-15.3%	(952.7)	1.8%	111.5	-17.1%	(1,064.2)
New York	-16.9%	(12,194.0)	2.8%	2,025.6	-19.7%	(14,219.5)
North Carolina	-10.1%	(2,373.6)	1.8%	423.2	-11.9%	(2,796.8)
North Dakota	-32.1%	(496.8)	5.1%	79.0	-37.2%	(575.8)
Ohio	-10.2%	(3,521.1)	5.0%	1,744.5	-15.2%	(5,265.6)
Oklahoma	-21.9%	(1,326.3)	4.4%	263.8	-26.3%	(1,590.0)
Oregon	-12.0%	(1,099.6)	3.9%	355.5	-15.9%	(1,455.2)
Pennsylvania	-7.8%	(2,593.0)	2.6%	865.4	-10.5%	(3,458.4)
Rhode Island	-13.4%	(534.5)	2.0%	79.1	-15.4%	(613.6)
South Carolina	-16.2%	(1,241.2)	2.5%	188.9	-18.6%	(1,430.1)
South Dakota	-7.2%	(109.4)	2.8%	43.0	-10.0%	(152.4)
Tennessee	-11.1%	(1,597.3)	2.3%	325.1	-13.4%	(1,922.4)
Texas	-12.1%	(6,550.9)	4.3%	2,324.3	-16.3%	(8,875.2)
Utah	-15.6%	(1,038.2)	2.7%	178.9	-18.2%	(1,217.1)
Vermont	-14.9%	(224.2)	3.5%	52.4	-18.3%	(276.6)
Virginia	-15.4%	(2,859.9)	3.1%	579.6	-18.6%	(3,439.4)
Washington	-10.6%	(2,040.4)	1.3%	251.5	-11.9%	(2,291.9)
West Virginia	-8.7%	(339.2)	3.1%	121.7	-11.8%	(460.9)
Wisconsin	-10.7%	(1,723.0)	4.1%	654.7	-14.8%	(2,377.6)
Wyoming	-8.4%	(133.4)	2.7%	43.2	-11.1%	(176.6)

Notes:

1) Tax revenue shortfall is how much lower the level of tax revenues in 2019 would be under our severe recession scenario compared with where they would have been in the same year if they had simply increased at the rate of inflation (2%) in 2018 and 2019. The column captures this concept in both nominal dollar terms and as a percentage of estimated fiscal 2017 revenues.

2) Medicaid spending increase refers to how much higher Medicaid spending would be in 2019 under the stress scenarios compared with where it would have been in the same year under our baseline forecast. This column shows this concept in nominal dollar terms and as a percentage of fiscal 2017 revenues in our baseline forecast.

3) Combined fiscal shock is how much money a state would need in reserves to maintain revenues at their 2017 inflation-adjusted level while keeping up with the increase in Medicaid spending without raising taxes or cutting spending. This column shows this concept in nominal dollar terms and as a percentage of estimated fiscal 2017 revenues.

Sources: NASBO, Moody's Analytics

up in the ebb and flow of enrollees during changes in the business cycle. This is evident when comparing the forecasts for states that have opted into the Medicaid expansion and those that have not. Opt-in states are likely to see overall Medicaid spending grow faster over the long run but experience less volatility during changes in the business cycle. This will keep Medicaid growing as a share of overall state funding for the foreseeable future, but recessionary shocks from the program will be more muted in turn.

Third, and perhaps most important, is that states vary considerably in their ability to meet these preparedness levels. Comparing the potential fiscal shocks for all 50 states to data on fund balances from NASBO, 16 states have the funds needed to withstand a moderate recession with limited fiscal disruption (see Chart 11 and Table 3). An additional 19 states are within 5 percentage points of the funds they would need to withstand a moderate recession. This means that through a combination of fund balances and fiscal action they would be relatively prepared to withstand the fiscal shock of a moderate recession.

Unfortunately, though, 15 states fall more than 5 percentage points below what they would need to withstand even a moderate recession. What is more, a handful of these have no appreciable fund balances whatsoever, making them extremely vulnerable to another economic downturn.

It should be noted, however, that fund balances are not always equivalent to available reserves. Fund balances can often be obligated for other uses and are not explicitly set aside for fiscal emergencies. NASBO estimates that explicit "rainy-day fund" balances are materially lower than total balances in most states. Therefore, the preparedness levels estimated in this report are not exact, and should be viewed as a best case scenario in most instances.

More than just reserves

Though the number of states with inadequate reserves is concerning, fund balances are not enough to ward off the effects of a recession all on their own. In addition to having adequate balances, the purpose of those

funds being used for reserves should be explicit. This helps to prevent some of the indecision that can cost states valuable time during a recession. During the Great Recession, several states with sizable reserves implemented those funds late if at all while policymakers debated the reserves' true purpose. As a result, several state rainy-day funds were marginalized during one of the largest downpours in modern American history. This forced some states to take more severe fiscal actions than they otherwise might have, which subsequently weighed on the pace of economic recovery.

Other key factors beyond the size of reserves are the amount of flexibility inherent in a state's budget process and the specific policy goals outlined by legislators. Recent research from Moody's Investors Service notes that flexibility is enhanced by the ability to:

» Make midyear spending reductions within the executive branch
» Approve major budget measures by a simple legislative majority
» Defer costs into subsequent fiscal years
» Shift costs to lower levels of government
» Access short-term credit for liquidity purposes[7].

This flexibility extends as well to the make-up of the state budget across mandatory and discretionary items as well. As Medicaid, pensions, and other mandatory items continue to grow as a share of state budgets, less and less is left over for discretionary items in the zero-sum game of state fiscal policy. Discretionary items are those that are explicitly appropriated by policymakers, and as such can also be cut by policymakers. Therefore, as the share

Chart 11: Most States Are Relatively Prepared
Difference between actual reserves and necessary* reserves:

*Reserves needed to make up for fiscal shock under moderate recession scenario

- Within 1 ppt
- 1 ppt to 5 ppt
- More than 5 ppt
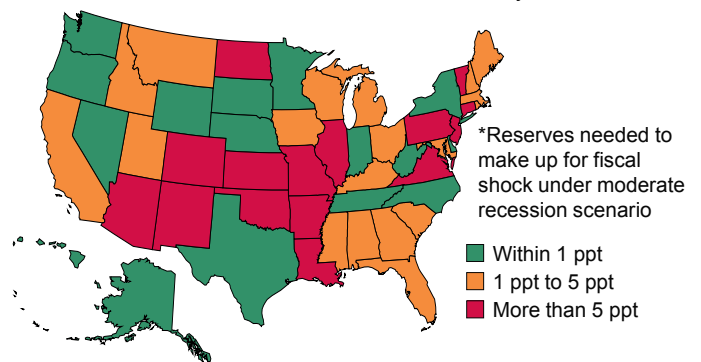
Sources: NASBO, Moody's Analytics

of mandatory items grows in a state budget, the fewer opportunities policymakers have to cut spending.

What is more, there are some additional qualifying considerations that should be taken into account when interpreting the results of this analysis. Because of data limitations, this study does not take into account the recessionary impacts of pension funds, which can be significant. Pension funds rely on three primary sources of funding to pay out future benefits: government contributions, employee contributions, and investment returns. During a recession, investment returns can fall woefully short of funding targets, which typically necessitates larger contributions from a state's general fund. Though these effects are borne out over a relatively lengthy period of time, they will have some near-term general fund impacts that could make a state's recessionary liabilities higher than those identified in this analysis.

Lastly, during a recession it is unlikely that state policymakers will wish to rely entirely on reserves, and they will seek to implement at least some spending cuts if not revenue increases as well. Therefore, at least some of the recessionary liabilities calculated in this stress-testing exercise will be covered by minor fiscal changes from policymakers. Thus, a state need not have its entire liability covered within its reserves to be able to reasonably weather the effects of a recession on its budget and economy. This ultimately boils down to a policy choice and risk assessment from the appropriate policymakers in each state, which again underlines the need for individual

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7   Emily Raimes, et al., "Fiscal Stress Test: Ability to Withstand Next Recession Depends on Reserves, Flexibility," Moody's Investors Service: Sector In-Depth (April 21, 2016).

Table 3: State Preparedness - Moderate Scenario
% of projected fiscal 2017 revenues

	Actual reserves	Necessary reserves	Difference between actual and necessary reserves
Alaska	232.8%	42.0%	190.8%
Wyoming	92.9%	8.6%	84.4%
West Virginia	22.3%	7.1%	15.1%
Texas	21.7%	11.7%	10.0%
Nebraska	18.2%	8.6%	9.6%
South Dakota	10.5%	6.9%	3.5%
Tennessee	12.8%	9.5%	3.3%
Indiana	10.7%	7.5%	3.2%
Oregon	12.2%	10.0%	2.2%
Delaware	9.9%	7.8%	2.1%
Hawaii	11.1%	9.2%	1.8%
Washington	10.1%	9.2%	1.0%
Minnesota	12.6%	11.7%	0.9%
North Carolina	7.6%	7.9%	-0.3%
New York	10.0%	11.0%	-0.9%
Nevada	11.2%	12.2%	-1.0%
Alabama	9.8%	10.9%	-1.1%
Ohio	7.9%	9.2%	-1.4%
Iowa	8.6%	10.0%	-1.4%
Georgia	8.8%	10.4%	-1.6%
Sum of States	**8.3%**	**10.5%**	**-2.2%**
South Carolina	11.2%	13.5%	-2.3%
Florida	9.5%	12.2%	-2.7%
New Hampshire	6.3%	9.1%	-2.8%
Rhode Island	6.8%	9.6%	-2.8%
Maine	6.9%	9.7%	-2.9%
Utah	7.5%	10.7%	-3.2%
Maryland	5.5%	9.0%	-3.5%
Massachusetts	3.1%	6.9%	-3.8%
Michigan	9.8%	13.9%	-4.2%
Idaho	9.6%	13.8%	-4.3%
Montana	5.5%	10.0%	-4.5%
Mississippi	5.7%	10.5%	-4.8%
Wisconsin	4.6%	9.4%	-4.8%
California	5.9%	10.7%	-4.8%
Kentucky	3.2%	8.1%	-4.9%
Connecticut	1.3%	7.4%	-6.1%
Arkansas	0.0%	6.7%	-6.7%
Arizona	5.7%	12.4%	-6.7%
Vermont	6.2%	13.3%	-7.1%
Virginia	3.4%	10.9%	-7.5%
Kansas	1.6%	9.2%	-7.6%
Missouri	5.4%	13.8%	-8.4%
Pennsylvania	-1.8%	6.9%	-8.8%
New Jersey	1.4%	11.0%	-9.6%
Colorado	5.3%	15.1%	-9.8%
Illinois	0.4%	11.1%	-10.7%
New Mexico	-1.1%	10.0%	-11.1%
Oklahoma	4.0%	16.0%	-12.1%
North Dakota	0.7%	20.1%	-19.4%
Louisiana	3.1%	27.2%	-24.0%

Notes:

1) Actual reserves refer to states' estimated fiscal 2017 total balances. FY 2017 estimates for Oklahoma were not available, so actual balances for FY 2016 were used instead.

2) Necessary reserves represent the combined fiscal shock as a percentage of projected fiscal 2017 revenues.

3) The difference between actual and necessary reserves refers to the amount of the fiscal shock that would not be covered by actual reserves under the moderate scenario, expressed as a percentage of projected fiscal 2017 revenues. A negative percentage means a given state would not be able to make up for the entire fiscal shock, whereas a positive percentage means a given state would be more than able to make up for the full extent of the fiscal shock under the moderate scenario.

Sources: NASBO, Moody's Analytics

states to perform these types of evaluations on their own and design the best recession plan for their needs and risk appetites.

Policy applications

Despite these caveats, which in most cases can be mitigated through the use of more precise input data from individual states, this analysis shows that alternative economic scenarios can be used to effectively prepare state and local government budgets for future recessions. This will be a crucial exercise for policymakers, as the Great Recession has demonstrated that structural changes in state fiscal conditions have made recessions much more impactful on budgets. Those states with more volatile industrial mixes, and those with more volatile tax structures, are particularly vulnerable.

How policymakers prepare for these eventualities matters a great deal in the pace of economic recovery. Unpreparedness can lead to disruptive decisions to drastically cut spending or raise revenues just at the time the economy can least afford it. Preparedness, on the other hand, can lend stability to a struggling economy and help conditions recovery more quickly. These preparations can be a difficult balancing act, however, necessitating as much objective care and precision as possible in such an imprecise discipline as budget forecasting.

States are slowly but surely learning these lessons and have earmarked more of their fund balances as "rainy-day" reserves than ever before. As a result, this analysis provides a more optimistic snapshot of state fiscal conditions than previous assessments, with a majority of states within at least 5 percentage points of their estimated recession impact. However, a concerning number of states are still substantially unprepared for an economic downturn, and that level of unprepared-ness will have economic repercussions if not addressed.

To sufficiently protect their budgets and their economies from increased volatility and fiscal drag, state and local government policymakers should be investing in their budget processes and making stress-testing a higher priority. At the very least, states and local governments should be reviewing their reserve policies and checking on their adequacy following such a tumultuous fiscal period as the past decade. At best, policymakers should be diligently implementing statutory reserve guidelines based on such reviews and working to expand reserve levels while budget conditions are still improving. Continuation of current policies in many states risks a repeat of the lackluster recovery that followed the Great Recession and is not conducive to long-term economic growth.

About the Authors

Dan White is a director at Moody's Analytics, where he directs consulting and economic research.

Dan's broad research interests include public finance and fiscal policy, healthcare, energy economics, and regional economic development. Dan regularly presents to clients, conferences, and policymakers of all levels. He has been featured in a number of print, radio and televised media outlets ranging from Bloomberg Television to the Wall Street Journal, and writes regular editorial pieces for a number of online and print publications.

His most recent research has focused on public policy responses to the Great Recession and ways to better prepare federal and subnational fiscal conditions for changes in the business cycle. He also has the pleasure of working directly with a number of governments and policymakers in an advisory role and teaches economics as an adjunct professor at Villanova University.

Before joining Moody's Analytics, Dan worked as a financial economist for the State of New Mexico, where he forecast revenues and analyzed a wide range of policy issues concentrated around economic development, public investment and debt management. Dan holds an MA in economics as well as undergraduate degrees in finance and international business from New Mexico State University.

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Additionally he covers Virginia and Puerto Rico, and develops forecasts for Switzerland. Bernard is also a key piece of Moody's Analytics' global sub-national forecast team, managing a database of forecasts for Europe, Asia, and Mexico.

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Brittany covers the economies of France, Jordan, the State of Nevada, and several U.S. metro areas. She maintains the Moody's Analytics Medicaid state forecast model and is involved in a number of consulting engagements for state and local governments with a special emphasis on revenue forecasting. In that capacity she has developed a number of quantitative models which states and local governments use in their tax forecasting processes.

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