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THE PEW CHARITABLE TRUSTS

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Managing Uncertainty

How State Budgeting Can Smooth Revenue Volatility

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The Pew Charitable Trusts is driven by the power of knowledge to solve today's most challenging problems. Pew applies a rigorous, analytical approach to improve public policy, inform the public, and stimulate civic life.

About this report

“Managing Uncertainty” is the first in a series of reports by The Pew Charitable Trusts offering policymakers strategies that improve long-term fiscal health and manage budget uncertainty. In this report, Pew researchers examine patterns in revenue volatility across the 50 states between 1994 and 2012. The report examines the factors that drive volatility, including state-specific patterns of economic growth and contraction and their interaction with state taxes, and recommends the best ways to respond to these conditions. Future research will explore in greater detail how states can use fiscal management tools such as rainy day funds and revenue forecasting to better manage their finances over the course of the business cycle.

Pew’s research methods in reaching the conclusions and findings in “Managing Uncertainty” are discussed in detail at the end of this report. The team analyzed the relationships between state-specific economic data from the Federal Reserve Bank of Philadelphia and state revenue data compiled by the Rockefeller Institute of Government for all 50 states, and interviewed key fiscal policymakers and independent analysts in 15 states.

Overview

The decades of the 1990s and 2000s could not have been more different for state government finances. In the booming 1990s, states rode the longest economic expansion in U.S. history. In the tumultuous 2000s, they endured a weaker period marred by two recessions, including the deepest downturn since the Great Depression.

Surging tax revenue during most of the 1990s allowed governors and legislatures to reduce taxes while increasing spending for programs such as K-12 education and aid to local governments. Many states built up rainy day funds and rewarded their public workers with raises and increased benefits. The reverse was true throughout much of the 2000s as declining revenue drove officials to increase taxes and fees while cutting many government services and programs, slashing aid to localities, draining reserves, laying off and furloughing state employees, and reducing their benefits.

The economic ups and downs of the past two decades illustrate how volatile state revenue can directly influence the timing and size of budget shortfalls and surpluses. Revenue swings in either direction often confound the best efforts of state officials and policymakers to accurately forecast revenue and keep the budget in balance.¹ For this reason, it is important for policymakers to adopt practices that smooth state finances over shifts in the business cycle. Such policies can reduce the need for difficult budget choices, including spending cuts and tax increases during periods of decline, or identifying the best use of surplus dollars when tax collections are flush.

To help policymakers understand volatility and to suggest policy options that could best manage it, The Pew Charitable Trusts examined state patterns of economic and revenue fluctuation over the past 20 years. The research shows:

- Wide variation exists among states in how tax revenue aligns with broad measures of economic performance, reflecting the diversity of state economies and tax systems.
- State economic factors—natural resources, the range of industries, population, and other characteristics— affect the level of revenue volatility.
- State tax structure and policy—what and how states tax—can magnify or moderate underlying economic sources of revenue volatility.

Nevada and West Virginia, two very different states, help illustrate these findings. (See Figure 1.) Nevada depends substantially on gaming and tourism for tax revenue but does not tax income. West Virginia taxes income but also relies on revenue from its natural resources of coal and natural gas to generate revenue.

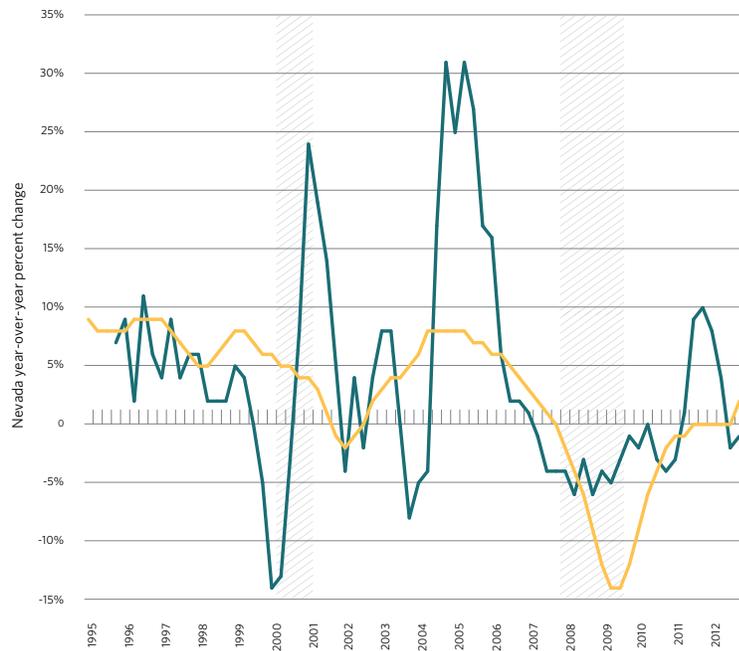
As late as 2005, Nevada topped the nation in jobs, population, and revenue growth. Then the housing slowdown and Great Recession hit, halting its construction boom and discouraging out-of-state gamblers from visiting. By 2010, Nevada led the country in unemployment and foreclosures. In just five years, Nevada's economy went from outperforming nearly every state to underperforming the rest of the country. Nevada's revenue was also relatively volatile. Gaming-related revenue fell 20 percent during the recession, leading policymakers to increase taxes, cut spending, layoff and furlough employees, and deplete reserves.²

West Virginia was more fortunate. While financial markets foundered and unemployment surged during the Great Recession, the state benefited from high coal and natural gas prices and an increase in coal exports. Energy tax revenue poured into the state treasury. Severance tax revenue—based on the extraction of natural resources—rose 66 percent between budget years 2007 and 2012, offsetting significant losses in the state's personal income tax and sales tax receipts over the same period.³ As a result, West Virginia was one of the few states that did not tap its emergency reserves during the recession.

Figure 1

Tax Hikes and Spending Cuts

Comparing Nevada's Economic Performance to its Tax Collections, 1995-2012



Two states' reactions to volatility

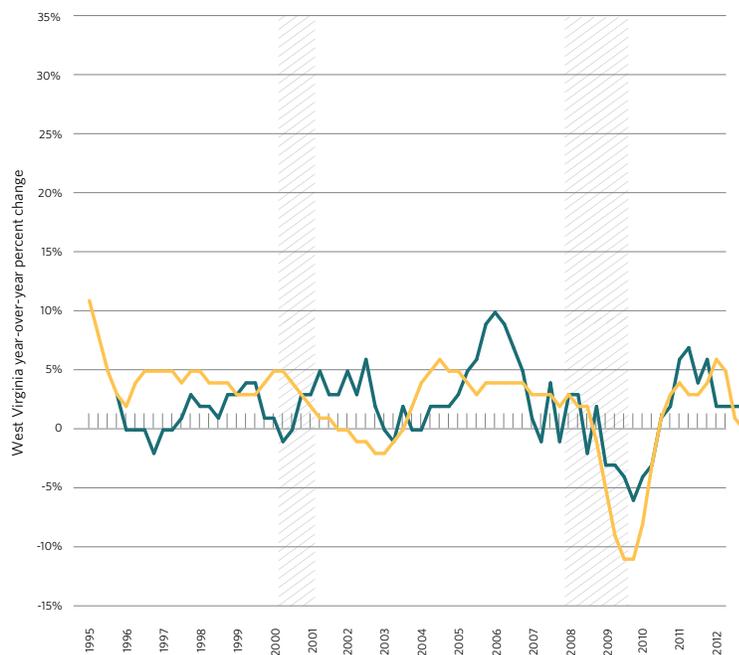
Nevada and West Virginia demonstrated different patterns of revenue volatility during the last recession. Nevada's revenue losses were driven by a falloff in tourism and gaming. West Virginia's economy declined, but the state gained revenue because of an unexpected rise in energy prices.

- Tax revenue
- Economic conditions
- ▨ Recession periods

Sources: State coincident index, Federal Reserve Bank of Philadelphia; State tax collections, Rockefeller Institute of Government, SUNY, Albany, NY
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Tax Windfalls Eased Budget Strain

Comparing West Virginia's Economic Performance to its Tax Collections, 1995-2012



No one knows what the coming years will bring, with the economy continuing to be difficult to predict. Policymakers have limited influence over states' unique business cycles and the resulting changes in tax revenue, and even less control over other volatility drivers such as natural disasters. Nevertheless, Pew's research found some promising practices that can help policymakers chart a clearer course in spite of persistent fiscal uncertainty:

1. **States should study the causes of volatility and their impact over time. These studies should be released on a regular schedule, examine which areas of the tax system and the economy are volatile and why, and include recommendations for fiscal policies to manage uncertainty.** For example, every three years Utah analyzes changes in economic activity that affect its tax base, the interaction between the tax base and tax rate, and policy changes that modify the tax system. The report's findings spurred reserve fund policy changes in 2009, 2012, and 2013. With their regular studies, Utah lawmakers acknowledge that revenue volatility is a major component of overall budget uncertainty that can change over time and they are using data-driven observations about volatility to inform their budget reserve fund policies.
2. **States should revise revenue forecasts as close to the final passage of the state budget as possible and plan for possible shortfalls or surpluses.** While revenue can be inherently difficult to predict, states can develop their forecasts as close to key budget decisions as possible and have processes in place to better respond to forecasting errors. Washington state officials prepare quarterly updates to the forecast used to build the budget and present alternate scenarios with higher and lower revenue. These practices prepare the Legislature to respond more quickly to sudden ups and downs.
3. **States should develop or refine budget policies that run counter to economic cycles and save money during growth periods for use in down times.** States can create their reserve, or rainy day funds, so that saving money during good times is a consistent, predictable practice based on experience with revenue volatility. Virginia uses a formula that compares the current year to historical revenue performance and requires the state to set aside money when there is exceptional growth to cushion downturns. Several other states—including Massachusetts, Tennessee, and Texas—also have rainy day funds that require deposits determined by revenue performance.

This report highlights the diverse budget challenges revenue volatility can create for states. It begins with an examination of economic and revenue fluctuation across states, and continues with an exploration of the interrelated factors driving those fluctuations, including state economic characteristics, state tax structure and policy, federal policy changes, and catastrophic events. Despite the complexity of revenue volatility, Pew identifies several specific actions states can take to hedge against these ups and downs.

Volatility and the states

Revenue volatility is not inherently bad. When revenue is higher than anticipated, states can use this good fortune to improve roads and bridges, pay down debt, or set money aside to buffer against leaner years ahead. But revenue volatility also means that periods of unexpected high revenue may just as easily be followed by years of unanticipated low revenue that prompt service cuts or increased taxes to make ends meet.

States experience substantial revenue volatility over each business cycle. Recent evidence suggests that state tax collections have become more volatile over the past decade, creating new challenges for policymakers seeking to manage their states' budgets over the long term.⁴ Policymakers must be cautious about misinterpreting positive

How Pew measured volatility

This report focuses on two aspects of volatility. The first is range, or the extent to which economic and fiscal levels change from year to year. The second is alignment, or to what degree the timing of these economic and fiscal fluctuations are similar.

Pew's measure of range is the interquartile range, which looks at the middle 50 percent of values to identify the typical magnitude of economic and fiscal change from year to year. Pew's measure of alignment is the correlation coefficient, which captures whether economic and fiscal fluctuations happen at the same time across state and national economies and whether upticks and downturns in revenue collections happen at the same time as changes in economic conditions. For more information, please refer to the complete methodology found in the appendix.

revenue upticks as a lasting trend. States that are too optimistic about revenue growth can face even tougher decisions during an unexpected economic downturn. Policymakers can learn to harness the good years and protect against the bad, but only if they first understand their state's unique patterns of volatility.

State economies exhibit diverse patterns of growth and contraction that contribute to revenue volatility.⁵ Pew compared each state's economy with the national economy from 1990 to 2012 to identify states with distinctive economic cycles. While most state economies experienced the same ups and downs over the study period, a handful with more specialized economies, including Alaska, Louisiana, North Dakota, and Wyoming, did not. (See Figure 2.) Key differences in state economies—the mix of industries, workforce characteristics, population change, natural resources, education systems, and the quality of infrastructure—help explain these patterns, though factors such as natural disasters also play a role.

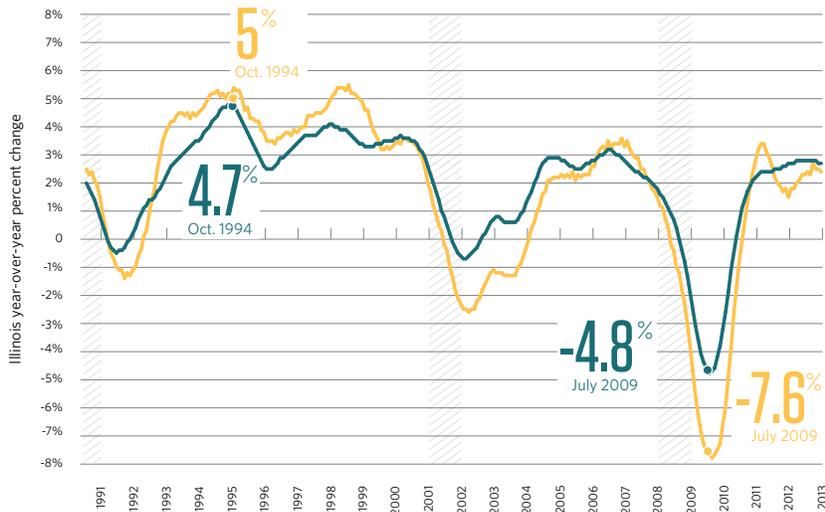
When state economies grow, states may anticipate collecting more revenue. But these two patterns are never in perfect sync. Each state also has its own mix of taxes on personal and corporate income, sales of goods and services, property, natural resource extraction, and more. The way states tax certain parts of their economies may increase or decrease revenue volatility. Pew examined fluctuations in state revenue between 1994 and 2012 and found that the alignment between tax collection and economic performance differed by state.

In slightly more than half (28) of the states, revenue patterns closely tracked broadly measured economic conditions, with the highs and lows of revenue collection aligned with upturns and downturns in the state economy. Revenue patterns in Colorado, Georgia, North Carolina, and Virginia were the most aligned with economic performance in terms of timing.

In the remaining 22 states, however, revenue patterns did not track economic performance closely. Tax collections in Alaska, New Hampshire, Oregon, South Dakota, and Wyoming were the least aligned with trends in the economy.⁶

On average, Pew's research found that states experienced more revenue volatility than underlying economic fluctuation. (See Figure 3.) In other words, the tax revenue the average state collects from year to year fluctuated more than the growth and contraction of its economy. For example, between 2008 and 2009, Minnesota's total tax revenue shrank about three times more than the underlying economy, only to rebound three times as fast in the following two years.⁷ Surprisingly, the states with the most volatile revenue were not always the states that had the most turbulent economic performance.

Figure 2
 Illinois Closely Follows National Trends
 State Economic Performance Compared to the United States, 1990-2012



States and the national economy

Most state economies, including Illinois', experience similar patterns of growth and contraction and align closely with the national economic as a whole. Some states, such as Alaska, have business cycles that are distinctly different from other states and do not align with the national economy.

- United States
- State
- Recession periods

Sources: State coincident index, Federal Reserve Bank of Philadelphia
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Alaska Experiences Distinct Economic Fluctuations
 State Economic Performance Compared to the United States, 1990-2012

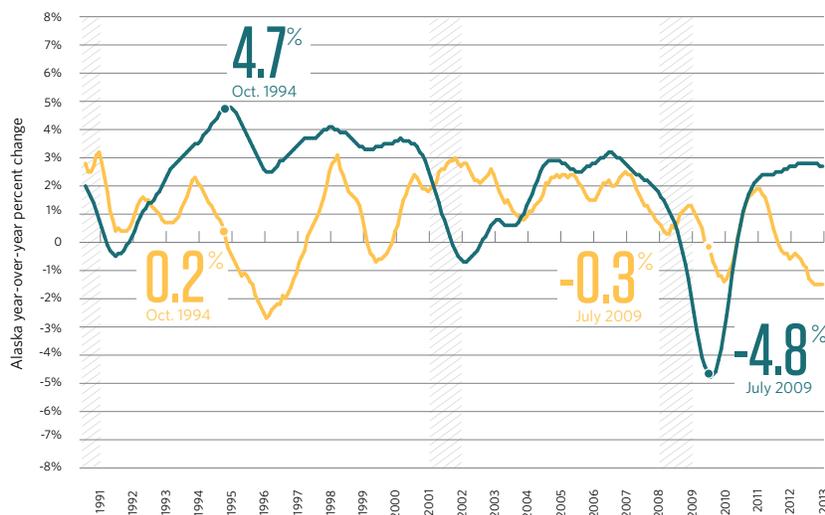
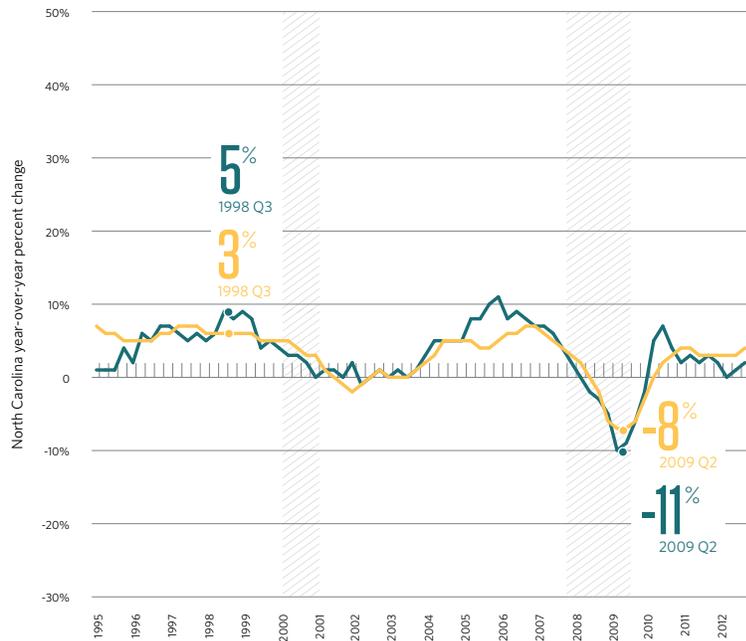


Figure 3

North Carolina Tax Collections Track Closely with Economic Performance, 1995-2012



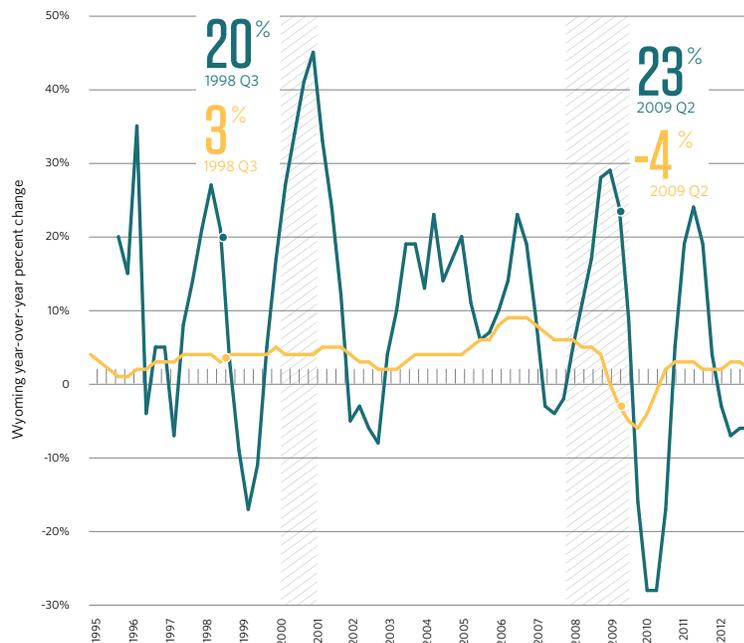
States' revenues and their economies

In some states, such as North Carolina, tax revenue grows and contracts more or less at the same time and pace as the state's economy. In other states, such as Wyoming, the relationship between economies and revenues is more complex.

- Tax revenue
- Economic conditions
- Recession periods

Sources: State coincident index, Federal Reserve Bank of Philadelphia; State tax collections, Rockefeller Institute of Government, SUNY, Albany, NY
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Wyoming Tax Revenues Vary Widely Compared to Economic Performance, 1995-2012



Overall, Pew's research shows that states exhibit unique patterns of revenue volatility tied to economic performance. Policymakers can prepare for these ups and downs, but first they must understand and identify the unique causes of revenue volatility in their state.

Causes of state revenue volatility

There is no single source of revenue volatility. In each state, the ups and downs in tax collections can be attributed to a unique and complex mix of economic factors—such as the mix of industry, natural resources, workforce, and population growth— as well as state-specific taxes and policies that amplify underlying economic fluctuations and introduce additional patterns of volatility. Changes in the federal budget and unforeseen and detrimental events, including major snow storms or hurricanes, also magnify volatility.

State economic characteristics influence revenue volatility

The economic composition of each state may be the most significant driver in explaining the differences in the timing and magnitude of fluctuations in revenue across the 50 states. States with more specialized economies often do not have the same experience over the business cycle as their neighbors. For example, North Dakota's economy, fed by oil and natural gas, grew between 2007 and 2011 while the national economy was contracting. In some instances, a state's concentration in certain industry sectors can result in particularly volatile revenue when that industry suffers. Michigan's revenue plunged to unprecedented levels during the 2000s while the rest of the nation experienced modest economic expansion, as American automakers shifted production out of Michigan and U.S. consumers increasingly bought cars from foreign automakers.

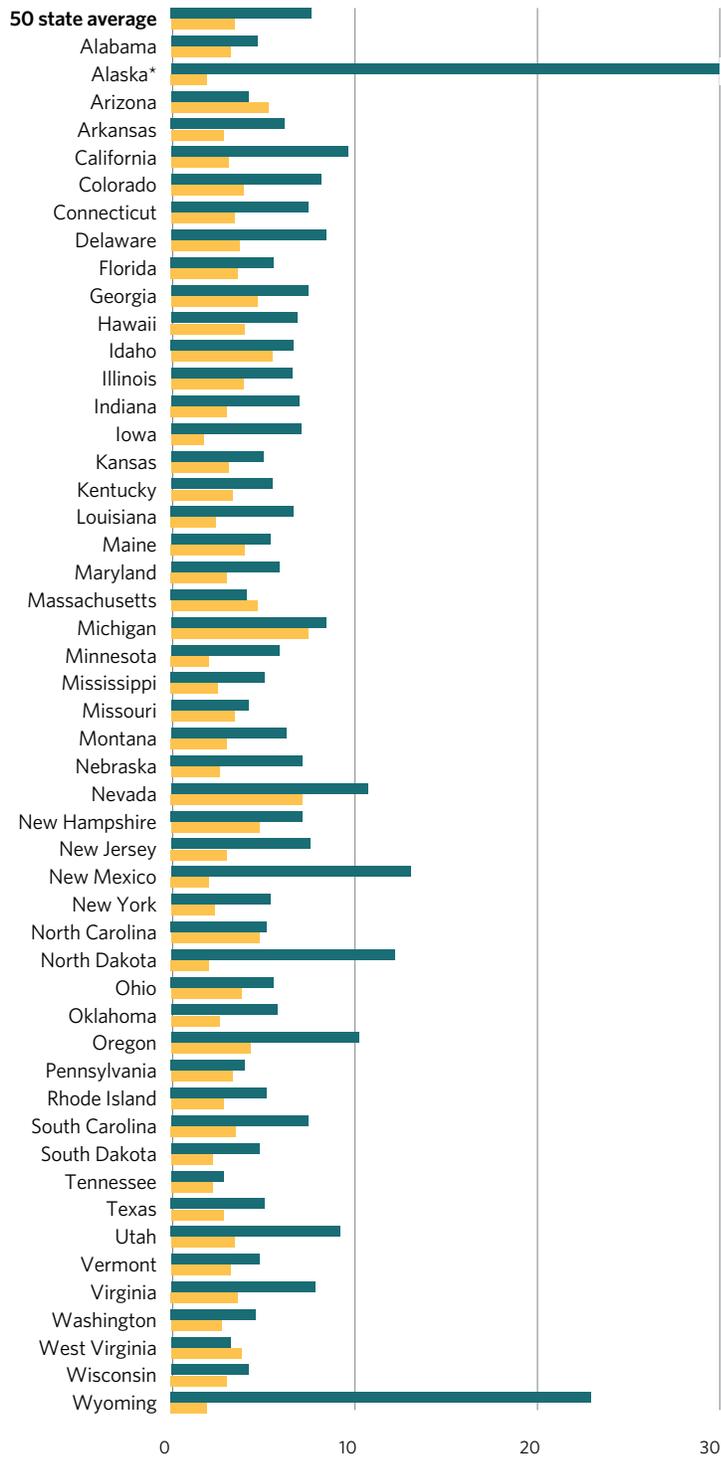
Even within the same state, economies change over time, creating new patterns of revenue volatility. (See Figure 4.) Over the last several decades, New York state's economy has shifted substantially from its traditional manufacturing base toward professional services. As a result, the state experienced different kinds of recessions in 1991 and 2007. New York sustained a more severe recession than other states during 1990 and 1991 driven largely by a decline in the manufacturing sector.⁸ The loss of half a million jobs during that period, the most since the 1930s, weakened the state economy and contributed to years of budget gaps. By contrast, the job losses during the Great Recession were mostly in the financial sector. This time New York recovered faster than many other states, bolstered by federal aid to stabilize large banks.⁹ By 2012, tax revenue surpassed prerecession levels and the state regained nearly 95 percent of the jobs lost in the recession; more than twice the national share.¹⁰ During both recessions, New York's economy behaved differently from the economies of other states because of its unique and shifting industrial composition.

Industry makeup is not the only economic factor that affects state revenue volatility. For states with a relatively small population, a decision by a single company to hire or downsize can affect the entire state. For example, Micron Technology's decision to reduce its Idaho-based workforce by several thousand jobs during the Great Recession had an outsized impact on the state.¹¹ With a population of only 1.6 million (39th in the nation), Idaho lost a higher percentage of jobs during the recession than all but five other states.¹² As the national economy slowly recovered, however, Idaho also added jobs at a faster pace than the national average. "A thousand jobs doesn't sound like a lot of jobs, but for us it is," said state economist Nathaniel Clayville.¹³

Figure 4

State Revenue Volatility Varies Greatly, and Is Not Fully Explained by Economic Conditions

Economic and revenue volatility in 50 states, 1995-2012



States' revenues and their economies

States experienced different levels of overall economic and revenue volatility, measured as the interquartile range of year-over-year percent change over the past two decades. In most instances, revenue collections were more volatile than economic performance, but there is wide variation across states in how economic activity is reflected in tax collections. States with the most volatile economies are not always the states with the most volatile revenues.

- Tax volatility (Interquartile range)
- Economic volatility (Interquartile range)

*Note: Actual range for Alaska under "Interquartile range of tax revenue" ends at 49%.

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State tax systems can amplify or temper revenue volatility

A state's tax structure and its economy are inextricably linked. Decisions about which taxes to impose and how high or low to set rates often evolve to fit a state's unique economic and other tax policy characteristics. Some states are expanding their tax bases to reflect changes in the economy. For example, a number of states began expanding their sales tax in the 2000s to include some professional or personal services in addition to goods, reflecting shifts in both business and household consumption patterns.¹⁴

There are many ways that a tax portfolio can amplify or temper swings in revenue. Different tax sources capture activity from distinct sectors within a state's economy, and are therefore tied to shifts in the business cycle.¹⁵ Both severance taxes, which are tied to the global price of energy commodities, and corporate income taxes, which are tied to unpredictable profits, have a reputation for being notoriously volatile.¹⁶ Other tax sources, such as sales and personal income taxes, are relatively more stable on average.¹⁷ But no tax is immune to sudden swings. Consumers abruptly increased savings and curbed spending during the Great Recession, which hurt such states as Nevada, which are particularly sensitive to declines in consumer spending because they rely so much on sales taxes generated by gaming, tourism, and construction. Nevada's sales tax revenue fell more than 20 percent between 2008 and 2010, contributing to a \$3 billion projected budget shortfall in late 2010 that led to tax increases, spending cuts, depleted reserves, increased borrowing, and a drawing of federal stimulus aid.¹⁸

Taxes that draw heavily on a sector of the state economy that is likely to fluctuate unpredictably from year to year are likely to increase overall revenue volatility. For example, Pew found that Wyoming has one of the most volatile revenue systems in the country due to heavy reliance on severance taxes. This volatility is magnified by Wyoming policymakers' decision to forgo an income tax, which is broader-based and relatively more stable. At times, changes in oil and gas income have been a boon to Wyoming. But when commodity prices fall, steep revenue declines have buffeted the state, as during the Great Recession, when the governor had to cut \$205 million in spending in fiscal 2010, nearly 5 percent of the previous year's expenditures.¹⁹ Similarly, Florida relies much more on its housing industry to generate state revenue than do most other states. One of the first states to enter the Great Recession, Florida was hit hard by the housing bust after years of robust growth. Revenue from the state's documents tax, which is levied on real estate transactions such as deeds, bonds, notes, and mortgages, fell from a peak of \$4 billion in fiscal 2006, at the height of the housing boom, to just over \$1 billion in fiscal 2010 at the depth of the recession.²⁰ The drop contributed to a budget shortfall that policymakers addressed primarily with deep cuts in spending on education, human services, state courts, and environmental programs.²¹

Even states that collect taxes on the same types of economic activity may experience different levels of revenue volatility because they do not levy the tax the same way. For example, California and Massachusetts both tax income from capital gains—the profits investors make when they sell assets—but apply the tax differently. In California, capital gains income is calculated through the state's progressively structured personal income tax. A higher rate for the state's wealthier taxpayers, who pay a larger share of taxes on dividends and capital gains, means that the state's overall revenue is more closely tied to the boom-and-bust cycle of the stock market.²² By contrast, Massachusetts charges a separate flat rate on capital gains and a lower flat rate on all other types of personal income.²³ This results in relatively more predictable income tax collections. Taken by itself, Massachusetts' capital gains revenue is still volatile; the state brought in \$2.1 billion in fiscal 2008 in taxes on capital gains before dropping to \$500 million the next year after the Wall Street financial crisis.²⁴ These losses were substantial, but because Massachusetts separates out this revenue source the volatility was easy to identify. Moreover, taxes overall have been relatively stable in comparison to California.²⁵

North Carolina: Smoothing revenue volatility

North Carolina had a volatile economy from 1994 to 2012 compared with other states, but its revenue remained relatively stable except during the depths of the Great Recession.²⁶ This stability was accomplished primarily because of a diverse tax portfolio and the use of temporary taxes.

Historically, North Carolina has relied on a mix of personal and corporate income taxes and sales and excise taxes that takes advantage of its diverse economy. Just as individual investors benefit from diversified holdings, states with a diverse portfolio of taxes can increase the stability and predictability of state revenue. Growth in one tax source may counterbalance losses in another.²⁷

Over the study period, North Carolina also smoothed budget pressures with temporary tax increases, particularly in bad years. The state adopted permanent and temporary tax increases during the 1991 and 2001 recessions. Anticipating a deficit of more than \$3 billion in 2010, lawmakers again turned to temporary tax increases for state income and sales taxes. Those increases were allowed to expire as scheduled in 2011, when lawmakers closed a \$1.7 billion gap with a combination of one-time and permanent spending cuts.²⁸

This experience also shows that adjusting what is taxed and how those levies are applied involves trade-offs; with revenue stability being one of many competing goals. These other objectives can include limiting shifts in business and consumer behavior, encouraging economic development, spreading responsibility for taxes more equitably, securing enough money to keep the government running, and supporting spending priorities. Changes made to moderate tax volatility will likely result in consequences affecting other priorities.

Federal fiscal policy and catastrophic events

Federal dollars make up more than a third of states' revenues—reaching a historic high of 34.7 percent in 2011.²⁹ But the unpredictability of federal spending—as seen in the recent debates over funding the government, raising the debt ceiling, and the automatic spending cuts known as sequestration—has made planning for that money difficult. State revenue is affected by direct federal cuts as well as the ripple effect of federal spending changes on the economy. A handful of states with a heavy federal presence are especially sensitive to the impact of federal changes and uncertainty and some have taken steps to ready themselves.³⁰ Virginia, which receives more federal procurement dollars than any other state, established a special trust fund to help cover expected economic losses from reduced federal spending caused by sequestration. Because Virginia's rainy day fund can be used only for midyear shortfalls, the purpose of the special fund was twofold: "to provide another source of liquidity that was needed at the time given the looming sequestration and the uncertainty that surrounded that situation, and to give us the ability to use the money" said state Secretary of Finance Ric Brown.³¹

Even states less affected by federal budget uncertainty are planning for potential reductions in this funding source. In the 2013 legislative session, Vermont lawmakers allocated a portion of the budget surplus to manage sequestration cuts and to prepare for future uncertainties.³² Utah lawmakers also had an eye on the future during their session when they decided to include analysis of the federal funding uncertainty as part of the regular state-mandated revenue volatility study. The state also requires contingency plans for every federal grant it receives, outlining policies in case those funds dry up.³³

Federal fiscal policy can also assist states, as it did in 2009 with the \$830 billion stimulus package, part of which was aimed at helping states cope with revenue shortfalls created by the Great Recession.³⁴ Some states received money they had not budgeted for, which helped them avoid deeper spending cuts and higher tax increases. Federal policy played a significant role in easing New York's experience in the Great Recession—particularly the Troubled Asset Relief Program, which reduced the recession's impact on the state's financial services sector.³⁵

Even with careful planning to prepare for revenue growth and decline, policymakers still face unpredictable events that disrupt state finances. Hurricanes are not unusual in places such as Louisiana, but state officials were not prepared for a catastrophe as large as Hurricane Katrina in 2005. New York officials knew early in 2001 that the economy was slowing, but no one could predict the terrorist attacks later that year that would worsen state finances.

Challenges and solutions

While many causes of state revenue volatility are out of policymakers' control, Pew's research identified practices that states should consider to help manage these fluctuations.

Challenge

States often lack information on how the factors that drive revenue volatility change over time.

Solution

States should periodically study their unique sources and drivers of revenue volatility.

Volatility varies across states and over time. Regularly determining the underlying causes can help state officials design policies that anticipate and smooth fluctuations in tax revenue. Historical patterns in tax collections and analysis of the mix of industries in a state's economy can provide information to improve fiscal policies that harness volatility.

For example, Utah has taken the most comprehensive approach to studying volatility. In 2008, lawmakers voted to require a joint legislative and executive study of the state's revenue volatility every three years. Utah officials examine three sources of volatility for the report: changes in economic activity that affect the tax base, interactions between the tax base and tax rate, and policy changes that modify the tax system.³⁶ By looking at economic and tax performance over 40 years, Utah determined that tax revenue was more unstable than its economy as a whole. In the Great Recession, this volatility was driven primarily by the sales and personal income taxes, which have grown as a share of total tax revenue.

Utah has used the volatility study to inform fiscal policy. The state has two major budget reserve funds, each supported by different taxes. The analysis helped policymakers establish separate funding targets for each fund in 2009 and led them to raise those targets again in 2012.³⁷ In the 2013 legislative session, Utah lawmakers added a requirement to track volatility in federal funds as well.³⁸

Similarly, Minnesota's 2008 Budget Trends Commission Study examined 50 years' worth of tax data to identify the key drivers of volatility. Researchers found that volatility among the taxes feeding the state's general fund was

30 percent greater than it had been in the 1970s, with most of the increase occurring since the late 1990s. The commission concluded that the state's budget reserve ceiling was not high enough to properly manage cyclical revenue volatility and proposed raising it from \$653 million to \$2.1 billion.³⁹

The California Legislative Analyst's Office found that economic factors—including the rise of high-paying technology companies, growth in the housing sector, and the related concentration of income among wealthy households—influenced the cyclic nature of tax revenue in the past 20 years. The study also noted that corporate and personal income taxes played a role in amplifying volatility.⁴⁰ In particular, legislative researchers found that capital gains revenue significantly complicated the budget process during periods of expansion in the late 1990s and mid-2000s, when it was unclear how much surplus revenue was recurring or one-time. This lack of clarity resulted in unsustainable spending growth, expanded programs, and inadequate savings. The legislative analyst's office concluded that the most effective way for California to manage its budget volatility would be to set aside above-average revenue growth in reserve funds for use in later years.

States can take a variety of approaches to learn more about their sources and drivers of revenue volatility. But any study of revenue volatility should analyze the state's economy and taxes, compare volatility across different taxes and through multiple business cycles, and make recommendations for improving fiscal policy.

Challenge

States will never be certain exactly how much revenue they will receive in any year, which complicates the budget process.

Solution

States may be able to improve the accuracy of their revenue forecasts by timing them closer to final passage of the state budget and by planning for possible shortfalls or surpluses in the budget process.

Revenue forecasts are central to developing state budgets, but despite officials' best efforts, these predictions rarely are perfect. Forecasting errors—the difference between projected and actual tax revenue—have grown in recent years, particularly during the two most recent recessions, when revenue was well below expectations.⁴¹ These errors are largely attributable to the underlying volatility of state revenue streams. The more revenue fluctuates, the more difficult it is to forecast it accurately.

States should examine how effective their revenue forecasting is in the context of revenue volatility. In some states, this may mean changing when estimates are made. The more time between a forecast and approval of a state budget, the more likely it is that unexpected conditions will affect the forecast's accuracy. This concern is heightened for biennial states that require revenue forecasts be set more than a year before the second half of the budget takes effect.

Some states frequently revise their predictions to respond to volatility. For example, Washington officials update their forecast four times a year to provide the most current estimates about the economy.⁴² With each revision, the state also prepares two unofficial forecasts, one based on an optimistic economic and revenue scenario and another with pessimistic assumptions. In 2013, Washington's forecasters increased the fiscal 2015-17 revenue estimate by \$342 million between June and September, reflecting better-than-expected job growth and real estate sales.⁴³

Revenue forecasting is inherently imprecise. Still, states can take steps to move their forecasts as close to key budget decisions as possible and prepare to deal with forecasting error as it occurs.

Challenge

Revenue volatility causes extensive year-to-year variation in the resources available to state governments.

Solution

States should redesign their reserve funds to smooth budgets across the business cycle.

Although revenue uncertainty will continue, state officials can still plan for unexpected financial challenges. When confronted with a sudden windfall, lawmakers are often pressured by interest groups, as well as the desire to address unmet needs, to change the tax code, or expand services and employee compensation. These budget choices can later prove problematic if revenue growth is actually a function of one-time revenue volatility rather than underlying, sustainable growth in the state's tax base. Saving money during the good times can mitigate those consequences and allow states to harness, instead of react to, revenue fluctuations. State officials should redesign their reserve funds—including their maximum size and the rules for making deposits—to correspond better with their state's revenue fluctuations.

Almost all states have established a rainy day fund to manage surpluses and deficits.⁴⁴ Rainy day funds improve fiscal health in states that have them. They help states maintain spending,⁴⁵ lower borrowing costs,⁴⁶ and preventing tax increases and spending cuts.⁴⁷ During the Great Recession, rainy day funds played a key role, along with one-time federal stimulus money, in stabilizing state budgets.⁴⁸ Two-thirds of states dipped into their rainy day funds to reduce or eliminate budget gaps between 2008 and 2010.⁴⁹

But not all reserve funds are created equal. Some states set caps that are too low to mitigate a serious budget gap, or that do not reflect their own experience with fluctuating revenue. After the Great Recession, states with high revenue volatility—including Georgia, Nevada, North Dakota, South Carolina, and Virginia—raised the cap on their rainy day fund balances, recognizing that a higher limit would provide more money to weather future budget shortfalls.⁵⁰

Most states still have reserve fund deposit rules that are not tied to revenue volatility. Yet, the rules each state sets for contributing to these funds in good times can be structured to align with state-specific drivers of volatility. For example, Virginia compares the increase in tax revenue from the previous year to the average increase over the past six years to determine contributions to its stabilization fund. This rule works to harness revenue during surplus years while maintaining budget flexibility during leaner times.⁵¹ Some states have found it effective to tie deposits to a specific, highly volatile revenue source, such as the capital gains tax in Massachusetts or the severance tax in Texas.⁵² Massachusetts instituted its capital gains rule after drawing down its budget stabilization fund during the Great Recession. After the change, the state more than doubled its fund, to almost \$1.7 billion, between fiscal 2010 and 2012.⁵³

States will always have to cope with fluctuating revenue. But policymakers can smooth these fluctuations by setting caps that allow reserve funds to grow large enough to withstand sudden downturns and by designing deposit rules that are closely tied to state-specific drivers of volatility.

Conclusion

Over the past two decades, states have experienced the dizzying heights of unprecedented economic growth and the sobering lows of severe recession. Uncertainty about the future of state finances is likely to persist. Yet volatility is neither inherently good nor bad. Large upward swings in revenue can be beneficial if state officials learn how to capture those windfalls and hedge against future downturns. Effectively managing this variability from year to year, in good times and in bad, requires that policymakers have a firm understanding of the unique patterns and drivers of revenue growth in their state. While it may not be possible or even preferable to eliminate all volatility from state budgets, it is increasingly imperative to harness it.

Appendix: Data and methods

Data sources

For this report, Pew researchers analyzed data on state economic conditions for two full business cycles between 1990 and 2012 and tax revenue collections between 1994 and 2012.

Economic conditions

To measure state economic performance, Pew researchers used the State and National Coincident Index data developed by the Philadelphia Federal Reserve Bank (<http://www.philadelphiafed.org/research-and-data/regional-economy/indexes/coincident>). This index combines four seasonally adjusted indicators to summarize current economic conditions in a single statistic for each state. The four variables captured in the index are nonfarm payroll employment, average hours worked in manufacturing, the unemployment rate, and wage and salary disbursements deflated by the consumer price index (U.S. city average). The trend for each state's index is then set to the trend of its gross domestic product (GDP), so long-term growth in the state's index matches long-term growth in its GDP.

Because they are built on variables measuring labor market conditions and employment, state coincident indexes are particularly useful for comparing economic activity to revenue performance. State tax collections are largely triggered by sales of goods or services or the realization of income, factors linked to labor market conditions. State GDP, by comparison, measures the production of goods and services, with changes often occurring months before the resulting impact on employment and tax collections. On the other hand, the coincident index is limited in that it does not capture the direct effects of changes in non-labor market trends, such as investment income and commodity prices. For states that tax these other areas of the economy, the coincident will track more poorly with GDP. Through a review of previous studies, Pew researchers determined these impacts would be minimal. A 2013 study by the Federal Reserve Bank of Philadelphia provides more information.⁵⁴

Tax revenue

The principal data source for total state-generated tax revenue is the State Government Tax Revenue by State series reported by the Nelson A. Rockefeller Institute of Government (http://www.rockinst.org/newsroom/revenue_reports/2013/2013-08-08-SRR_92.pdf). Rockefeller relies on the U.S. Census Bureau's Quarterly Summary of State and Local Tax Revenue for its historical data and for recent years whenever possible. Rockefeller adjusts tax data based on additional information in cases where the Census Bureau had to impute data that was not received from the state in time. Due to limitations in the Bureau's state government data for 1991 and 1993, Pew looked at tax revenue collection data beginning in 1994.

Pew's adjustments to economic and tax data

To accurately compare economic and revenue volatility, Pew researchers adjusted the state tax revenue data to control for inflation using the GDP deflator from the Bureau of Economic Analysis (<http://www.bea.gov>) and for seasonality in tax collections by using year over year change, rather than quarter over quarter. Revenue data were further smoothed by taking a four-quarter moving average for each data point. The coincident index is already constructed in a way that removes the impact of seasonality and inflation. For comparability, researchers converted monthly index values to quarterly averages. Pew then calculated year-over-year percentage changes for both data sources for each quarter.

Measuring volatility

Pew researchers focused on two distinct measures of volatility. Range captures the magnitude of economic and fiscal change from year to year. Alignment captures how closely the timing of those changes track between the state and national economies.

Range

Pew researchers used the interquartile range, or IQR, to quantify the magnitude of economic and fiscal swings. IQR calculates the range between the first and third quartiles of the data distribution, giving a sense of the spectrum within which 50 percent of the data lie. Unlike some other measures of variation, such as standard deviation, IQR minimizes the effects of extreme outliers. This is particularly beneficial for the tax data, where some of the more extreme year-over-year changes are almost certainly the result of tax policy changes. Using this measure of range effectively prevents states from being deemed highly volatile because of a small number of major tax rate or base changes. If a state changes tax policy every year, this will still be reflected in the data, but this can be considered another driver of volatility for policymakers to keep in mind.

Using the year-over-year change in each state's coincident index for each quarter in the 1990-to-2012 study period, Pew determined an IQR value for each state's economy. States with larger IQRs see more severe changes in typical years and are thus considered more volatile with respect to range in the study. Pew applied the same statistical technique to the state tax data to determine the IQR for revenue for the study period of 1994 to 2012. As with revenue, states where the difference between the top and bottom quartile was greater were deemed more volatile in this dimension.

Alignment

To measure alignment with respect to economic volatility, Pew calculated a Pearson's R correlation coefficient for the relationship between the year-over-year change in the U.S. national coincident index and the year-over-year change in each state's index from 1990 to 2012. In states where this correlation coefficient was 0.60 or higher (a standard cutoff for Pearson's R), Pew concluded that the timing of state economic upturns and downturns was largely in sync with the national economy. As part of this analysis, Pew looked at whether a stronger correlation existed when comparing the nation to the states in the previous month or the following month and did not find lead or lag time to be a significant factor.

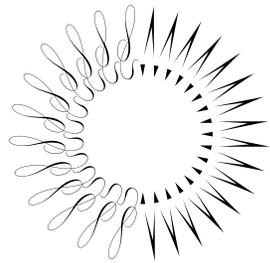
Finally, Pew assessed the alignment of tax revenue and economic performance within each state over time to gauge whether state revenue collections moved in tandem with state economic performance from 1994 to 2012. This analysis involved calculating the Pearson's R correlation coefficient to compare the year-over-year change in each state's coincident index to the year-over-year change in the four-quarter moving average of state tax revenue collections. Again, states with a correlation coefficient of 0.60 or above were considered to have high alignment between economic performance and tax collections. Lead or lag time did not play a significant role in these distinctions.

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