

The Growth and Volatility of State Tax Revenue Sources in the Tenth District

By R. Alison Felix

With the sluggishness in the national economy in 2008, many state governments are projecting budget shortfalls for the 2009 fiscal year. This trend is a concern to policy makers, as the health of a state's tax revenues is important to its economic growth and its ability to finance the public services that residents demand. State governments provide physical infrastructure, educate the future workforce, and protect people and property. In addition, in the Tenth Federal Reserve District, state and local governments employ more than 16 percent of the workforce.

While a number of factors influence the growth and volatility of state tax revenues, one key determinant is the composition of each state's tax portfolio. Governments desire a portfolio of tax instruments that allows for revenues to grow with the economy so that spending demands can be met without much change in tax rates. At the same time, stability in the revenue stream is important so that governments are not left with large financing constraints during downturns.

This article analyzes the impact of portfolio composition on the growth and stability of state tax revenues, particularly in the states that

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make up the Tenth District. The first section tracks the performance of state tax revenues nationwide since 1967, examines the factors that influence their performance, and details the portfolio components of Tenth District states. The second section discusses the importance of growth and stability for state tax revenues and describes the methodology for measuring growth and stability. The third section uses long-run and short-run elasticity estimates to analyze the growth and stability of each tax instrument. The fourth section discusses implications for Tenth District states.

I. PERFORMANCE AND COMPOSITION OF STATE TAX REVENUES

State tax collections are closely related to the economic health of both a state and the nation. When times boom, revenues abound. But when the economy takes a downturn, revenues tend to follow. However, economic downturns affect each state's tax revenues differently. These differences can be attributed to the state's industry mix and performance as well as the composition of its tax portfolio.

Factors affecting the performance of state tax revenues

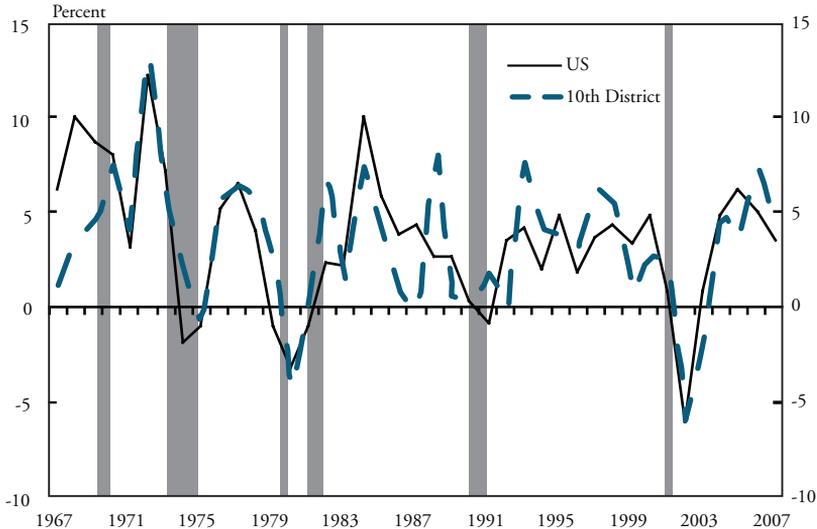
Real state tax revenues have fallen in most recessions during the past four decades (Chart 1). In the 2001 recession, revenues fell dramatically.¹ From 2001 to 2003, state tax revenues dropped more than 6 percent, pressuring state governments to cut services, raise taxes, or both. The Tenth District follows the national pattern with a few exceptions.²

A national slowdown in economic activity does not affect all states the same; some always fare better than others. The same is true for state tax revenues. With the national economy slowing in late 2007 and 2008, 29 states are projecting budget shortfalls in the 2009 fiscal year totaling more than \$48 billion (McNichol and Lav). The overall trend for the Tenth District is more positive with several states, including Oklahoma, Wyoming, and Nebraska, even experiencing budget surpluses (CREG Monthly Report; Hicks; Watts).

Variations in growth and cyclicity of revenues arise from two factors. One is the industry mix and performance of industries within a state. In the 2001 recession, for example, the financial, technology, and airline industries were hit especially hard, and states highly con-

Chart 1

REAL TOTAL STATE REVENUE GROWTH, 1967-2007



Sources: U.S. Census Bureau; Bureau of Labor Statistics

Notes: U.S. represents the average among U.S. states. 10th District represents the average among the district states. The shaded areas represent past U.S. recessions as defined by the National Bureau of Economic Research.

centrated in these industries suffered. In the 2008 economic slowdown, the construction industry and auto manufacturing are struggling, while financial markets remain unstable. And, indeed, states facing the largest revenue problems tend to be on the coasts, where the housing contraction is greatest; in the upper Midwest, where auto manufacturing is important; and in New York and New Jersey, which rely on financial markets. By contrast, states with a high presence in the energy sector are benefiting from high energy prices, resulting in generally strong revenue flows.

Another important factor in the growth and stability of state tax revenues, and the focus of the remainder of this article, is the composition of each state's tax portfolio.³ States choose from a variety of tax instruments when designing their tax structure, including general sales, selective sales, personal income, corporate income, license, property, and severance taxes. Each of these tax instruments responds differently to upturns and downturns in the economy. For example, a sales tax on food is fairly stable because people will buy food in good times and in

bad. However, tax revenues from capital gains depend largely on the stock market's performance and thus can be volatile.

Composition of state tax revenues in the Tenth District

The composition of state tax portfolios varies across the United States and changes over time. The Tenth District has a few especially unique tax structures. Understanding these differences will help analyze the growth and volatility of state tax revenues.

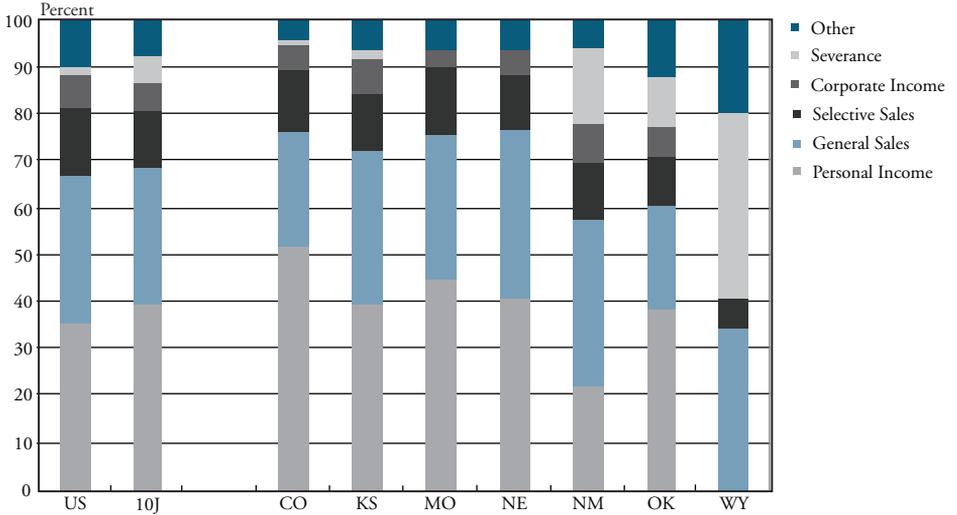
In most states, the general sales tax and personal income tax provide the largest share of total tax revenues (Chart 2). Selective sales taxes, including motor fuel taxes, alcohol taxes, tobacco taxes, insurance premium taxes, amusement taxes and others, represent 15 percent of the average general tax fund. Corporate tax revenues make up 7 percent, while severance taxes and other taxes supply the remaining 11 percent.⁴

Tax portfolios in the Tenth District are somewhat similar to the nation as a whole, but several differences deserve mention. Overall, the Tenth District relies more on personal income and severance taxes and less on sales (both general and selective) and corporate taxes. Indeed, the biggest difference between tax revenues in the nation and the Tenth District is the size of severance tax revenues, which are more than four times more important in the district. Oil and gas extraction is the top defining industry in the district, and its contribution to states' budgets is felt through severance tax revenues (Wilkerson and Williams). These taxes are especially important in New Mexico, Oklahoma, and Wyoming, where in 2007 severance taxes made up 16, 10, and 40 percent, respectively, of total tax revenues.

Several notable tax differences between the nation and district states exist. For example, Wyoming is one of only three states without a corporate income tax and one of only seven without a personal income tax. Wyoming also relies less heavily on selective sales taxes than the nation. The absence of these tax sources is compensated by revenues from severance taxes, as well as from property taxes (shown in the "Other" category in Chart 2). In addition, Colorado places less reliance on general sales taxes and more on personal income taxes than the national average. Oklahoma also receives a smaller contribution from general sales taxes but compensates with greater revenues from its severance tax. Missouri trades lower corporate tax revenues for higher personal income tax revenues.

Chart 2

COMPOSITION OF STATE TAX PORTFOLIOS, U.S. AND TENTH DISTRICT, 2007



Source: U.S. Census Bureau

Notes: U.S. represents the average among U.S. states. 10th District represents the average among District states.

State tax structures in the Tenth District have also changed somewhat over time. Over the last 40 years, district states have gradually become much more reliant on personal income taxes and less on selective sales taxes (Chart 3). Revenues from corporate and severance taxes have also edged upward as a percent of total revenues. But while there have been some general trends in the direction of tax changes over time, major changes to tax structures within the district have been rare, especially in recent years.⁵

II. GROWTH AND STABILITY OF STATE TAX REVENUES

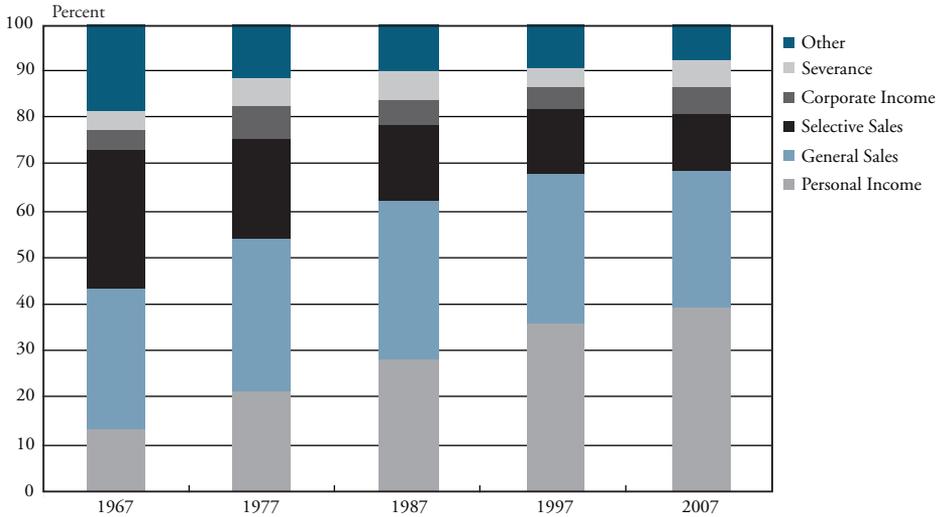
Growth and stability are important characteristics of tax instruments. This section first explains why this is true and then describes a methodology for measuring these concepts. To assess the overall performance of tax revenues for each district state, data from 1965 to 2007 are used to estimate the growth and volatility of total tax revenues.

The importance of growth and stability

As real personal incomes have risen over the past 40 years, the demand for public goods and services has also climbed. In 1965, state tax

Chart 3

COMPOSITION OF STATE TAX PORTFOLIOS, TENTH DISTRICT, 1967-2007



Source: U.S. Census Bureau

revenues averaged \$902 per person (in 2007 dollars). By 2007, this figure had nearly tripled to \$2,581 per individual. State governments are pressured to choose a state tax portfolio that produces revenues to keep pace with the growing demand for such things as education, highways, police protection, healthcare, and parks. The growth rate of each tax instrument varies. Revenues from some taxes grow much faster than personal income, while others grow more slowly. Indeed, researchers have found that the growth of personal income taxes often exceeds the growth of general and selective sales taxes (White; Sobel and Holcombe).

In addition to the growth of tax revenues, state governments must also consider stability when choosing a tax structure. Unlike the federal government, most state governments are required to balance their budget. If revenues falter, states must respond by cutting services or increasing tax rates, neither of which is popular among state officials or their constituencies. Some types of tax revenue are volatile and change more than personal income; others are more stable and change less. For example, corporate income tax revenues tend to be cyclical, but tax revenues from gas, alcohol, and tobacco tend to be much more stable (Sobel and Holcombe). The response of tax revenues to the business

cycle can be measured by comparing changes in revenues with changes in personal income.

Research about the relationship between the growth and stability of tax instruments has evolved over time. Early economic literature in this area suggested there was an innate trade-off between the two (Groves and Kahn). This literature emphasized that tax bases exhibiting rapid growth were also often the most unstable. More recently, researchers have questioned this relationship and found that, while such a trade-off exists for many tax instruments, there are exceptions. For example, Sobel and Holcombe (1996) found that sales tax and corporate tax revenues tend to grow at about the same speed, while revenues from corporate taxes are much more volatile. Dye and McGuire (1991) showed that certain components of tax bases do not experience this trade-off, such as the personal consumer services component of sales tax revenue. Some aspects of the tax structure can affect whether the trade-off exists. Personal income taxes grow faster than sales taxes, but they are not necessarily more volatile, depending on the structure of both tax sources (Bruce, Fox, and Tuttle). The more recent literature suggests that state governments may be able to reduce the cyclical nature of state tax revenues without giving up their much needed growth.

Measuring growth

To understand the growth of tax revenues over time it is helpful to compare their growth to that of personal income. The easiest way to illustrate this comparison is to estimate the long-run elasticity of tax revenues—that is, how revenues increase in response to an increase in personal income. In this case, long-run elasticity measures the percent change in tax revenues divided by the percent change in personal income, and is estimated using Equation 1:^{6,7}

$$(1) \ln(\text{revenue}) = \alpha + \beta \cdot \ln(\text{personal income}) + \gamma \cdot (\text{tax rate}) + \varepsilon$$

In the equation, β estimates the long-run elasticity of tax revenues. $\beta > 1$ implies that tax revenues grew more quickly than personal income, and $\beta < 1$ means it grew slower. To control for changes in the tax rate over time, the tax rate is included as an independent variable.⁸ This prevents changes in the tax rate from influencing this measure of revenue growth. The natural logarithms of tax revenues and personal income are taken to ease the interpretation of β .

Using tax revenue data from 1965 to 2007, the long-run elasticity of total state tax revenue (β in Equation 1) is estimated to be 1.17 for the nation as a whole.^{9,10} This estimate implies that tax revenues increased 1.17 percent for every 1 percent increase in personal income. (Section III will explore some reasons why tax revenues have grown more quickly than personal income over the past 40 years.) Estimates of the long-run elasticity for each Tenth District state exhibit quite a bit of variation (Table 1). For example, total tax revenues in Colorado and New Mexico grew significantly slower than in the nation, and revenues in Colorado actually increased less than personal income.¹¹ By contrast, the long-run elasticity of total tax revenues in Kansas, Missouri, Nebraska, and Wyoming is significantly larger than that of the nation. These estimates are for total tax revenues; elasticities for each type of tax instrument will be estimated in the next section.

Measuring volatility

The volatility of tax revenues refers to the relationship of state tax revenues to the state's business cycle—that is, the cyclical nature of revenues. As the economic health of a state fluctuates, the volatility of tax revenues describes how much revenues respond to these changes. The measurement of volatility is similar to the measurement of growth, except that volatility occurs in the short-term. Thus, instead of comparing the *growth* of tax revenues to the *growth* of personal income, the comparison is made between the *changes* in these growth rates. This specification is shown in Equation 2:^{12,13}

$$(2) \quad \Delta \ln(\text{revenue}) = \alpha + \theta \cdot \Delta \ln(\text{personal income}) + \gamma \cdot \Delta(\text{tax rate}) + \varepsilon$$

In the equation, the volatility, or short-run elasticity, of state tax revenues is estimated by θ . When $\theta > 1$, state tax revenues are said to be more volatile than personal income, and when $\theta < 1$, state tax revenues are less volatile (or more stable). To attempt to control for changes in the tax structure over time, the change in the tax rate is included as an independent variable.¹⁴

From 1965 to 2007, the short-run elasticity of total state tax revenue is estimated to be 1.34 for the nation. Thus, state tax revenues have been more volatile than personal income over the last 40 years. (The reasons will be explored in Section III.) Most states in the Tenth District have tax revenue that is more volatile than personal income (Table 1).¹⁵

Table 1

ESTIMATES OF GROWTH AND VOLATILITY OF TOTAL TAX REVENUE

	Growth Estimates (long-run elasticity)	Volatility Estimates (short-run elasticity)
U.S. ^a	1.17***	1.34***
10th District ^b	1.21***	1.25***
Colorado	.92***	1.18***
Kansas	1.35***	.92**
Missouri	1.34***	1.57***
Nebraska	1.69***	.32
New Mexico	1.03***	1.42***
Oklahoma	1.18***	1.23***
Wyoming	1.33***	1.3***

Notes: *, ** and *** indicate that coefficients are significant at the 10%, 5% and 1% level, respectively. Tax rates were not included in these estimates.

a) Data used represents the average among U.S. states.

b) Data used represents the average among Tenth District states.

III. MEASURING GROWTH AND STABILITY OF PORTFOLIO COMPONENTS

This section analyzes the growth and volatility of the five most important tax instruments in the Tenth District—general sales, selective sales, personal income, corporate income, and severance taxes. Growth (long-run elasticity) is estimated using Equation 1, and volatility (short-run elasticity) is estimated using Equation 2. Estimates of the growth and volatility of each of these revenue sources are presented in Table 2.

General sales

Over the past 40 years, general sales tax revenues grew at about the same pace as personal income. The long-run elasticity indicates that general sales tax revenues increased slightly slower than personal income in the nation (.92) and slightly faster in the Tenth District (1.13).¹⁶ The short-run elasticity shows that general sales tax revenues were slightly more volatile than personal income in both the nation (1.24) and in the Tenth District (1.23). Even so, general sales tax revenues were generally less volatile than other revenue sources.

Table 2
ESTIMATES OF THE GROWTH AND VOLATILITY OF STATE TAX INSTRUMENTS

GROWTH										
Long-Run Elasticities of Tax Revenue										
	U.S. ^a	10J ^b	CO	KS	MO	NE	NM	OK	WY	
General Sales ^c	0.92***	1.13***	0.85***	0.94***	0.66***	0.95***	1.25***	0.82***	1.46***	
Selective Sales ^d	0.23	0.01	0.43***	0.64**	-0.62	-0.03	0.19**	-0.23**	-0.23	
Personal Income ^e	2.03***	2.10***	1.27***	2.37***	2.29***	3.03***	2.00***	2.49***	n/a	
Corporate Income ^f	0.53***	0.85***	0.44***	0.99***	0.27	1.32**	1.67***	0.86***	n/a	
Severance ^g	1.09***	1.57***	1.83***	5.58***	-0.05	-1.29***	0.99***	1.04***	5.59***	
VOLATILITY										
Short-Run Elasticities of Tax Revenue										
	U.S.	10J	CO	KS	MO	NE	NM	OK	WY	
General Sales ^h	1.24***	1.23***	1.61***	0.72***	1.38***	0.36	1.81**	1.55***	1.60***	
Selective Sales ^h	1.26***	0.94***	0.39	1.14**	1.16**	0.45**	0.62	0.42	0.59	
Personal Income ^h	2.58***	1.82**	1.19**	1.19	1.65***	1.20	2.63	1.64***	n/a	
Corporate Income ^h	2.61***	3.26***	1.85	2.96*	5.23***	1.41	5.71***	3.56***	n/a	
Severance ^g	-0.93	2.67	1.05	6.59	-1.80	-2.57**	3.43**	4.43***	3.12	

Notes: *, **, and *** indicate that coefficients are significant at the 10%, 5% and 1% level, respectively.

a) Data used represents the average among U.S. states.

b) Data used represents the average among Tenth District states.

c) General sales tax rates are included as an independent variable, and the state regressions include dummies for food exemptions and prescription drug exemptions.

d) Tax rates for beer, gasoline, and cigarettes are included as independent variables.

e) The highest marginal personal income tax rate is included as an independent variable.

f) The highest marginal corporate tax rate is included as an independent variable.

g) Tax rates are not included.

h) The changes in the relevant tax rates are included as independent variables.

Table 3
VOLATILITY OF CONSUMER EXPENDITURES, 1967-2007

Spending Categories	Variance of the Annual Percent Change
Durable goods	30.28
Motor vehicles and parts	74.07
Furniture and household equipment	22.47
Nondurable goods	2.04
Food	1.94
Clothing and shoes	6.58
Transportation	11.81
Medical care	2.61
Recreation	3.69
Gasoline	1.35
Cigarettes	3.10

Notes: All numbers measure the variance of the annual percent change in spending except gasoline and cigarettes, which measure the variance of the annual percent change in quantity sold.

Sources: U.S. Department of Agriculture; Bureau of Economic Analysis

To understand differences in the growth and volatility of general sales tax revenues across states, it is important to recognize that the structure of general sales taxes among states varies widely (Table A.1.). The estimates presented in this analysis control for differences in tax rates, but several other key differences should be kept in mind as well. For example, many states exempt food and prescription drugs from sales taxes. In 2008, 44 states (including all Tenth District states) exempted prescription drugs, and 31 states (including Colorado, Nebraska, New Mexico, and Wyoming) exempted food.¹⁷ Food and prescription drug purchases tend to grow slowly with increases in income (Dye; Bruce, Fox, and Tuttle). Thus, if food and prescription drugs are taxed, general sales tax revenues may grow more slowly.¹⁸ On the other hand, food and prescription drug purchases do not vary much with the business cycle because in economic downturns consumers tend to cut spending on other goods first. Consequently, food and medical care are two of the least volatile categories of consumer spending (Table 3). Thus, if food and prescription drugs are taxed, general sales tax revenues may be less volatile than personal income (Dye and McGuire).

Two other structural differences in general sales taxes are the number and types of services taxed. For example, in 2004 Colorado taxed 14 services and New Mexico taxed 156.¹⁹ Taxed services can include utilities, personal services, business services, professional services, admissions/amusements, and computer services. Consumer spending on services has increased dramatically over the last couple of decades, and taxing a large number of services has boosted revenue growth.²⁰ In addition, including a large number of services in the sales tax base may help states reduce the volatility of sales tax revenue by diversifying their sources of revenue.

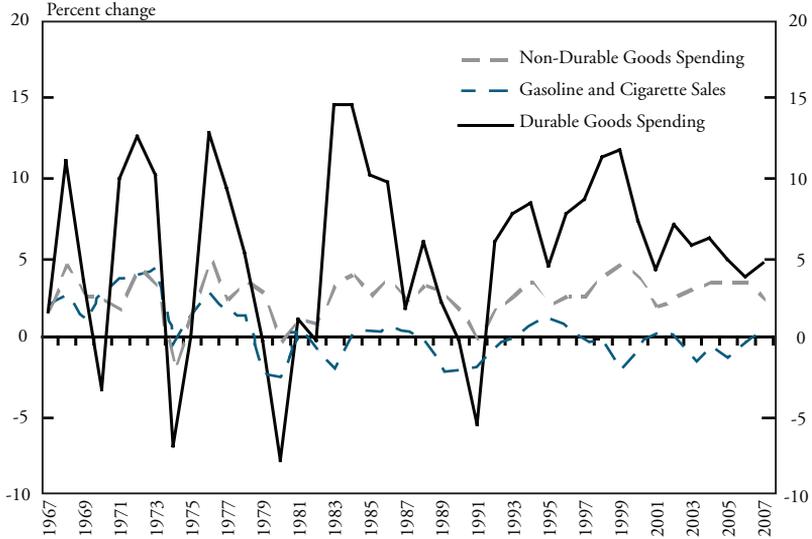
Selective sales

Selective sales taxes include those imposed on tobacco, alcohol, gasoline, insurance premiums, and amusements. Estimates of the long-run elasticity show that selective sales tax revenues have grown much more slowly than personal income over the past 40 years, and in some states revenues have declined. In addition, selective sales tax revenues are not highly correlated with personal income, as observed by the lack of statistical significance in many of the estimates. Short-run elasticities indicate that selective sales tax revenues are slightly more volatile than personal income in the nation, but slightly less volatile in the Tenth District. In many district states, the volatility of these revenues is very low. Thus, the selective sales tax is the slowest growing and least volatile tax in the Tenth District.

As personal incomes have increased over time, individuals have not increased their consumption of goods like gasoline, tobacco, and alcohol in proportion.²¹ This difference can result in a low growth rate or a relationship between income and revenues that is not statistically significant. In addition, consumption of these goods does not decrease dramatically during economic downturns. For example, gasoline and cigarettes are much less volatile than durable goods purchases (Chart 4). Some volatility in selective sales tax revenues is evident, but in most states these revenues are much less volatile than personal incomes.

It is also important to remember that gasoline, alcohol, and tobacco taxes are assessed on the quantity of the good sold and not the price.²² For example, gas taxes are imposed per gallon and cigarette taxes are imposed per pack. The estimates in this analysis control for gasoline,

Chart 4

GROWTH OF SELECTED CONSUMER EXPENDITURES,
1967-2007 (YEAR-OVER-YEAR)

Source: United States Department of Agriculture; Bureau of Economic Analysis

alcohol, and tobacco taxes. After holding these rates constant, real revenues will decrease if the quantity sold does not increase. This occurs as revenues per quantity fail to keep pace with inflation. Thus, over time states must raise tax rates on these goods to keep revenues neutral or else tax these goods based on price instead of quantity. Overall, taxing goods based on quantity of sales contributes to slower growth of selective sales tax revenues.

Personal income

Personal income tax revenues are the fastest growing revenue source both nationwide and in the district. The long-run elasticity estimates show that growth in personal income tax revenues more than doubled personal income growth over the past 40 years. Tax revenues from personal income are also volatile—in fact, the second most volatile tax source in both the nation and the district after corporate income taxes.

It may seem that personal income tax revenues should move in step with changes in personal income. However, revenues grow faster

and are more volatile than personal income for two reasons. First, most states have a progressive income tax structure with tax brackets. For instance in Kansas, earners pay 3.5 percent on the first \$15,000 of income, 6.25 percent on the second \$15,000 and 6.45 percent on any income over \$30,000. As incomes increase, taxpayers are bumped into higher tax brackets and thus pay a higher percentage of additional income in taxes. In this way, personal income tax revenues will increase faster than personal incomes. Second, many states do not index their tax brackets for inflation. For example, Kansas tax brackets have stayed the same since 1993. Therefore, even if real personal income (adjusted for inflation) stays constant, revenues will increase. Structures that are more progressive and not indexed for inflation will experience faster growth and more volatility in revenues.²³ Colorado is the only state in the Tenth District with a flat income tax, where all incomes pay the same tax rate. The long-run and short-run elasticities for Colorado show that its personal income tax revenues have grown more slowly than in other states and are also less volatile.

Another reason to expect personal income tax revenues to grow faster and be more volatile than personal income is that in most states capital gains are taxed as ordinary income. One of the most common forms of capital gains is the sale of appreciated stocks and bonds. Stock prices have grown faster than personal income since 1980 and are much more volatile than personal income. Taxing capital gains as personal income leads to faster revenue growth that is much more volatile.

Corporate income

The estimates of the long-run and short-run elasticity of corporate tax revenues from 1965 to 2007 indicate there was not a trade-off between growth and stability for these revenues.²⁴ Corporate tax revenues grew slower than personal income and were much less stable in both the nation and district—in fact, they were the most volatile tax instrument.

One potential explanation for the slow growth of corporate tax revenues over the past 40 years is the increased use of business tax incentives by state governments (Burnstein and Rolnick). Business tax incentives can take many forms, including lower corporate income taxes. In 1998, 37 states had available some form of corporate tax exemption to retain or attract business investment (Chi and Hofmann). Tax incentives such as

these can lead to slower growth of corporate tax revenues. For example, in the Tenth District only Nebraska and New Mexico did not offer any type of corporate tax exemption, and these two states showed the fastest growth of corporate revenues in the district (Chi and Hofmann).

As with personal income taxes, many corporate income tax structures are progressive. In the Tenth District, Kansas, Nebraska, and New Mexico have progressive corporate taxes, while Colorado, Missouri, and Oklahoma have flat corporate taxes. This structural difference is likely to have less effect on growth and stability of corporate tax revenues than it did on personal income tax revenues. The reason is that most corporate tax structures have a relatively low top income bracket, and they often have only two brackets. Thus, the difference between a flat corporate tax and a progressive one may be smaller than in the personal income tax structure.

Severance

Severance taxes are assessed on extracted natural resources, often including oil, natural gas, and coal. These sources provide considerable revenue to some Tenth District states, including almost a billion dollars annually to each of New Mexico, Oklahoma, and Wyoming. Other states in the district receive very little such revenue. In 2007, Missouri and Nebraska received just \$58,000 and \$2.5 million, respectively.²⁶

The long-run and short-run elasticities for severance tax revenues vary widely among states. Many of these differences can be explained by changes over time in severance tax rates and structures. The estimates in this analysis do not control for severance tax rates because of the complexity of these tax structures. For example, since the inception of its first severance tax in 1969, Wyoming has altered its severance tax rates and structure almost 70 times, and it taxes at least 14 different natural resources (Wyoming State Legislature). For this reason, the estimates presented here should be interpreted with caution. The long-run and short-run elasticity estimates should be understood as the growth and volatility of severance tax revenues and the effects of tax changes over time on these revenues. The long-run elasticity estimates indicate that severance tax revenues in the Tenth District (1.57) have grown faster than personal income. This growth can be attributed to both the increase in the prices of natural resources and increasing tax rates.

Severance tax revenues in most district states are highly volatile. A primary reason is that prices of natural resources, such as oil, gas, and coal, tend to be unstable and often unpredictable. Most severance taxes are *ad valorem* taxes and thus revenues depend directly on the price of the good.²⁷ The high volatility of severance taxes can be seen by comparing oil prices to severance tax revenues (Chart 5).

IV. IMPLICATIONS FOR DISTRICT STATES

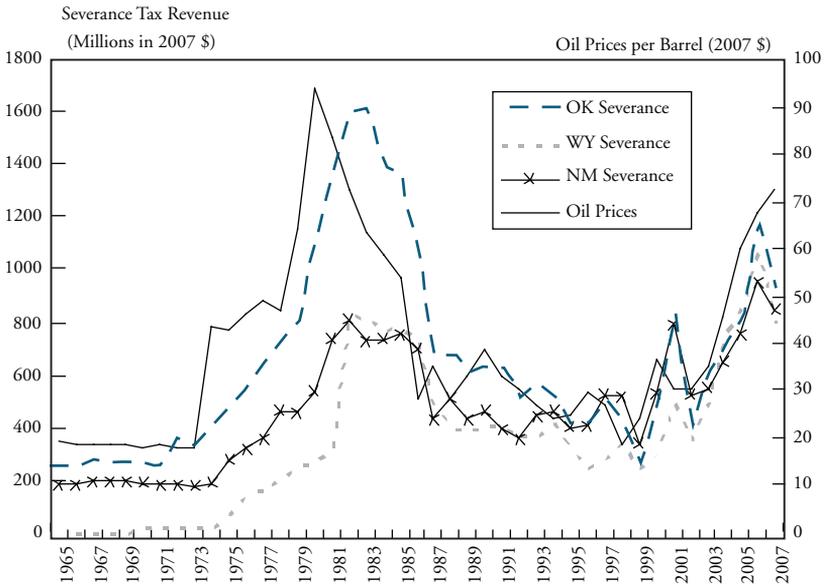
Estimating the growth and stability of each tax instrument over the past 40 years is important for understanding the overall performance of state tax revenues. It is also important to consider changes in tax rates and structures over time and the diversification of the tax structure. Combining an analysis of tax revenue growth and volatility with information about current state tax structures then makes it possible to assess the potential risks and rewards of changes in tax policy. (Appendix Table A.1 describes the tax structure for each district state.)

Colorado's tax revenue had the lowest growth (long-run elasticity) of the Tenth District states over the past 40 years. The state also receives a larger share of its revenues from personal income taxes than any other district state. In some states this might lead to faster growth and higher volatility. But in Colorado, personal income is taxed at a flat rate, which reduces the growth of these tax revenues. Another contributing factor to slower growth over the past 40 years is tax rates for sales, personal income, and corporate income that have remained steady or even declined. In addition, in 1992 Colorado residents enacted a Taxpayers Bill of Rights (TABOR) to limit the growth rate of tax revenues.

Kansas had the least volatile tax revenues in the Tenth District over the past 40 years. The tax portfolio in Kansas is relatively diversified, putting almost equal weight on sales taxes and income taxes. Just as diversification reduces risk in a financial portfolio, diversifying state tax structures is likely to reduce volatility. Kansas also taxes food at the ordinary sales tax rate, which also reduces the volatility of tax revenues.

Missouri and *Nebraska* experienced the most growth in revenues from personal income taxes and the most volatility from corporate income taxes since 1965. Missouri also limited its general sales tax revenue growth by taxing food and only 28 services. In addition, unlike other states in the district, Missouri and Nebraska receive less than 1 percent of their tax revenues from severance taxes.

Chart 5
OIL PRICES AND SEVERANCE TAXES, 1965-2007



Sources: U.S. Census Bureau; Dow Jones and Company

New Mexico has the most progressive corporate tax structure of any district state, which likely increased the growth and volatility of corporate tax revenues in recent decades. General sales tax revenues also increased relatively quickly in New Mexico, due in large part to the large number of services taxed. However, a small reliance on personal income tax revenues restricted the growth of total tax revenues. In 2005, New Mexico exempted food from the general sales tax, which may increase both the volatility and growth of general sales tax revenues.

In *Oklahoma*, reliance on selective sales taxes has decreased tax revenues over time but has also provided some stability. Over the past 40 years, severance taxes and corporate income taxes have been the most volatile tax sources for Oklahoma. As in Missouri, growth from general sales taxes has been limited by taxing food and only 32 services.

Wyoming has avoided two of the most volatile tax instruments by not taxing personal income and corporate income. However, by relying primarily on just three tax instruments, the state reduced the diversification of its tax structure, likely adding volatility. The lack of personal income tax revenues has also restricted tax revenue growth. Tax revenues appear to have kept pace with other states in part by increasing

the tax rates on severances. Wyoming excluded the taxation of food in 2006, which will likely increase the growth and volatility of general sales tax revenues in the future.

V. CONCLUSIONS

The composition of a state's tax portfolio plays a critical role in determining the growth and stability of state tax revenues. In addition, however, the structure of each tax instrument can affect the performance of revenue and result in differences in growth and volatility across states for the same tax instrument. Of the five taxes examined in this paper, the personal income tax has provided the fastest growth in revenues over the past 40 years. Corporate income tax has added the most volatility to tax structures, at the same time providing only limited growth. Sales tax revenues, both general and selective, have been the least volatile tax instruments.

Revenue portfolios differ substantially across states. No portfolio is better or worse than another as a general case, but each government's portfolio has important implications for revenue growth and stability, and hence for potential economic growth and vitality. Consequently, tax revenue portfolios should be developed to fit a state's unique economic make-up. To maintain tax revenues that can keep pace with increasing constituent demands and survive potential downturns in economic activity, policymakers should be aware of the growth and stability characteristics of each tax policy. These considerations should be weighed in conjunction with other policy goals such as the equity and efficiency of the state tax system.

State tax revenues in the Tenth District are likely to fare better in the near term than revenues in the nation as a whole. The district's strong reliance on severance taxes will provide a boost to revenues in several states, as prices of natural resources are at all-time highs. In addition, the robust recent performance of the agriculture sector will add much needed sales and personal income tax revenues in several states. However, some negative effects on state tax revenues from the sluggishness in the national economy are to be expected. Corporate tax revenues tend to be volatile and decreases from this revenue source are probable in some areas. There is also a risk that growth in personal income tax revenues will slow with a decrease in capital gains due to a slumping stock market. Such revenues declined considerably during the financial

market difficulties associated with the 2001 recession. Finally, while sales taxes tend to be the least volatile tax instrument, any weakness in consumer spending would also lead to a drop in sales tax revenues in areas not concentrated in the agriculture or energy sectors.

APPENDIX

Table A-1
2008 TAX STRUCTURE IN THE TENTH DISTRICT

	General Sales	Selective Sales	Personal Income^a	Corporate Income	Severance (Oil and Gas)^b
	2.9%	Gas = 22 ¢/gallon	4.63%	4.63%	2% - 5% Oil
Colorado	Food and prescription drugs exempt	Cigarettes = 84 ¢/pack			2% - 5% Gas
	14 services taxed	Beer = 8 ¢/gallon			
	5.3%	Gas = 25 ¢/gallon	3.5% > \$0	4% > \$0 ^c	8% Oil
Kansas	Prescription drugs exempt	Cigarettes = 79 ¢/pack	6.25% > \$15,000	7.35% > \$50,000	8% Gas
	71 services taxed	Beer = 18 ¢/gallon	6.45% > \$30,000		
	4.225% ^d	Gas = 17.6 ¢/gallon	1.5% > \$0 ^e	6.25% ^{f,g}	None
Missouri	Prescription drugs exempt	Cigarettes = 17 ¢/pack	2% > \$1,000		
	28 services taxed	Beer = 6 ¢/gallon	2.5% > \$2,000		
			3% > \$3,000		
			3.5% > \$4,000		
			4% > \$5,000		
			4.5% > \$6,000		
			5% > \$7,000		
			5.5% > \$8,000		
			6% > \$9,000		
Nebraska	5.50%	Gas = 23.9 ¢/gallon	2.56% > \$0	5.58% > \$0	2% Stripper Oil
	Food and prescription drugs exempt	Cigarettes = 64 ¢/pack	3.57% > \$2,400	7.81% > \$50,000	3% Nonstripper Oil
	76 services taxed	Beer = 31 ¢/gallon	5.12% > \$17,500		3% Natural Gas
			6.84% > \$27,000		

5%	Gas = 18 ¢/gallon	1.7% > \$0	4.8% > \$0	7.8% - 8.7% Oil ^h
New Mexico	Food and prescription drugs exempt	Cigarettes = 91 ¢/pack	3.2% > \$5,500	6.4% > \$500,000
156 services taxed	Beer = 41 ¢/gallon	4.7% > \$11,000	7.6% > \$1,000,000	8.6% - 9.5% Gas
		5.3% > \$16,000		
4.50%	Gas = 17 ¢/gallon	0.5% > \$0	6%	7% Oil
Oklahoma	Prescription drugs exempt	Cigarettes = 103 ¢/pack	1% > \$1,000	7% Gas
32 services taxed	Beer = 40 ¢/gallon	2% > \$2,500		
		3% > \$3,750		
		4% > \$4,900		
		5% > \$7,200		
		5.65% > \$8,700		
4%	Gas = 14 ¢/gallon	None	None	6% Oil
Wyoming	Food and prescription drugs exempt	Cigarettes = 60 ¢/pack		6% Gas
62 services taxed	Beer = 1.9 ¢/gallon			

- a. Brackets listed are for single filers
- b. Most states also tax other minerals including coal, uranium, gold, silver, etc.
- c. Banks taxed at lower rate
- d. Food is taxed at the lower rate of 1.225%
- e. Federal tax is deductible up to \$5,000 for single filer
- f. 50% of federal tax is deductible
- g. Banks taxed at higher rate
- h. Rate is determined based on county and school district

ENDNOTES

¹Decreases in capital gains tax revenues due to the stock market crash were a major contributor to the decline of state tax revenues.

²The Tenth Federal Reserve District includes Colorado, Kansas, Nebraska, Oklahoma, Wyoming, the western third of Missouri, and the northern half of New Mexico.

³The growth and stability of tax revenues are two of the primary considerations of designing a state government's tax structure. Common goals for tax policy also include efficiency, equity, and simplicity. Considerable economic research has been devoted to these areas. Auerbach and Hines (2002) provide an extensive review of the tax efficiency literature. Slemrod (1996) discusses the simplicity of the tax system. Fullerton and Metcalf (2002) present an overview of the basics of tax incidence.

⁴Severance taxes are collected on oil, coal, natural gas, and other natural resources that are extracted from a state.

⁵Nebraska added a sales tax, personal income tax, and corporate income tax in 1968 (Nebraska Department of Revenue). Wyoming added the majority of its severance taxes in 1969 (Wyoming State Legislature). Many states have added food and drug exemptions to their general sales tax since 1965. The following states added food exemptions in this time period: Colorado (1979), Nebraska (1982), New Mexico (2005), and Wyoming (2006) (Advisory Commission on Intergovernmental Relations; State of New Mexico Taxation and Revenue; Wyoming Department of Revenue). The following states added prescription drug exemptions during this time period: Kansas (1978), Missouri (1980), New Mexico (1999), and Oklahoma (1981) (Advisory Commission on Intergovernmental Relations; State of New Mexico Taxation and Revenue). Beer and cigarette taxes have increased faster than most other tax rates in many states.

⁶This specification is similar to the one used by Sobel and Holcombe (1996). They use the tax base as the dependent variable instead of the tax revenue. There are benefits and drawbacks to using tax revenue data. The main drawback is that changes in the tax code can affect revenue as well as changes in personal income. The major drawback of using tax base data is that these data are imprecise given that data on tax bases are not directly available. Tax bases must be approximated using similar measures such as retail sales data.

⁷Sobel and Holcombe (1996) point out that estimates from this equation will be asymptotically biased. They correct for this bias by using Dynamic Ordinary Least Squares with the Newey-West error correction. However, estimates from their corrected and uncorrected model show only small differences, and they conclude that the simpler model (like Equation 1) still provides useful estimates.

⁸Tax rates have been included in the regressions to attempt to control for tax code changes. However, changes to the tax base may still affect estimates.

⁹Tax revenue data are available from the Bureau of the Census and personal income data are obtainable from the Bureau of Economic Analysis. Information on tax rates was compiled from the Office of Tax Policy Research at the University of Michigan, the Tax Foundation, the Federation of Tax Administrators, Significant Features of Fiscal Federalism, and individual state websites. All dollar amounts have been converted to 2007 dollars using the consumer price index (CPI) available from the Bureau of Labor Statistics.

¹⁰In estimating the elasticity of total tax revenue, the tax rate was not included in the regression because a good measure of the overall tax rate does not exist. Thus, estimates should be interpreted as the growth in tax revenue including changes in tax rates.

¹¹One possible explanation for slower growth in Colorado is the implementation of its Taxpayers Bill of Rights (TABOR) in 1992. TABOR limits revenue growth to the previous year's allowed collections plus population growth and inflation rate. Voters in Colorado suspended TABOR in 2005 for five years.

¹²The specification in Equation 2 is similar to the specification used in Sobel and Holcombe (1996). The difference is that tax revenue data are used in this analysis, while tax base data were used in theirs. A simpler form of Sobel and Holcombe's (1996) model is used here. In their paper, they use an error correction model. When comparing estimates from the two models, they find few differences and conclude that the simpler model provides useful estimates.

¹³Volatility has been estimated by several equations in the literature. These methods are discussed briefly in Dye (2004). Holcombe and Sobel (1996) introduced this technique to deal with the problem of non-stationarity.

¹⁴The change in the tax rate is included for tax instruments that have a rate available. Tax rates are not included for estimates of total tax revenue elasticities.

¹⁵The table data suggest that the exceptions are Kansas and Nebraska, but the elasticity in Kansas is not significantly different from one, and the Nebraska number is imprecisely estimated.

¹⁶These two estimates are not statistically different at the 5 percent level.

¹⁷According to the Federation of Tax Administrators, Missouri taxes food at a lower rate (1.225 percent in 2008), and Kansas and Oklahoma provide rebates via income tax credits to compensate poor households for this tax.

¹⁸Bruce, Fox and Tuttle (2006) and Dye and McGuire (1991) suggest that exempting food from the tax base may increase the long-run elasticity.

¹⁹The number of services taxed in 2004 in each district state is as follows: Colorado, 14; Kansas, 71; Missouri, 28; Nebraska, 76; New Mexico, 156; Oklahoma, 32; Wyoming, 62 (Federation of Tax Administrators).

²⁰Bruce, Fox and Tuttle (2006) find that the taxation of more services results in a larger long-run elasticity.

²¹Taxes on motor fuels, tobacco, insurance premiums, and alcohol comprise more than 85 percent of selective sales tax revenues in the Tenth District states.

²²Some states impose an ad valorem tax on gasoline in addition to the tax based on quantity. This does not apply to any state in the Tenth District. This is one factor that may lead to a higher volatility in the U.S. than in the Tenth District for selective sales taxes.

²³Dye and McGuire (1991) find that tax revenues from the highest income levels grow at the fastest pace and are least stable.

²⁴Estimates of the growth and volatility of corporate tax revenues have controlled for changes in the highest marginal corporate tax rate. However, corporate tax structures are complex and thus the regressions did not control for changes in the structure.

²⁵New Mexico is an exception in the Tenth District. Its highest bracket starts at \$1 million.

²⁶The small collections of Missouri and Nebraska make it difficult to interpret the long-run and short-run elasticities for these states.

²⁷Ad valorem taxes are assessed as a percentage of the price of a good.

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