Comparing State Fiscal Policies: What Do Local Governments Receive from Oil and natural Gas Production Taxes?
Data Sources and Methods
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This document describes the data and methods used to generate the interactive data tool: "What Do Local Governments Receive from Oil and Gas Production Taxes?"

Why Is Oil and Gas Fiscal Policy Important?

Horizontal drilling and hydraulic fracturing technologies—or "fracking"—have led a resurgence in oil and natural gas production in the U.S. sometimes referred to as the "shale revolution." The revolution reshaped domestic energy markets as suddenly plentiful and cheap natural gas displaced coal as the leading fuel in U.S. power generation. Shale oil similarly reshaped global oil markets contributing to plummeting prices and a significant bust in oil producing states.

This new energy development can and ought to generate long-term benefits for communities where drilling occurs. As a general rule, however, wealth from energy resources has rarely translated into a long- term economic advantage for energy dependent communities, in part due to the challenges of managing booms and busts in drilling activity and related impacts and volatile revenue.

The challenges associated with booms and busts are heighted in the shale era. Horizontal drilling and hydraulic fracturing technologies require many wells to be drilled on a continuous basis to maintain production. This expands potential employment, income, and tax benefits, but also increases public costs.

The largest benefit of energy extraction is fiscal. Yet energy fiscal policies at the state level are failing in fundamental ways to manage volatility and provide lasting benefits. State policies often don't deliver revenue in the time, location, and amount required to facilitate drilling booms, and can increase (rather than moderate) revenue volatility over time.

The interactive compares state fiscal policies specific to unconventional oil and gas across major producing states. The comparison highlights how states return oil and natural gas revenue to local governments and what states do to stabilize government revenue and secure lasting economic and fiscal benefits.

Best practices include:

- Fiscal policy should mitigate acute and legacy impacts of oil and gas booms by ensuring tax revenue is available in the right amount, time, and location to manage development and related population growth. Communities should develop monitoring and mitigation plans.
- Manage revenue volatility by avoiding tax incentives that add to revenue uncertainty, maximize investments in permanent savings funds, and avoid using oil and gas revenue to replace other more stable sources of income.
- Invest in long-term infrastructure and economic diversification by allocating revenue to capital improvement and maintenance funds, permanent savings, education, and economic diversification. By comparison, states should avoid spending oil and gas revenue on general government operations.

How Are States Selected?

The 10 states included in the interactive are selected because they currently rank among the most productive in either unconventional oil or natural gas plays in the U.S. Eight oil producing states and eight natural gas producing states are compared in the oil and natural gas interactives respectively. Some of the states are included in both.

Most shale wells completed in the U.S. produce a mix of oil, dry natural gas, and natural gas liquids (NGLs). States often tax these resources quite differently, and shale plays are often developed primarily for one or the other resource. For this reason, the interactive treats the two resources separately to illustrate how states tax the two resources. States such as Colorado, Texas, and Wyoming that have both oil and natural gas plays are included in both interactives. States such as Pennsylvania and North Dakota, where plays are developed predominantly for a single resource are included only in appropriate interactive—Pennsylvania in the natural gas interactive and North Dakota in the oil interactive respectively.

Production Volume: How Are Well Profiles Constructed?

While no two wells are identical, unconventional wells all share a typical production profile, characterized by relatively high rates of initial production followed by steep production declines. This makes it possible to construct a "typical" well profile that illustrates these shared characteristics. Each state's tax policies are applied to this typical well profile to identify the policy factors (as opposed to variations in well performance) that affect government revenue in different states.

The oil comparison uses data for an average oil well completed in Montana's Elm Coulee field, part of the Bakken formation. The natural gas comparison uses data for an average natural gas well completed in Pennsylvania's Marcellus shale play based on data from the U.S. Energy Information Administration's Annual Energy Outlook.

Production Value: What's an Unconventional Well Worth?

To estimate the value of production from each typical oil and natural gas well, we applied an average constant price for oil and natural gas over the entire ten-year production period. These prices are $45 per barrel of oil and $3 per mcf of natural gas, respectively.

Although oil and gas prices fluctuate over the lifetime of a well, affecting the cash flow and associated government revenue stream, we use constant prices to identify the policy factors (as opposed to fluctuations in price) that affect government revenue from a given production profile.

Tax Amount: How do States Tax Oil and Natural Gas Production?

Revenue from the direct production of oil and natural gas accrues to state and local governments from a variety of sources: state severance taxes, local government property (ad valorem) taxes, impact fees and regulatory fees and governmental royalties.

- **State severance taxes**: In general, a "severance tax" is a production tax levied on the value or volume of oil and natural gas extracted or "severed" from the earth. Severance taxes based on value typically levy a tax rate on the value of production at the wellhead. Severance taxes based on volume levy an indexed fee per barrel of oil or mcf of natural gas.
- **Local government property taxes**: In many states, including Colorado, Wyoming, and Texas, local governments levy property taxes on the production value of oil and natural gas. Property taxes are also called ad valorem taxes, which means "by value."

- **Impact fees and regulatory fees**: Pennsylvania is the only state in our selected plays that does not levy a severance tax. Instead, the state levies an impact fee per well, indexed to prices. Most state regulatory agencies also levy a modest fee to fund the agencies activities. These fees can either be on the value or volume of production.
- **Governmental royalties**: Royalties are production taxes paid to the owner of the resource, including federal, tribal, state, and private landowners. Federal and state royalties are common, particularly in the Western U.S. We include royalties in this analysis because royalties are often an important source of revenue for local governments. Companies also pay bonuses (a premium paid to win a leasing contract to drill in a specific area) through the competitive leasing process, and fees or rents to maintain a lease.

Production taxes, royalties and fees are levied in addition to other taxes that form the general tax structure of each state. Drilling related activity are subject to sales and income taxes in the same way these taxes apply to all economic activity in each state. Other aspects of the general tax base are not included in this analysis. While these sources can be important sources of revenue in some states, production taxes and royalties are the largest sources of revenue and are specific to oil and gas development.

For each type of production tax in each state, we estimate total revenue collections as:

*Revenue = (tax base – (deductions + exemptions)) * (base tax rate – (tax incentives + tax exemptions))*

Where the variables are defined as:

TAX BASE

Methods: The tax base is typically production value or production volume at the wellhead.

Taxes on production value are most common. Production value is volume times price. Because the resource is often sold at a point downstream from the wellhead (at a pipeline hub or to a consumer including refineries), transportation and processing costs between the wellhead and the point of sale are often deductible from the first market price. Some production is also exempt from the tax base. Many state severance tax policies exempt the royalty interest in production and resources used on site are also often exempt—for example, natural gas extracted from the well that is used to power equipment at the well site.

Volumetric taxes are more typically applied to natural gas, most commonly as a per-mcf levy on the total volume of natural gas extracted. Some state conservation fees are also based on a per-barrel or per-mcf basis.

In some states, local governments define the taxable value of oil for property tax purposes as the value of reserves in the ground, not based on production as it occurs. The so-called income approach applies local property tax levies on the expected value of production over the life of the reserve. For example, local property taxes in Texas are based on the income approach.

Pennsylvania applies an impact fee that is based on the productivity of the well, and is indexed to prices.

BASE TAX RATE

Generally, states apply a single tax rate for each specific production tax. However, base tax rates can vary with price (North Dakota), the income of the producer (Colorado), and for the working and non-working production interests in each well (Montana). For property taxes, the tax rate varies across each jurisdiction based on local mill levies. To estimate revenue derived from property taxes we apply the average mills

levied by county governments and school districts that have significant unconventional oil production. For taxes based on indexed prices, the tax rate can be calculated as the effective rate, or the indexed tax per unit divided by the price of the resource at the wellhead.

Tax Incentives and Deductions

Tax incentives provide for rate reductions for a variety of purposes, with the intention of inducing more drilling activity and production, promoting adoption of new technology, or encouraging conservation measures. The largest incentives specific to unconventional production include reductions in tax rates on newly completed horizontal wells for a defined period of time or until costs are recovered (sometimes called "tax holiday" incentives). Incentives in some states are only active when prices fall below established price thresholds (North Dakota), while other states provide for permanent incentives without regard to price (Montana).

Tax Exemptions

Exemptions typically include lower rates or no tax requirement for production from "stripper wells," defined as wells producing less than a threshold amount of oil. Wyoming does not exempt stripper wells, while the most generous exemption is in North Dakota where stripper wells are defined as wells producing less than 30 barrels per day. Exemptions can also be tied to price thresholds (Montana).

States have various other exemptions and deductions that are not applicable to new unconventional production. For example, new vertical wells, orphaned wells brought back into production, and various types of secondary and tertiary production all receive various exemptions and deductions. This comparison is focused specifically on new horizontally completed wells, so these aspects of state policies are not considered here, but may warrant additional attention as secondary production becomes more important in unconventional plays.

A detailed discussion of the tax policies used in the interactives are available in this series of reports:

Comparing Cumulative Tax Revenue

The interactive displays tax collections as a "curve" that shows the amount of revenue collected by each type of production tax, and the timing of collections based on five years of production from unconventional wells in each state.

Tax Amount: Timing of Revenue Collections

In general, state severance taxes are collected on a monthly basis. However, some states collected severance taxes quarterly (Montana) or annually (Colorado). By comparison, local government property taxes are based on annual assessments, with tax assessments and collections occurring in the following year. As a result, local government property tax collections lag production typically by two years.

During booms, communities must expand services, maintain and build new infrastructure to mitigate impacts and meet new demand as people move to producing regions to fill jobs. There is an inherent lag between when impacts occur (when drilling and well completion take place) and when tax revenue is available (only after production begins). The structure of tax policies can further delay revenue from arriving where and when it is needed. This lag can exacerbate the acute impacts associated with booms with some impacts going unaddressed and imposing higher costs and risks if communities borrow against future revenue to fund necessary infrastructure and services.

Distribution: State Revenue Distribution Policy

In general, state distribution polices treat every dollar of revenue in exactly the same way. However, in some cases, additional dollars of revenue are allocated in new ways. Allocating revenue in states that fall in the first category using strict proportional distribution systems is straightforward. The revenue generated from each well, regardless of its productivity or when it is drilled, is allocated in exactly the same way based on the allocation formula.

In states that change allocations as additional revenue is collected, it is impossible to know exactly where revenue from any single well ends up. Instead, we summarize how cumulative revenue collections over an entire tax period (fiscal year or biennium) are distributed. The total annual distributions are illustrated in the context of a single well by assuming that revenue from the average well would be distributed in the same way.

To simplify comparisons between states, we group distributions into four basic categories: state share, local share, permanent savings, and tax expenditures.

STATE SHARE

State share is any production tax revenue collected and retained by the state government for any governmental purpose. Many states deposit a share of production tax revenue into the General Fund, or allocate revenue to a variety of state agencies and purposes.

LOCAL SHARE

Local share is any revenue received by local governments, including direct property tax collections at the local level, direct distributions from state production tax collections, and impact grant programs funded with production tax revenue. It does not include state assistance that may be provided from other sources of governmental revenue.

PERMANENT SAVINGS

Permanent savings include allocations made to trust funds that have constitutionally or legislatively protected principal. A number of states have severance tax trust funds, or invest a share of production tax revenue into existing funds established for budget stabilization, school funding, or other purposes.

TAX EXPENDITURES

Tax expenditures are defined as the value of production tax incentives and tax relief funded with production tax revenue.

Best Practices

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ABOUT HEADWATERS ECONOMICS

Headwaters Economics is an independent, nonprofit research group whose mission is to improve community development and land management decisions in the West.
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